Dr. Ambedkar Institute of technology, Bengaluru-56

Department of Civil Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. S.Vijaya

Department of Civil engineering

Professor and Head
Department of civil Engineering
Dr. Ambedkar Institute of Technology
Bangalore - 560 056

NAAC CO-ORDINATORS:

MARY BHAGYA JYOTHI.T, Asst Professor

Dr K Hemanth Kumar, Asst Professor

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Outcome Based Education(OBE) and Choice Based Credit System (CBCS) (As per NEP2020)

Scheme of Teaching and Examination for I /II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle: I/II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Linear Algebra	Mathematics	3	2	0	0	5	3	50	50	100	4
		21MAT201	Advanced Calculus and Numerical methods											
2	BS	21CHT102/ 21CHT202	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST103/ 21CST203	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT104/ 21ECT204	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET105/ 21MET205	Elements of Mechanical Engineering	Mechanical	2	2	0	0	4	3	50	50	100	3
6	BS	21CHL106/ 21CHL206	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL107/ 21CSL207	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
		21HST208	Professional writing skills in English											
9	AE	21CVT109	Rural Development	Civil	1	0	1*	0	2	2	50	50	100	1
		21HST209	Health and Wellness	Humanities										
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
		21HSN210	Career Development skill-II											
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course, HS: Humanities & Social Science Course, AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Note –At the end of the second-semester summer internship shall be carried out – based on inter/intra institutional activities credited in the third semester. University /Institutions may swap few courses between a FIRST and SECOND semester to balance the workload teaching and laboratory schedule

Summer Internship - I: All the students admitted shall have to undergo a mandatory summer internship of 03 weeks during the vacation of II semesters. Summer Internship shall include Inter / Intra Institutional activities. Internship A University Viva-voce examination shall be conducted during III semesters and the prescribed credit shall be included in III semesters. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements

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UG - 2021 - 2022

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Outcome Based Education(OBE) and Choice Based Credit System (CBCS) (As per NEP2020)

Scheme of Teaching and Examination for I /II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle : I/II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101 / 21MAT201	Calculus and Linear Algebra / Advanced Calculus and Numerical methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT102/ 21PHT202	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET103/ 21EET203	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT104/ 21CVT204	Elements of Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MED105/ 21MED205	Computer aided Engineering Drawing	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL106/ 21PHL206	Engineering Physics Lab	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL107/ 21EEL207	Basic Electrical lab	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108 / 21HST208	Communicative English / Professional writing skills in English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST109 / 21CVT209	Health and Wellness / Rural Development	Humanities / Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110 / 21HSN210	Career Development skill-I / Career Development skill-II	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
				Total					29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course, HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

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Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)

Name of the Programme: **B. E. (CIVIL ENGINEERING)**

Scheme of Teaching and Examination Effective from the Academic Year: 2021 – 2022

III Semester

Sl No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours / Week					Examinations				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BSC	21MAT301CV	Mathematics - III	Maths	3	0	0	0	3	03	50	50	100	3
2	IPCC	21CVT302	Strength of Materials	Civil	3	0	2	0	5	03	50	50	100	4
3	IPCC	21CVT303	Surveying	Civil	3	0	2	0	5	03	50	50	100	4
4	PCC	21CVT304	Geology and Construction Materials	Civil	3	0	0	0	3	03	50	50	100	3
5	PCC	21CVL305	Construction Materials Lab	Civil	0	0	2	0	2	03	50	50	100	1
6	UHV	21HST306	Social Connect and Responsibility	Civil	0	0	1	0	1	01	50	50	100	1
7	HSSC	21HST3S07 / 21HST3B07	Samskrutika Kannada / Balake Kannada	HSS	1	0	0	1	2	01	50	50	100	1
		OR												
		21HST307	Constitution of India & Professional Ethics (CIP)											
8	AEC	21CVT308X	Ability Enhancement Course – III	Civil	If offered as Theory Course: 1	0	0	0	1	01	50	50	100	1
					If offered as Lab Course: 0	0	2	0	2	02				
9	HSSC	21HSN309	Professional Skills	HSS	1	0	1	0		02	50		PP/NP	0
										Total	**400**	**400**	**800**	**18**

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10	Scheduled activities for III to VIII Semester	21HSNS803	National Service Scheme (NSS)	NSS	All students have to register for any one of the courses namely National Service Scheme, Physical Education (PE) (Sports and Athletics), and Yoga with the concerned coordinator of the course during the first week of III semester. The activities shall be carried out between III semesters to VIII semester (for 5 semesters). SEE in the above courses shall be conducted during VIII semester examinations and the accumulated CIE marks shall be added to the SEE marks. Successful completion of the registered course is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities.
		21HSN803	Physical Education (PE) (Sports and Athletics)	PE	
		21HSN803	Yoga	Yoga	

Course prescribed to lateral entry Diploma holders admitted to III semester B.E. programs

11	**21MAD310**	**Additional Mathematics - I**	**Mathematics**	**02**	**02**	**---**	**---**	**---**	**50**	**---**	**50**	**PP/NP**

Note:

BSC: Basic Science Course, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **INT**: Internship, **HSSC:** Humanity and Social Science Courses, **AEC**: Ability Enhancement Courses, **UHV:** Universal Human Value Course.

L–Lecture, **T**–Tutorial, **P**-Practical/Drawing, **S**–Self Study Component, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Examination.

TD-Teaching Department, **PSB**: Paper Setting department.

21HST3S07/4S07 Samskrutika Kannada is for students who speak, read and write Kannada and 21HST3B07/21HST4B07 Balake Kannada is for non-Kannada speaking, reading, and writing students.

Integrated Professional Core Course (IPCC):

Refers to Professional Theory Core Course Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3:0:2) or (2:2:2).The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be Inciuded in these question paper.

21CVI410 Inter/Intra Institutional Internship:

All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory **21CVI410** Inter/Intra Institutional Internship of **03 weeks** during the intervening period of III and IV semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up /complete the internship shall be declared fail and shall have to complete subsequently after satisfying the internship requirements. The faculty coordinator or mentor shall monitor the students 'internship progress and interact with them for the successful completion of the internship.

Non–credit mandatory courses (NCMC):

(A) Additional Mathematics I and II:

(1) These courses are prescribed for III and IV semesters respectively to lateral entry Diploma holders admitted to III semester of B.E./B.Tech. Programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal

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Evaluation (CIE): In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

(2) Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

(3) Successful completion of the courses Additional Mathematics I and II shall be indicated as **NP/PP** in the grade card. Non-completion of the courses Additional Mathematics I and II shall be indicated as unsatisfactory.

(B)Placement Training: These courses are prescribed for I and VI semesters respectively to the students of B.E. programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an **NP (not pass)** grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

National Service Scheme / Physical Education (Sport and Athletics) / Yoga:

(1) Securing 40% or more in CIE, 35% or more marks in SEE and 40% or more in the sum total of CIE + SEE leads to successful completion of the registered course.

(2) In case, students fail to secure35%marks in SEE, they have to appear for SEE during the subsequent examinations conducted by the University.

(3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the requirements of the course. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks.

(4) Successful completion of the course shall be indicated as satisfactory in the grade card. Non-completion of the course shall be indicated as Unsatisfactory.

(5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of a degree.

Ability Enhancement Course - III	
21CVT3081	Photogrammetry and Remote Sensing
21CVT3082	Sustainable Materials and Green Buildings
21CVT3083	Fire safety in Buildings
21CVT3084	Pavement Materials and Construction

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Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (Asper NEP 2020)

Name of the Programme: **B. E. (CIVIL ENGINEERING)**

Scheme of Teaching and Examination Effective from the Academic Year: 2021 – 2022

IV Semester

Sl No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours / Week					Examinations				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BSC	21MAT401CV	Mathematics - IV	Mathematics	3	0	0	0	3	03	50	50	100	3
2	IPCC	21CVT402	Water Supply and Sanitary Engineering	Civil	3	0	2	0	5	03	50	50	100	4
3	IPCC	21CVT403	Fluid Mechanics and Machinery	Civil	3	0	2	0	5	03	50	50	100	4
4	PCC	21CVT404	Structural Analysis	Civil	3	0	0	0	3	03	50	50	100	3
5	PCC	21CVL405	Computer Aided Building Planning and Drawing	Civil	0	0	2	0	2	03	50	50	100	1
6	AEC	21HST406	Biology for Engineers	ML	2	0	0	0	2	02	50	50	100	2
7	HSSC	21HST4S07 / 21HST4B07	Samskrutika Kannada / Balake Kannada	HSS	1	0	0	0	2	01	50	50	100	1
		OR												
		21HST407	Constitution of India & Professional Ethics (CIP)											
8	AEC	21CVT408X	Ability Enhancement Course - IV	Civil	If offered as Theory Course: 1 0 0 0				1	01	50	50	100	1
					If offered as Lab Course: 0 0 2 0				2	02				
9	HSSC	21HSN411	Professional Skills	HSS	1	0	1	0	2	02	50	---	PP/NP	0
10	UHV	21HST409	Universal Human Values	Civil	1	0	0	0	1	01	50	50	100	1
11	INT	21CVI410	Inter / Intra Institutional Internship	Evaluation by the	Completed during the intervening period of II and III semesters by students					03	50		100	2

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				appropriate authorities	admitted to first year of B.E. and during the intervening period III and IV semesters by Lateral entry students admitted to III Semester.								
									Total	550	450	1000	22
Course prescribed to lateral entry Diploma holders admitted to III semester B.E programs													
12		21MAD411	**Additional Mathematics - I**	**Maths**	**2**	**2**	**---**	**----**	**----**	**100**	**PP/NP**	**100**	**0**

Note:
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HSSC: Humanity and Social Science Courses, **UHV**: Universal Human Value Courses.
L–Lecture, **T**–Tutorial, **P** - Practical/Drawing, **S**–Self Study Component, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Examination.

21HST3S07/4S07 Samskrutika Kannada is for students who speak, read and write Kannada and
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Integrated Professional Core Course (IPCC):
Refers to Professional Theory Core Course Integrated with Practical of the same course.
Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3:0:2) or (2:2:2).
The theory part of the IPCC shall be evaluated both by CIE and SEE.
The practical part shall be evaluated by only CIE (no SEE).
However, questions from the practical part of IPCC shall be included in the SEE question paper.

Non–credit mandatory course(NCMC):
(A)Additional Mathematics –II:
(1) Lateral entry Diploma holders admitted to III semester of B.E./B.Tech.., shall attend the classes during the IV semester to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.
(2) Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.
(3) Successful completion of the course Additional Mathematics-II shall be indicated as satisfactory in the grade card. Non-completion of the courses Additional Mathematics-II shall be indicated as Unsatisfactory.
(B)Placement Training: These courses are prescribed for I and VI semesters respectively to the students of all B.E. programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured

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an 'NP' (not pass) grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

Internship of 04 weeks during the intervening period of IV and V semesters;
21CVI410 Innovation/Entrepreneurship/Societal based Internship.

(1) All the students shall have to undergo a mandatory internship of **04 weeks** during the intervening period of IV and V semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the VI semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up /complete the internship shall be considered under F (fail) grade and shall have to complete during subsequently after satisfying the internship requirements

(2) Innovation/ Entrepreneurship Internship shall be carried out at industry, State and Central Government /Non-government organizations (NGOs), micro, small and medium enterprises (MSME), Innovation centers, or Incubation centers. Innovation need not be a single major breakthrough; it can also be a series of small or incremental changes. Innovation of any kind can also happen outside of the business world.

Entrepreneurship internships offer a chance to gain hands-on experience in the world of entrepreneurship and help to learn what it takes to run a small entrepreneurial business by performing intern duties with an established company. This experience can then be applied to future business endeavors. Start-ups and small companies are a preferred place to learn the business tactics for future entrepreneurs as learning how a small business operates will serve the intern well when he/she manages his/her own company. Entrepreneurship acts as a catalyst to open the minds to creativity and innovation. Entrepreneurship internships can be from several sectors, including technology, small and medium-sized, and the service sector.

(3) **Societal or social internship:** Urbanization is increasing on a global scale; and yet, half the world's population still resides in rural areas and is devoid of many things that urban population enjoys. The rural internship is a work-based activity in which students will have a chance to solve/reduce the problems of the rural place for better living.

Ability Enhancement Course – IV	
21CVT4081	Construction Methods and Equipment
21CVT4082	Soil and Water Conservation Engineering
21CVT4083	Ecology and Environment
21CVT4084	Cartography and GIS Concepts

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2021-2022

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Course Title	**Civil Engineering and Mechanics**						
Course Code	**21CVT104 / 204**						
Category	**Engineering Science Course (ESC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	3	**0**	**0**	**0**	**3**	**39**	**3**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Objectives:	
1	Students will be exposed to apply the knowledge of the principles of mechanics in various fields of Engineering curricula and develop analytical ability and powers of reasoning.
2	To become conversant with basic concepts of equilibrium with reference to support reactions and friction.
3	To understand the significance of centroid and moment of inertia and to determine the coordinates of the centroid and moment of inertia of the composite sections.
4	To familiarize with laws of motion, kinematics of motion and their inter relationships.

Unit No.	Syllabus	No. of hours
I	**Basics of Civil Engineering** **Introduction to Civil Engineering:** Scope of different fields of Civil Engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering. **Infrastructure:** Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country. **Roads:** Types of roads, components and their function. **Bridges and Dams:** Different types with simple sketches. **Self-study:** Case study of infrastructural development of a region, types of roads, bridges and dams.	**07**
II	**Fundamental principles of mechanics:** Introduction, basic principles and concepts of mechanics, laws of mechanics, idealization of mechanics **Basic principles of statics:** Force and its characteristics, equivalent system of forces, principles of transmissibility of a force, systems of forces, resultant of coplanar concurrent forces, component of a force, moment of a force with respect to a point, principles of moments (Varignon's theorem), Couples, effects of a force at another point, equations of static equilibrium, free body diagram. **Co-planar forces (forces in a plane):** Resultant of co-planar concurrent forces, equilibrium of co-planar concurrent forces and Numerical problems. **Co-planar non concurrent force system:** Resultant of co-planar non-concurrent forces, equilibrium of coplanar non concurrent forces and Numerical problems.	**10**
III	**Support Reactions:** Introduction, Beam, Classification of beams, types of loads and supports, support reactions in statically determinate beams - Numerical problems. **Friction:** Introduction, laws of dry friction, limiting friction, co-efficient of friction, angle of friction, angle of repose and cone of friction. Numerical problems on Blocks (horizontal and inclined plane), Ladder friction and Wedge friction.	**07**

IV	**Centroid:** Introduction, centroid and centre of gravity. Derivations of simple geometrical sections – rectangle, triangle, semicircle and quarter circle. Numerical problems on composite sections. **Moment of Inertia:** Introduction, Moments of Inertia of an area, Parallel axis theorem, Perpendicular axis theorem, Radius of gyration, Polar moments of inertia. Derivations of simple geometrical sections – Rectangle, Triangle, Circle, Semicircle and Quarter circle. Numerical problems on composite sections.	**08**
V	**Basic Principles of Dynamics:** Introduction, kinematics and kinetics, Definitions of Displacement, Speed, Velocity and Acceleration. D' Alembert's principle with Numerical problems. Newton's Laws of motion. Rectilinear motion with simple-numerical problems Differential relationship between displacement, velocity and accelerations. Projectile with numerical problems.	**07**

Course Outcomes: The students will be able to	
1	Discuss the basics of Civil Engineering, Concept of Engineering Mechanics, Forces and Force Systems to determine the resultant.
2	Define the effect of forces on the bodies in respect of its contact surfaces and the reactions developed in the system.
3	Identify the geometrical properties like, coordinates of the centroid and Moment of Inertia of regular, irregular and built-up sections.
4	Illustrate the kinetics, kinematics and rectilinear motion of a body with numerical approach.

Suggested Text Book(s):	
1	Irving H Shames, Engineering Mechanics, Prentice Hall.
2	F P Beer and E R Johnson, Vector Mechanics for Engineers, Vol-II-Dynamics, Tata McGraw Hill.
3	Engineering Mechanics by Timoshenko-Young and J V Rao, Mc Graw-Hills Book Company, New Delhi.
4	Elements of Civil Engineering (IV Edition) by S S Bhavikatti, Vikas Publishing House Pvt. Ltd. New Delhi.
5	Elements of Civil Engineering and Engineering Mechanics, by M N Shesha Prakash and G V Mogaveer, PHI Learning 2014.

Suggested Reference Book(s):	
1	R C Hibler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2	Endy Ruina and Rudraprathap, Introduction to Statics and Dynamics, Oxford University Press.
3	Shanes and Rao, Engineering Mechanics, Pearson Education.
4	Bansal R J, Text Book of Engineering Mechanics, Likshmi Publications.
5	Engineering Mechanics by M V S Rao and D R Durgaiah, University Press 2005.

Other useful e-resources:
https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8 PpwT https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8P pwT&index=2 https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5 https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8Pp wT&index=18 https://www.youtube.com/watch?v=3YBXteL-qY4 https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8P pwT&index=10 https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8Pp wT&index=7 https://www.youtube.com/watch?v=atoP5_DeTPE https://www.youtube.com/watch?v=ksmsp9OzAsI https://www.youtube.com/watch?v=x1ef048b3CE

https://www.youtube.com/watch?v=l_Nck-X49qc
https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
https://www.youtube.com/watch?v=RIBeeW1DSZg
https://www.youtube.com/watch?v=R8wKV0UQtlo
https://www.youtube.com/watch?v=0RZHHgL8m_A
https://www.youtube.com/watch?v=Bls5KnQOWkY 4 JBOS 18.10.2021 / EC 30.10.2021 Activity-

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:

https://www.youtube.com/watch?v=Zrc_gB1YYS0
https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc
https://www.youtube.com/watch?v=Hn_iozUo9m4
https://play.google.com/store/apps/details?id=com.teobou
https://www.youtube.com/watch?v=WOHRp3V-QA0

Theory Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO & PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓										✓
CO3	✓	✓										✓
CO4	✓	✓		✓								✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**Rural Development Engineering**						
Course Code	**21CVT109 / 209**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**13**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

Course Objectives:	
1	Describe the scope of Rural Development Planning and Concept of Appropriate Technology and implementation of various national policies.
2	Understand the need and concept of low-cost construction materials for individual and group housing;
3	Illustrate the concept of Water Supply and Rural Sanitation.
4	Interpret the concept of rural transport system and issues related to it.
5	Summarize the need of effective Watershed and catchments area development methods and problems relating to watershed management, watershed structures

Unit No.	Syllabus	No. of hours
I	**Rural Development Planning and Concept of Appropriate Technology**: Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development program / projects.	**03**
II	**Rural Housing:** Low-cost construction materials for housing; Composite material - ferro-cement & fly ash, soil-stabilized un-burnt brick; Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry; rat-trap bond for walls; Panels for roof, ferro-cement flooring / roofing units.	**03**
III	**Rural Water Supply and Sanitation:** Sources of water. BIS and WHO water standards. Quality, Storage and distribution for rural water supply works; low-cost water treatment technologies; conservation of water; rainwater harvesting; drainage in rural areas, septic tank; low-cost community & individual Garbage disposal systems	**03**
IV	**Rural Transportation System:** Categories of Pavement Layers, Types of roads, Surface Treatments for roads in rural areas. Soil Stabilization, Lime, Lime Fly ash and Cement Treated Course.	**03**
V	**Irrigation Techniques:** Consideration of low-cost irrigation techniques, drip & sprinkler irrigation systems. Watershed and catchments area development - problems and features of watershed management, watershed structures	**03**

Course Outcomes: The students will be able to	
1	Describe the scope of Rural Development Planning and Concept of Appropriate Technology and implementation of various national policies.
2	Understand the need and concept of low-cost construction materials for individual and group housing.
3	Illustrate the concept of Water Supply and Rural Sanitation.
4	Interpret the concept of rural transport system and issues related to it.
5	Summarize the need of effective Watershed and catchments area development methods and problems relating to watershed management, watershed structures

Suggested Text Book(s):	
1	Rural Development by Katar Singh, SAGE Publication
2	A.G.Madhov Rao, D.S.Ramachandra Murthy, Appropriate Technologies for low cost Housing Oxford and IBH Publishing Co. Pvt .Ltd.

Suggested Reference Book(s):	
1	Rural Infrastructure by P.Nair, SBS Publication
2	Rural Infrastructure by Samalia Bihari Verma, Gyaneshwar Prasad & Sahib Kumari Singh, Sarup & Sons.
3	C. Satyanarayana Murthy, Design of Minor Irrigation and Canal Structures. Wiley Eastern Ltd.,
4	Document on Rural Road Development in India Volume1& 2; Central Road Research Institute, New Delhi.

Other useful e-resources:
https://www.youtube.com/watch?v=8N7ckN-O3yA https://www.youtube.com/watch?v=LXgyAfnBgWo https://www.youtube.com/watch?v=1Q188bq6U8Y https://www.youtube.com/watch?v=Y3giIjR6qTM https://www.youtube.com/watch?v=rfRVX9DdNVA https://www.youtube.com/watch?v=yO-AYyPa_Rk

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
https://www.youtube.com/watch?v=IdBemHBN7xQ https://www.youtube.com/watch?v=rsg_GXldFmQ

Theory Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. The students will have to answer five full questions, selecting one full question from each unit.

CO & PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓	✓					
CO2							✓					
CO3			✓				✓					✓
CO4							✓					
CO5					✓		✓					✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**STRENGTH OF MATERIALS**						
Course Code	**21CVT302**						
Category	**Integrated Professional Core Course (IPCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	3	**0**	**2**	**0**	**5**	**50**	**4**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Objectives:	
1	Understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2	Interpret different internal forces and stresses induced due to representative loads on structural elements.
3	Determine slope and deflections of beams.
4	Evaluate the behavior of torsion members, columns and struts.

Unit No.	Syllabus	No. of hours
I	**SIMPLE STRESS AND STRAIN:** Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress – Strain Diagram for structural steel and non-ferrous materials, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections.	**08**
II	**SIMPLE STRESS AND STRAIN (CONTINUED):** Elongation member due to self– weight, Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Thermal stresses (including thermal stresses in compound bars).	**08**
III	**BENDING MOMENT AND SHEAR FORCE IN BEAMS:** Introduction, Types of beams loadings and supports, Shearing force in beam, Bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering point loads, UDL, UVL and Couple, Point of contra-flexure.	**08**
IV	**BENDING STRESS AND SHEAR STRESS IN BEAMS:** Introduction – Bending stress in beam, Assumptions in simple bending theory, Pure bending derivation of Bernoulli's equation, Modulus of rupture, section modulus, Flexural rigidity, Expression for shear stress in beam, Shear stress diagram for rectangular, symmetrical 'I' and 'T' section (Flitched beams not included). **DEFLECTION OF BEAMS:**	**08**

	Introduction – Definitions of slope, deflection, Elastic curve-derivation of differential equation of flexure, Sign convention, Slope and deflection for standard loading classes using Macaulay's method for prismatic beams and overhanging beams subjected to point loads, UDL and Couple.	
V	**TORSION OF CIRCULAR SHAFTS:** Introduction – Pure torsion-Torsion equation of circular shafts, Strength and stiffness, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections. **ELASTIC STABILITY OF COLUMNS:** Introduction – Short and long columns, Euler's theory on columns, Effective length slenderness ration, radius of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems.	**08**

Expt. No	LABORATORY EXPERIMENTS:	No. of sessions
1	Shear Test on Mild steel.	**10**
2	Impact test on Mild Steel (Charpy and Izod).	
3	Hardness tests on ferrous and non-ferrous metals – Brinell's method	
4	Hardness tests on ferrous and non-ferrous metals – Rockwell method	
5	Hardness tests on ferrous and non-ferrous metals – Vicker's method	
6	Tension test on Mild steel and HYSD bars.	
7	Compression test of Mild Steel and Cast iron.	
8	Torsion test on Mild Steel circular sections.	
9	Bending Test on Wood Under two point loading.	
10	Test on helical spring - compression (Demo)	

Course Outcomes: At the end of the course the student will be able to:	
1	Understand the basic principles of internal stress distribution, deflection and their causes in beams.
2	Study the behaviour of beams and columns under different loading conditions.
3	Solve the problems under various loadings and boundary conditions on beams and columns.

Teaching Learning Process: These are sample Strategies, which the teacher can use to accelerate the attainment of the various course outcomes.	
1	Power point Presentation, Video.
2	Video tube, NPTEL materials.
3	Quiz/Assignments/Open book test to develop skills.
4	Adopt problem based learning (PBL) to develop analytical and thinking skills.
5	Encourage collaborative learning in the class with site visits related to the subject and impart practical knowledge.

Text Book(s):	
1	Strength of Materials, R K Bansal, Lakshmi Publications (P) Ltd., 6th Edition.
2	Strength of Materials, S Ramamrutham, Dhanpath Rai, Publishing Co, 20th Edition.
3	Strength of Materials, Bhavikatti S S, Vikas Publishing house (P) Ltd, 5th Edition

Reference Book(s):	
1	Elements of Strength of Materials, Timoshenko and Young Affiliated East-West Press, 3rd Edition.
2	Strength of Materials, R Subramanyam, Oxford University Press, 3rd Edition.
3	Strength of Materials, B C Punmia, Ashok Jain, Arun Jain, Lakshmi Publications (P) Ltd, 10th Edition.

Web links and Resources:	
1	Strength of Materials web course by IIT Roorkee https://nptel.ac.in/courses/112107146/
2	Strength of Materials video course by IIT Kharagpur https://nptel.ac.in/courses/105105108/
3	Strength of Materials video course by IIT Roorkee https://nptel.ac.in/courses/112107147/18

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
Seminars / Quiz (to assist in GATE preparations). Demonstrations in the lab. Self-Study on simple topics. Virtual lab experiments.

Process of Ascertaining (both CIE and SEE):
50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE). A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (36 Marks out of 100) in the semester End examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together. **Continuous Internal Evaluation (CIE):** Two Tests each of **20 Marks (duration 01 hour**) has been conducted in each semester. First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester. The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason. Two assignments each of **05 Marks (taken average at the end)** First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester. Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**) CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the COs and POs and PSOs. At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks.

(For each CIE, the portion of the syllabus should not be common / repeated). **CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							✓
CO2	✓	✓			✓							✓
CO3	✓		✓				✓			✓		✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**SURVEYING**						
Course Code	**21CVT303**						
Category	**Integrated Professional Core Course (IPCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	3	**0**	**2**	**0**	**5**	**50**	**4**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Objectives:	
1	Provide basic knowledge about principles of surveying for location, design and construction of civil engineering projects
2	Develop skills for using surveying instruments including, levelling instruments, plane tables, theodolite, compass
3	To familiarize in acquiring surveying data and applying fundamental concepts to eliminate errors and set out the works
4	Expose to new technologies which are used for abstracting the information of earth Surface

Unit No.	Syllabus	No. of Hours
I	**Introduction to Surveying:** Importance of surveying in Civil Engineering, Concepts of plane and geodetic surveying Principles of surveying –Plans and maps – Surveying equipment, Meridians, Bearings, Dip, Declination, Local attraction, Calculation of bearings and included angles.	**07**
II	**Compass surveying:** Introduction**,** Prismatic and surveyor's compasses, temporary adjustments. **Areas and volumes:** Measurement of area – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpsons one third rule, area from co-ordinates, introduction to planimeter, digital planimeter. Measurement of volumes-trapezoidal and Prismoidal formula	**07**
III	**Levelling:** Principles and basic definitions, Types of Levels, Types of adjustments and objectives, Types of levelling, Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning, Booking of levels – Rise & fall and H. I methods **Contouring:** Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours.	**08**
IV	**Curve Surveying:** Curves – Necessity – Types, Simple curves, Elements, Designation of curves, setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (numerical	**09**

	problems). Compound curves, Elements, Design of compound curves, Setting out of compound curves (numerical problems). Reverse curve between two parallel straights (numerical problems on Equal radius and unequal radius).	
V	**Total Station Survey:** Concept of latitude & departure, calculation of latitude-longitude of a closed traverse (simple analytical problem) dependent & independent coordinate, closing error balancing of a traverse by Bowditch's method & transit method (no analytical problems), adjustments. **Global Positioning System**: Definition, Principles of GPS, DGPS and its applications. Methods of processing GPS, DGPS data, A Concepts of rapid, static methods with GPS, DGPS - semi-Kinematic, pure Kinematic and Real time kinematic methods – Applications and Case studies. **UAV surveying:** Definitions of UAV, RPA, Quad copters -Basic Components and Categories – Applications, Principles of Flight Planning, Mapping and Surveying, Comparison with other aerial vehicles, Case Studies: Agriculture Weed Classification, Land use and Land cover, Microdrone surveillances	**09**

Expt. No	LABORATORY EXPERIMENTS:	No. of Sessions
1	To set regular geometric figure (Pentagon) and to find the distance between two inaccessible points, using chain, tape and prismatic compass.	**10**
2	To find the distance between two inaccessible points shown in the field using Theodolite.	
3	To determine the difference in elevation between various points by differential levelling using Auto level and Total Station.	
4	To find the true difference in elevation between various points by profile levelling and cross-section method using Total Station	
5	To establish contour of a given area by Block leveling using Total station	
6	To establish simple circular curve using Rankine's deflection method using Total station	
7	To set out a compound curve using Deflection angle method using Total station	
8	Convert, Extract, overlaying analysis of given data(exp no 3-no 7) using Q-GIS software	
9	Georeferencing and Digitization of a given toposheet using Q-GIS Software.	
10	Demo: GPS,DGPS and UAV/Drone	

Course Outcomes: At the end of the course the student will be able to	
1	Execute survey using Optical Survey Instruments and EDM
2	Find the level of ground surface and Calculation of area and volumes
3	Operate GPS, UAV For Field Execution
4	Preparation & digitization of different topography map with the help of GIS software

Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations, YouTube videos.

Suggested Text Book(s):	
1	Surveying By B. C. Punmia, Ashok Kumar Jain, Arun Kuma Jain, lakshmi publication, Vol. 1, 2 & 3.
2	Surveying and leveling, T P Kanetkar, Pune Vidyarthi Griha Prakashan
3	Surveying and Leveling – R Subramanian. Oxford University Press (2007)
4	Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning
5	Surveying Vol. I, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.

Suggested Reference Book(s):	
1	'Higher Surveying' A.M. Chandra New age international (P) Ltd
2	Fundamentals of Surveying - S.K. Roy – Prentice Hall of India
3	Text Book of Surveying – C. Venkataramiah. Universities Press. (2009 Reprint)
4	Plane and Geodetic Surveying by David Clark Vol I and II, CBS Publishers.

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
http://nptel.ac.in https://swayam.gov.in

Process of Assessment (both CIE and SEE):

50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE).

A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (36 Marks out of 100) in the semester End examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together.

Continuous Internal Evaluation (CIE):

Two Tests each of **20 Marks (duration 01 hour**) has been conducted in each semester.

First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester.

The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason.

Two assignments each of **05 Marks (taken average at the end)**

First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester.

Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**)

CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the CO^{s} and PO^{s} and PSO^{s}.

At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks.

(For each CIE, the portion of the syllabus should not be common / repeated).

CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO - PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓				✓			✓
CO2	✓	✓	✓	✓					✓			✓
CO3	✓	✓		✓	✓		✓		✓			✓
CO4	✓		✓	✓	✓	✓	✓		✓	✓		✓

Course Title	**GEOLOGY AND CONSTRUCTION MATERIALS**						
Course Code	**21CVT304**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week						
	L	T	P	SS	Total	Total Teaching Hours	Credits
	3	0	0	0	3	40	3
CIE Marks:50	**SEE Marks:50**		**Total Marks:100**		**Duration of SEE:03 Hours**		

Course Objectives:	
1	Understand the engineering properties of various materials used in civil engineering applications.
2	Learn the techniques involved in designing the components of buildings and method of construction.
3	Acquire knowledge about the different elements of the building and understanding environmentally sustainable building techniques.

Unit No.	Syllabus	No. of Hours
I	**PHYSICAL GEOLOGY:** Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils – landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics.	**08**
II	**MINEROLOGY AND PETROLOGY:** Physical properties of minerals – Quartz group, Feldspar group, Pyroxene – hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals. Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.	**08**
III	**INTRODUCTION TO BUILDING MATERIALS:** **STONES & BRICKS:** Quarrying of stones, Tests on stones, properties and uses, Deterioration and preservation of stone work, Ingredients of good brick earth, manufacturing of Bricks, classification and qualities of bricks, Test on Bricks. **CEMENT & CEMENT CONCRETE BLOCKS:** Ingredients, Manufacturing, types. **TIMBER:** Timber, classification, seasoning of timber. Defects in timber, preservation of timber, uses & their properties. Plywood, Block Board, Particle Board, Laminates.	**08**
IV	**FOUNDATION:**	**08**

	Function and requirements of a good foundation, Types of foundations, Preliminary investigation of soil, Safe Bearing Capacity of Soil, Introduction to spread, combined, strap, mat and pile foundations, Deep Foundation **MASONRY:** Classification and Joints in stone masonry, Introduction to load bearing and partition walls. Bonds in Brick work - English Bond, Flemish Bond, and Reinforced Brick Masonry, Characteristics and requirements of good brick masonry. **ARCHES:** Elements of an arch, Classification of arches, Stability of arch	
V	**DOORS, WINDOWS AND ROOFS:** Types of Doors and Windows, Types of Roofs & Roofing materials, Trusses. **STAIRS AND FORM WORK**: Requirements of good stair, Types of Stairs and, Geometrical design of RCC Dog-legged and open well stairs. Introduction to formwork and scaffolding, Formwork details for RCC Column, Beams and Floors, Shoring and under pinning. **GREEN BUILDING:** Green Design, Green Construction Methods, Energy Auditing, Green Products, Life-Cycle Assessment and Precast building, Passive Design Strategy, Carbon Footprint.	**08**

Course Outcomes:	
1	Apply geological knowledge in different civil engineering practice.
2	Acquire knowledge on stones, bricks, timber, cement, types of foundations, classification of Masonry structures, arches and their applications.
3	Understand types of doors, windows and roofs. Explain the construction of Staircase and learn damp proofing, green building concept.

Teaching - Learning Process	Chalk and talk, videos, Power Point Presentation; Group Discussions with assignments; Group Activity

Suggested Text Book(s):	
1	Building Construction, B.C Punmia, India.
2	Building Construction, Rangawala P.C. Charter Publishing House, Anand, India.
3	Building Construction, Sushil Kumar, Standard Publication and Distributors, New Delhi.
4	Chenna Kesavulu N., Textbook of Engineering Geology, Macmillan India Ltd., 2009.
5	Gokhale K.V.G.K, Principles of Engineering Geology, B.S. Publications, Hyderabad 2011.
6	Dr. Adv. Harshul Savla, Green Building: Principles & Practices
7	Parbin Singh. A, Text book of Engineering and General Geology, Katson publishing house, Ludhiana 2009.

Suggested Reference Book(s):	
1	A Text Book Building Materials, by P.G. Varghese, Prentice-Hall of India Pvt. Ltd., Publication.
2	Engineering Materials, Rangawala P.C. Charter Publishing House, Anand, India.

3	Concrete Technology – Theory and Practice, M.S. Shetty, S. Chand and Co, New Delhi, 2002.
4	Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
5	Bell F.G., Fundamentals of Engineering Geology, B.S. Publications. Hyderabad 2011.
6	Dobrin M.B, An introduction to geophysical prospecting, Tata McGraw Hill Pvt. Ltd, New Delhi, 1988

Other useful e-resources:	
1	https://www.youtube.com/watch?v=sTYao4RZck&list=PLDF5162B475DD915F&index=3
2	https://www.youtube.com/watch?v=EBiLLJAxBuU&index=2&list=PLDF5162B475DD915F

Process of Assessment (both CIE and SEE):

50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject /course by securing not less than 35% (36 Marks out of 100) in the Semester End Examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together.

Continuous Internal Evaluation (CIE):

Two Tests each of 20 Marks (duration 01 hour) has been conducted in each semester.

First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester.

The makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sports etc.) reason.

Two assignments each of 05 Marks (taken average at the end)

First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester.

Group discussion/Activities / Seminar/Quiz will be planned suitably to attain the Co^{s} and PO^{s} and PS^{o}.

At the end of the 13th week of the semester the sum of two tests, two assignments and Group discussion/Activities /Seminar/Quiz will be Scaled out of 50 marks.

(For each CIE, the portion of the syllabus should not be common/repeated).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination (SEE):

Theory SEE will be conducted by institute as per the scheduled timetable, with common question papers for the subject of duration **03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units/module. Each of the two questions under a Unit/module should have a maximum of 3 sub-questions, should have a mix of topics under the Unit/module. The students have to answer 5 full questions. Selecting one full question from each Unit/module.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓					✓	✓				✓
CO2	✓				✓		✓	✓				✓
CO3	✓				✓	✓	✓	✓				✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**CONSTRUCTION MATERIALS LABORATORY**						
Course Code	**21CVL305**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	S	Total		
	0	**0**	**2**	**0**	**2**	**26**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Learning Objectives: Make the Students to learn	
1	To analyses the bituminous material behaviour & their properties for the effectiveness of various projects.
2	To classify and select the suitable aggregate material for the infrastructural projects.
3	To impart knowledge on the various factors governing the Engineering behaviour of soils and the suitability of soils for road construction.

Sl No.	**Syllabus contents**	**Teaching Hours**
1	**Test on Coarse Aggregates:** a) Specific Gravity, water absorption test & Sieve Analysis b) Impact test c) Crushing test d) Abrasion test e) Size and shape test (Flakiness & Elongation Index, Angularity number)	**08**
2	**Test on fine Aggregates:** a) Specific Gravity b) Bulking of sand c) Sieve Analysis	**02**
3	**Test on Bitumen:** a) Specific Gravity b) Penetration c) Ductility d) Softening point e) Flash & fire f) Viscosity	**06**
4	**Test on Soil:** a) Wet sieve analysis b) CBR test c) In-situ Density test by i. Core Cutter method. ii. Sand Replacement method.	**06**
5	**Bituminous Mixes:**	**04**

	Proportioning of aggregate mixes by Rotchfutch Method, Marshall Stability Tests (Demo).	

Course Outcomes: At the end of the course the students will be able to	
1	Evaluate the characteristics of aggregates and their physical properties suitable for construction activities
2	Discuss the behavior of bituminous material with different climatic conditions and their Engineering properties
3	Assess the characteristics of soil and their physical properties suitable for construction activities

Suggested Text Book(s):	
1	Highway Material Testing Laboratory Manual by Khanna S K and Justo CEG Nemi Chand & Bros.
2	M. L. Gambhir: Concrete Manual: Dhanpat Rai & sons New – Delhi
3	Relevant IRC codes and MoRTH specifications.

Suggested References:	
1	https://morth.nic.in/sites/default/files/5-volume-5-january1998-december-2001.pdf
2	https://law.resource.org/pub/in/bis/irc/mort.250.2013.pdf
3	IS 2386-3: Methods of test for aggregates for concrete, Part III: Specific gravity, density, voids, absorption and bulking, Bureau of Indian standards, (1963).
4	IS 2386-4: Methods of test for Aggregates for concrete Part IV: mechanical properties of a) Specific Gravity, water absorption test & Sieve Analysis Impact test Crushing test Abrasion test Size and shape test (Flakiness & Elongation Index, Angularity number) , Bureau of Indian standards, (1963).
5	IS: 1202: Determination of specific gravity of Bitumen, Bureau of Indian standards,(1978)
6	IS: 1203: Determination of penetration of Bitumen, Bureau of Indian standards,(1978).
7	IS: 1205: Determination of softening point of Bitumen, Bureau of Indian standards,(1978).
8	IS: 1208: Determination of ductility of Bitumen, Bureau of Indian standards,(1978).
9	IS: 1209: Determination of flash point and fire point of Bitumen, Bureau of Indian standards,(1978).
10	IS: 1206: Methods for testing Tar and bituminous materials (Part I), Determination of viscosity, Bureau of Indian standards, (1978).
11	IS: 2720: Grain size analysis of soil by wet sieve analysis, (Part IV), Bureau of Indian standards, (1985).
12	IS: 2720: Determination of dry density of Soils in-place by the core-cutter method (Part XXIX), Bureau of Indian standards (1978).
13	IS: 2720: Determination of dry density of Soils in-place by the sand replacement method (Part XXVIII), Bureau of Indian standards (1974).
14	IS: 2720: Laboratory determination of CBR (Part XVI), Bureau of Indian standards, (1987).
15	ASTM D6927-06: Standard Test Method For Marshall Stability And Flow Of Bituminous Mixtures0

Assessment Details (both CIE and SEE):
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).

Continuous Internal Evaluation (CIE):

- ✓ CIE marks for the practical course is 50 Marks.
- ✓ The split-up of CIE marks for record/ journal and test are in the ratio 60:40.
- ✓ Each experiment to be evaluated for conduction with observation sheet and record write- up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- ✓ Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- ✓ Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- ✓ Weightage to be given for neatness and submission of record/write-up on time.
- ✓ Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- ✓ In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- ✓ The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- ✓ The average of 02 tests is scaled down to 20 marks (40% of the maximum marks).
- ✓ The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

CO & PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓			✓			✓	✓	✓
CO2	✓	✓					✓		✓		✓	✓
CO3	✓	✓					✓		✓		✓	✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**PHOTOGRAMMETRY AND REMOTE SENSING**						
Course Code	**21CVT3081**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	**No. of Hours/Week**					**Total Teaching Hours**	**Credits**
	L	**T**	**P**	**SS**	**Total**		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks:50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 01 Hours**		

Course Learning Objectives:	
1	Familiarize the various approaches of photogrammetry and its principles.
2	Understand the concept of Digital Photogrammetry by different methods and Remote sensing.
3	Apply the concept of sensors and platforms through various categories of satellites with their specific applications.

UNIT – I	
Photogrammetry: Metric photogrammetry- interpretative photogrammetry- Types of Photographs Terrestrial photographs- Aerial photography- Taking Vertical Aerial Photographs- Existing Aerial Photography- Application of Photogrammetry- Photogrammetry and Geographic Information Systems	**3 Hrs**
UNIT – II	
Principles of Photogrammetry: Theory of Photogrammetric Orientation- Photographic Resolution- Ground Coverage- 3D Rotation Photogrammetric Techniques- photographic devices- Instruments for Traditional and Digital Photogrammetry- 3D Visualization	**3 Hrs**
UNIT – III	
Digital Photogrammetry: Ground sampling distance-Photogrammetric Measurements- Using stereoscopic aerial photographs Digital photogrammetric techniques-Relating Focal length to altitude-Scale of vertical aerial photo over variable terrain-Height measurement from single aerial photos-Relief Displacement –Digital Photogrammetric station.	**3 Hrs**
UNIT – IV	
Remote Sensing: Introduction - Physics of Remote Sensing - Electromagnetic Radiation (EMR) - Blackbody Radiation - Planck's Law - StefanBoltzmann Law - Wien's Displacement Law - Components of Remote Sensing - Atmospheric Windows and Blinds - Interaction of EMR with atmosphere, and Earth's surface: soil, water and vegetation - Remote Sensing Platforms and Sensors – Image Interpretations	**3 Hrs**
UNIT – V	

Sensors and platforms: Platforms – types and their characteristics 2.2 Satellites and their characteristics – geo-stationary and sun-synchronous, Earth Resources Satellites -LANDSAT, SPOT, IRS, IKONOS satellite series, Meteorological satellites – INSAT, NOAA, GOES , Sensors – types and their characteristics, Basic concept and principles of thermal, microwave and hyperspectral sensing, Basic principles, types, steps and elements of image interpretation	**3 Hrs**

Course Outcomes: The students will be able to	
CO1	Classify and apply the concept and principles of photogrammetry.
CO2	Illustrate the digital outcome of the photogrammetry and remote sensing.
CO3	Validate the application of sensors and platforms in image interpretation.

Process of Assessment (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Two Tests (preferably in MCQ pattern with 20 questions) each of 20 Marks (duration 01 hour)

1. First test at the end of 5thweek of the semester
2. Second test at the end of the 10thweek of the semester

Two assignments each of 10 Marks

1. First assignment at the end of 4thweek of the semester
2. Second assignment at the end of 9thweek of the semester

Group discussion / Activities /Seminar/ Quiz 05 Marks (duration 01 hours), and it is suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

The sum of total marks of two tests, two assignments, and Group discussion / Activities /Seminar/ Quiz will be for50 marks and shall be scaled for the same.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure minimum of 35% of the maximum marks meant for SEE.

Course Outcomes: The students will be able to	
CO1	Classify and apply the concept and principles of photogrammetry.
CO2	Illustrate the digital outcome of the photogrammetry and remote sensing.
CO3	Validate the application of sensors and platforms in image interpretation.

Suggested Text Book(s):	
1	Campbell, J.B. (2006). Introduction to Remote Sensing. 4th edn. Guilford Press.

2	P.R. Wolf: 2000 (2nd) Ed, Elements of Photogrammetry, McGraw Hill ins.

Suggested Reference Book(s):	
1	Cracknell, A. (2007). Introduction to Remote Sensing 2nd. edn. Taylor and Francis.
2	Rampal, K.K., (2004), Textbook of Photogrammetry, John-Wiley & Sons
3	Lillesand T.M., Kiefer R.W. and Chipman J.W. (2003) Remote Sensing and Image Interpretation, 5th ed., Wiley.
4	Zorn H.C. (1980) Introductory Course in Photogrammetry, 6th Ed. ITC, Netherlands.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓	✓	✓					✓
CO2	✓	✓			✓		✓		✓			✓
CO3	✓			✓	✓		✓					✓

Course Title	**SUSTAINABLE MATERIALS AND GREEN BUILDINGS**						
Course Code	**21CVT3082**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks:50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 01 Hours**		

Course Objectives:	
1	Understand the Concepts of effective utilization of alternative building materials.
2	Learn the solar energy efficient strategies in Green buildings.
3	Learn the management of Solid Waste.

Syllabus	**No. of Hours**
Unit - I	
Introduction to alternative building Materials: Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo-	**3 Hrs**
Unit - II	
Cost effective Building Technologies: Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames	**3 Hrs**
Unit - III	
Passive Solar Techniques: Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions	**3 Hrs**
Unit - IV	
Green Buildings: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling	**3 Hrs**
Unit - V	
Green Composites for Buildings: Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes.	**3 Hrs**

Course Outcomes: At the end of the course the student will be able to :

1	Analyze and Discuss the Basic Concept of Ecology and its Divisions, Environment, Interactions Among Organisms and Autecology of Species.
2	Characterize and Explain Soil Science, Biogeographic Regions and Vegetation of India.
3	Identify the Land Pollution and its Effect on Biodiversity and Wildlife Conservation.

Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations, site visit to experience the ecological system of any type.

Suggested Text Book(s):	
1	HarharaIyer G, Green Building Fundamentals, Notion Press Construction Equipment and its Management - Sharma,S. C.: Khanna Publishers.
2	Dr. Adv. HarshulSavla, Green Building: Principles & Practices

Suggested Reference Book(s):	
1	"Green Building Fundamental" – G.HariharaIyer.
2	"Sustainable Construction"- Charles J. Kibert.

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
http://nptel.ac.in https://swayam.gov.in https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham https://www.youtube.com/watch?v=THgQF8zHBW8 https://www.youtube.com/watch?v=DRO_rIkywxQ

Process of Assessment (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Two Tests (preferably in MCQ pattern with 20 questions) each of 20 Marks (duration 01 hour)

1. First test at the end of 5thweek of the semester
2. Second test at the end of the 10thweek of the semester

Two assignments each of 10 Marks

1. First assignment at the end of 4thweek of the semester
2. Second assignment at the end of 9thweek of the semester

Group discussion / Activities /Seminar/ Quiz **05 Marks** (**duration 01 hours**), and it is suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

The sum of total marks of two tests, two assignments, and Group discussion / Activities /Seminar/ Quiz will be for50 marks and shall be scaled for the same.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure minimum of 35% of the maximum marks meant for SEE.

CO - PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓	✓	✓					
CO2	✓				✓	✓	✓					
CO3	✓				✓	✓	✓	✓			✓	✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**FIRE SAFETY IN BUILDINGS**						
Course Code	**21CVT3083**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours / Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 01 Hours**		

Course Objectives:	
1	Illustrate the objectives of fire safety in buildings, fire hazard analysis and classification of fire. Understanding of fire prevention, detection and alarm systems including emergency measures for control of fire.
2	Discus the firefighting arrangements, extinguishing principles, agents, appliances and firefighting services in buildings
3	Outline the fire risk management, pitfalls in the fire risk assessment process, emergency provisions and procedures and fire safety signs and notices. To understand the fire safety Standards and Codes for different firefighting devices and components.

Unit No.	Syllabus	No. of hours
I	**Fire Safety:** Introduction, causes of fire, objectives of fire safety. Theory of fire safety; fire science, fire triangle, chemical reaction for combustion (oxidation), flash point, fire point and ignition point, flammability characteristics, fire stages (life cycle of fire), explosion, fire hazards. Fire hazard analysis and assessment. Important definitions related to fire safety. Classification of fire.	**03**
II	**Prevention, Protection and Control of Fire:** Introduction, Prevention of fires; fire prevention activities, fire prevention measures, general precautions for fire prevention, Do's and Don'ts for handling fire hazards. Design requirements for fire safety; building design, ventilation, provisions of civil design. Fire Detection and Alarm Systems; fire detection, fire alarm system. Fire protection; fire protection systems, fire protection programme, facts about fire protection. Means of escape in emergency; factors affecting means of escape, evacuation (including search and rescue)	**03**
III	**Fire Fighting Arrangements:** Introduction, firefighting systems, fire extinguishing principles. Extinguishing agents and their applications; water, carbon dioxide, foam, dry chemical powder (DCP), aqueous film forming foam (AFFF), halon (halogenated hydrocarbons). Portable fire extinguishers; types of portable fire extinguishers, selection of portable fire extinguishers, general instructions for the use of fire extinguisher. Firefighting appliances, firefighting services in buildings,	**03**

	firefighting services in high rise buildings, electrical fires, quality and reliability in fire safety, fire training.	
IV	**Fire Risk Management:** Introduction, risk assessment criteria, risk assessment steps, Common pitfalls in the fire risk assessment process. Fire risk reduction and control. Fire Risk Management Action Checklist. Controlling combustible materials, reducing the potential for ignition, rapid identification and notification of the presence of fire or smoke, effective emergency provision and procedures, Control of the fire, management of fire risk. Information, training and education. Fire safety signs and notices.	**03**
V	**Fire Safety Standards and Codes:** Code and standard for Hydraulic platform, Turntable ladder and other Rescue and fire-fighting devices and components. Code, Standard and specification concerning to safety of fire-fighting personnel i.e., Breathing Apparatus P.P.E., safety gears and other devices. Code and Practice for construction of temporary structures and scaffolding.	**03**

Course Outcomes: At the end of the course the student will be able to :	
1	Understand the definition of fire, fire triangle, combustion process and fire stages. Fire hazard analysis and assessment. Acquire the knowledge of fire prevention, protection and control systems.
2	Describe different firefighting arrangements in the building.
3	Illustrate fire risk analysis and management including fire safety signs and notifications. Application of Fire Safety Standards and Codes for design of firefighting devices and components.

Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations and the online courses available should be shared with students. Field visit to fire stations and understand various fire accidents.

Suggested Text Book(s):	
1	S. C. Sharma & Vineet Kumar, Safety, Occupational Health and Environmental Management in Construction, Khanna Publisher ISBN No. 978-81-7409-270-0, 2nd edition 2019.
2	N. Sesha Prakash, Manual of Fire Safety, CBS Publishers & Distributors Pvt. Ltd, 2020.
3	Charles D Reese, Occupational Safety and Health Fundamental Principles and Philosophies, CRC Press, 2017
4	V K Jain, Fire Safety in Buildings, ISBN-13 978-938980219, New Age International Private Limited; Third edition, 2020
5	Fire protection, services and maintenance management of building, NPTEL video lecture, IIT, Delhi
6	Bureau of Indian Standards, "Hand Book of Functional Requirements Of Buildings, (SP-41 & SP- 32)", BIS 1987 and 1989.
7	Building Services Design - T. W. Mever, Published by RIBA Publications, 1971, ISBN 10: 0900630167
8	Building Engineering & System Design - F. S. Merrit & J. Ambrose, U. S Department of Energy Office of Scientific and Technical Information, 1990.
9	National Building Code of India- Part: 4, Fire and Life safety, Bureau of Indian Standard.
10	Concept of building fire safety - D. Egan, Krieger Publishing Company, 2006.

11	Design of fire resisting structures - H. L. Malhotra. Surrey University Press, 1982.
12	https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/lab_admin/documents/genericdocument/wcms_828851.pdf
13	https://dgfscdhg.gov.in/national-building-code-india-fire-and-life-safety
14	https://www.firepedia.in/indian-standards-on-fire-safety

Suggested Reference Book(s):	
1	An Introduction to Fire Dynamics -D. Drysdale, 2rd Edition, Wiley Publisher. ISBN: 978-1-119-97610, 2011
2	Structural Fire protection Edt by T.T. Lie, Published June 1992 by American Society of Civil Engineer
3	Building Maintenance Management-R. Lee, Wiley Publisher
4	Developments In Building Maintenance -I. E. J. Gibson, Applied Science Publishers,1978

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
https://archive.nptel.ac.in/courses/105/102/105102176/

Activity Based Learning (Suggested Activities in Class) / Practical Based learning
Assignment for Students: A case study of fire hazard in building and restoration procedure adopted

Process of Ascertaining (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Two Tests (preferably in MCQ pattern with 20 questions) each of 20 Marks (duration 01 hour)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester

Two assignments each of 10 Marks

1. First assignment at the end of 4th week of the semester
2. Second assignment at the end of 9th week of the semester

Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**), and it is suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

The sum of total marks of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be for 50 marks and shall be scaled for the same.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure minimum of 35% of the maximum marks meant for SEE.

CO - PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓	✓	✓		✓					
CO2	✓			✓	✓		✓					
CO3	✓						✓					

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**PAVEMENT MATERIALS AND CONSTRUCTION**						
Course Code	**21CVT3084**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

	Course Objectives:
1	Expose to the different materials which are used in pavement construction, impart knowledge about the engineering properties required.
2	To get knowledge about different highway construction equipment with their suitability and adaptability in various field scenarios.
3	Expose to construction practice and quality control aspects of flexible and rigid pavement as per the required specifications (MORTH).
4	To introduce the possible improvisation in various layers of pavement to increase the structural strength by the use of non-basic materials (DLC, polythene sheets).

Unit No.	Syllabus	No. of Hours
I	**Sub grade:** Introduction, properties and tests. **Aggregates:** Origin, Classification, Requirements, properties, Proportioning of aggregate mixes by Rotchfutch Method and tests on Road aggregates.	**03**
II	**Bitumen and Tar**: Origin, Preparation, Properties and Chemical Constitution of bituminous road binders, Requirements. **Bituminous emulsion and Cutbacks**: Preparation, Characteristics, uses and test.	**03**
III	**Equipments in highway construction:** Various types of equipments for excavation, grading and compaction- their working principles, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction.	**03**
IV	**Flexible Pavements**: Specifications of materials, Construction method and field control checks for various types of flexible pavement layers.	**03**
V	**Cement Concrete Pavements:** Specifications and method of cement concrete pavement construction (PQC, importance of providing DLC as sub base and polythene thin layer between PQC and sub base, white topping). Quality control tests.	**03**

Course Outcomes: At the end of the course the student will be able to :	
1	Evaluate and assess the suitability of any pavement material to be used in various components of pavement by conducting required tests as per IS, IRC specifications
2	Proficient to adapt suitable modern technique and equipment for speedy and economic construction.
3	Execute the construction of subgrade, flexible, rigid pavement and perform required quality control tests at different stages of pavement construction.

Teaching Learning Process: These are sample Strategies, which the teacher can use to accelerate the attainment of the various course outcomes.	
1	Chalk and talk, Power point Presentation, Video.
2	NPTEL materials.
3	Quiz/Assignments/Open book test to develop skills.
4	Encourage collaborative learning in the class with site visits related to the subject and impart practical knowledge.

Suggested Text Book(s):	
1	Highway Engineering- Khanna, S.K., and Justo, C.E.G.: Nem Chand and Bros. Roorkee.
2	Construction Equipment and its Management- Sharma, S.C.:Khanna Publishers.
3	Hot Mix Asphalt Materials, Mixture Design and Construction- Freddy L. Roberts, Kandhal, P.S: University ofTexas Austin, Texas. NAPA Education Foundation Lanham, Maryland.

Suggested Reference Book(s):	
1	Relevant IRC codes and MoRTH specifications.
2	www.nptel.ac.in
3	www.swayam.ac.in
4	https://onlinecourses.nptel.ac.in/noc22_ce93/preview
5	https://www.youtube.com/watch?v=XOyusu4QC8s: Pavement Materials 1 – Part-1
6	https://www.youtube.com/watch?v=Ivmo27N3ojo&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=47 : Pavement Materials 1 – Part-2
7	https://www.youtube.com/watch?v=V5iz3ATzMDE&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=48 : Pavement Materials 2 – Part-1
8	https://www.youtube.com/watch?v=UxAjLtFgO0Q&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=49 : Pavement Materials 2 – Part-2
9	https://www.youtube.com/watch?v=V5iz3ATzMDE&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=48 : Pavement Materials 2 – Part-1
10	https://www.youtube.com/watch?v=UxAjLtFgO0Q&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=49 : Pavement Materials 2 – Part-2

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
Seminars / Quiz (to assist in GATE preparations). Demonstrations in the lab. Self-Study on simple topics.

Virtual lab experiments.

Process of Assessment (both CIE and SEE):

50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE).

A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (36 Marks out of 100) in the semester End examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together.

Continuous Internal Evaluation (CIE):

Two Tests each of **20 Marks (duration 01 hour)** has been conducted in each semester.

First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester.

The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason.

Two assignments each of **05 Marks (taken average at the end)**

First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester.

Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**)

CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the CO^{s} and PO^{s} and PSO^{s}.

At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks.

(For each CIE, the portion of the syllabus should not be common / repeated). **CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO - PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓						✓					✓
CO2	✓				✓		✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓		✓		✓		✓	✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**WATER SUPPLY AND SANITARY ENGINEERING**						
Course Code	**21CVT402**						
Category	**Integrated Professional Core Course (IPCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	3	**0**	**2**	**0**	**5**	**50**	**4**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Objectives:	
1	Analyze the variations of water demand, sources, collection and conveyance system, and quantify the amount of water requirement for a community.
2	Study the drinking water quality, standards, qualitative analysis and various treatment methods to attain the required water quality standards.
3	Applying the mind to learn and understand the importance of providing the water carriage system of sewerage at all places, quantification and characterization of sewage.
4	Acquiring the knowledge and importance of waste water treatment and disposal with sustainable concept.

Unit No.	Syllabus	No. of Hours
I	**INTRODUCTION:** Water supply engineering, importance and necessity of planned w/s, water treatment, importance and reliability of water works. **WATER DEMANDS:** Various types, total requirement of water for a town or a city, per capita demand, factors affecting percapita demand, variations in demand, factors affecting losses and wastes, effect of variations in demand on the design capacities of water supply components, design periods, population data and population growth, population forecasting methods.	**08**
II	**SOURCES:** Surface and subsurface sources – suitability with regard to quality and quantity. **COLLECTION AND CONVEYANCE OF WATER:** Intakes, types of intakes. Conveyance of water; open channel, aqueducts, tunnels, flumes, pipes of different types, joints. **QUALITY OF WATER:** Wholesome water, impurities in water, physical tests, chemical tests, biological tests, standards of water quality. Maintenance of purity of water – water borne diseases, suitability of water for trade purposes.	**08**
III	**WATER TREATMENT AND DISTRIBUTION:** General introduction, objectives of water treatment, methods of water treatment, screening, aeration, plain sedimentation, sedimentation with coagulation, filtration, types of filters –	**08**

	sand filters, pressurefilter-operational problem in filters. **DISINFECTION OF WATER:** Requirements of disinfectants, methods of disinfection; disinfection, chlorination, chlorine demand, breaking point chlorination, super chlorination, de-chlorination, residual chlorine, miscellaneous treatments. **DISTRIBUTION:** Methods of water distribution- gravity, pumping, combined gravity and pumping system. Dead end, radial, circular system, Hardy cross method, Hazen William formula.	
IV	**SANITARY ENGINEERING:** Introduction, types of sewage and types of sewerage system, components of sewerage system. System of sanitation, methods of collection, conveyance system with its merits and demerits, water carriagesystem with its merits and demerits. Sewerage system, separate, combined and partially separate systems with their merits and demerits, comparison of these studies, patterns of collection system. **QUANTIFICATION OF SEWAGE:** Sources of sewage, factors affecting sewage, determination of rainfall intensity, quality of storm water, the rational method, runoff coefficient, empirical formula for rainfall intensities, time concentration, numerical problems. **CHARACTERISATION OF SEWAGE:** Physical, chemical and biological characteristics, decomposition of sewage, examination and sampling of sewage, solids- total solids, volatile solids, suspended solids, dissolved solids, fixed solids, determination of DO, BOD rates, COD, Chlorides and Sulphides, Nitrogen, P^H, oil and grease, fat.	**08**
V	**TREATMENT AND DISPOSAL OF SEWAGE:** Classification of treatment processes; screening, grit removal, oil and grease removal, sedimentation design, sedimentation aided with coagulation design, treatment through biological filtration, activated sludge process design, TF's, rotatory biological contactors (RBC), oxidation ponds and aerated lagoons, anaerobic treatment; septic tank, Imhoff tanks, sludge treatment, sludge drying. **DISPOSAL OF SEWAGE:** Disposal by dilution, land disposal, sewage farming.	**08**

Expt. No	LABORATORY EXPERIMENTS	No. of Sessions
1	Determination of Acidity and Alkalinity, pH and Turbidity.	**10**
2	Determination of Hardness by EDTA method.	
3	Determination of Chlorides in drinking water sample.	
4	Determination Residual Chlorine and Chlorine demand.	
5	Determination of D.O content.	
6	Determination of Total solids in Municipal sewage.	
7	Determination of BOD of Combined wastewater.	
8	Determination of C O D of Combined waste water.	

9	Determination of Optimum Coagulant dosage (ALUM)	
10	Determination of MPN. (DEMO EXPERIMENT)	

Course Outcomes: At the end of the course the student will be able to	
1	Analyse the various water demand, quantify the requirement, selection of suitable source and plan for suitable intake structures for supply water for a community.
2	Evaluate the water source for physical, chemical and biological characteristics, select and design a suitable treatment processes for the source and also a suitable distribution methods to fulfill the various water demand of a society.
3	Apply the knowledge to manage the sewage and sewerage systems, quantify the sewage generated by various activities and also its characteristics.
4	Plan and design a suitable wastewater treatment process's, disposable methods, and also use various laboratory analytical methods for water and wastewater analysis.

Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations, visit to in around water and waste water treatment plants, disposal and reuse Units.

Suggested Text Book(s):	
1	Water Supply and Sewerage, Steel. E. W. & Terence J. M. Ghees, Mc Graw – Hill International Book Co.
2	Water Supply & Sanitary Engineering, G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company (2015, Ninth Edition)
3	Wastewater Engineering – S. K. Garg, Khanna Publishers
4	Environmental Engineering II – B. C. Punmia and Ashok Jain

Suggested Reference Book(s):	
1	Water and waste water Engineering Vol-II- fair, Gayer and Okun, Willey publishers, New York.
2	Wastewater Treatment, Disposal and Reuse, Metcalf and Eddy Inc. Tata Mc Graw Hill Publications (2003 Edition).
3	Water and Wastewater Technology-SI Version, Hammer. M. J. (1986), 2nd Edition, John Wiley and Sons.
4	Environmental Engineering, Peavy, H. S., Rowe, D. R. and Tchobanoglous, G. McGraw Hills, New York 1985.

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
http://nptel.ac.in https://swayam.gov.in https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

Process of Ascertaining (both CIE and SEE):
50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE). A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (36 Marks out of 100) in the semester End

examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together.

Continuous Internal Evaluation (CIE):

Two Tests each of **20 Marks (duration 01 hour**) has been conducted in each semester.

First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester.

The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason.

Two assignments each of **05 Marks (taken average at the end)**

First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester.

Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**)

CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the CO^s and PO^s and PSO^s.

At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks.

(For each CIE, the portion of the syllabus should not be common / repeated).

CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO - PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓		✓	✓		✓			✓
CO2	✓	✓	✓	✓		✓	✓		✓			✓
CO3	✓	✓				✓	✓		✓			✓
CO4	✓	✓	✓		✓	✓	✓		✓	✓		✓

Course Title	**FLUID MECHANICS AND MACHINERY**						
Course Code	**21CVT403**						
Category	**Integrated Professional Core Course (IPCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	3	**0**	**2**	**0**	**5**	**50**	**4**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Learning Objectives:	
1	Understand fundamentals of fluid properties, fluid pressure and hydrostatic laws.
2	Gain knowledge on fluid dynamics and basic design of flow through pipes.
3	Able to measure flow of fluid with different devices.
4	Understand the working principles and performance of hydraulic machines.

Unit No.	Syllabus	No. of Hours
I	**BASIC PROPERTIES OF FLUIDS:** Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension, Capillarity and vapour pressure, Numericals. **PRESSURE AND ITS MEASUREMENT:** Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure, Measurement of pressure using simple, differential manometers and mechanical gauges. Numericals.	**08**
II	**DYNAMICS OF FLUID FLOW:** Introduction, Energy possessed by a fluid body. Euler's equation of motion along a streamline and Bernoulli's equation. Practical Applications of Bernouli's equation (Venturimeter, Orificemeter). Problems on applications of Bernoulli's equation. **FLOW THROUGH PIPES:** Losses in pipe flow, Darcy-Weisbach equation for head loss due to friction in a pipe, Minor losses in pipe flow, Numericals.	**08**
III	**DEPTH AND VELOCITY MEASUREMENTS, NOTCHES AND WEIRS:** **Measurement of depth:** Point and hook gauges, self-recording gauges. Staff gauge, Weight gauge, float gauge. **Measurement of velocity:** Pitot tube, Current meter. **Discharge measurements:** Small orifices, mouth pieces, Rectangular notch, Triangular notch, Cipolletti notch, Ogee weir and Broad crested weir, Numericals.	**08**
IV	**UNIFORM FLOW OVER OPEN CHANNELS:**	**08**

	Geometric properties of Rectangular, Trapezoidal. Chezy's equation, Manning's equation-problems. Most economical open channels - Rectangular, Trapezoidal channels, Numericals. **NON-UNIFORM FLOW OVER OPEN CHANNELS:** Specific energy diagram, Conditions for Critical flow. Hydraulic jump in a Horizontal Rectangular Channel, Numericals.	
V	**IMPACT OF JET ON VANES:** Force exerted by the jet on stationary and moving flat and curved vanes, numericals. **TURBINES:** Classification of turbines, working principles of impulse (Pelton) and reaction (Francis and Kaplan) turbines, unit quantities, numericals. **CENTRIFUGAL PUMPS:** Classification, Priming, working Principles, minimum starting speed, multi-stage Centrifugal Pumps (pumps in series and parallel), characteristic curves, numericals.	**08**

Expt. No	LABORATORY EXPERIMENTS	No. of Sessions
1	Verification of Bernoulli's equation.	**10**
2	Determination of Hydraulic coefficients of a vertical orifice.	
3	Calibration of Rectangular and 90^0 V-notch.	
4	Calibration of Broad- crested weir and Ogee weir.	
5	Calibration of Venturimeter and Orificemeter.	
6	Determination of Darcy's friction factor for a straight pipe (PVC and GI).	
7	Determination of vane coefficients for a fixed flat, inclined and semi-circular vane.	
8	Performance characteristics of a Pelton wheel Turbine.	
9	Performance characteristics of a Kaplan turbine and Francis Turbine.	
10	Performance characteristics of a single stage and multi-stage Centrifugal Pump.	

Course Outcomes: At the end of the course the student will be able to	
1	Understand fundamental properties of fluids and solve problems on hydrostatics.
2	Apply principles of Bernoulli's and compute discharge losses in flow through pipes.
3	Compute discharge through orifice, notches and weirs.
4	Design of open channels of various cross sections and operational functions of hydraulic machines.

Suggested Text Book(s):	
1	A Text Book of Fluid mechanics & Hydraulic Machines'- R.K. Rajput, S. Chand & Co, New Delhi, 2006 Edition.
2	'Principles of Fluid Mechanics and Fluid Machines'- N. Narayana Pillai, Universities Press (India), Hyderabad, 2009 Edition.
3	'Text Book Of Fluid Mechanics & Hydraulic Machines'- R.K. Bansal, Laxmi Publications, New Delhi, 2008 Edition.
4	Hydraulics and Hydraulic Machines- Dr. P. N. Modi and Seth, McGraw Hill Publications.

Suggested Reference Book(s):	
1	Fundamentals of Fluid Mechanics – Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, Wiley India, New Delhi, 2009 Edition.
2	'Introduction To Fluid Mechanics' – Edward j. Shaughnessy, Ira m. Katz: James p Schaffer, Oxford University Press, New Delhi, 2005 Edition.
3	Fluid Mechanics' – Streeter, Wylie, Bedford New Delhi, 2008(Ed)
4	Fluid Mechanics and Turbomachines'- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition.
5	Experiments in Hydraulics and Hydraulic Machines: Theory and Procedures, PHI learning Publishers, New Delhi, 2014 Edition.
6	IS: 14750 (2000) calibration of notches and weirs.
7	IS: 4477 - 2 (1975) calibration of venturimeter and orificemeter.
8	IS: 2951 – 1 (1965) Darcy's flow through pipes losses.
9	IS: 1710 (1989) Turbines and Pumps operational characteristics.

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
Seminars / Quiz (to assist in GATE preparations). Demonstrations in the lab. Self-Study on simple topics. Virtual lab experiments.

Process of Ascertaining (both CIE and SEE):
50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE). A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (36 Marks out of 100) in the semester End examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together. **Continuous Internal Evaluation (CIE):** Two Tests each of **20 Marks (duration 01 hour**) has been conducted in each semester. First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester. The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason. Two assignments each of **05 Marks (taken average at the end)** First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester. Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**) CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the CO^{s} and PO^{s} and PSO^{s}. At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks.

(For each CIE, the portion of the syllabus should not be common / repeated). **CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							✓
CO2	✓	✓			✓							✓
CO3	✓		✓				✓			✓		✓
CO4		✓										✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**STRUCTURAL ANALYSIS**						
Course Code	**21CVT404**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	3	**0**	**0**	**0**	**3**	**40**	**3**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Objectives: Make the Students to learn	
1	Understand the concept of determinate structures, indeterminate structures, deflection and strain energy.
2	Influence line diagram for beams subjected to rolling loads and analysis of truss, arches and cables.
3	Analysis of beams and frames by moment distribution method, slope deflection method and matrix methods.

Unit No.	Syllabus	No. of Hours
I	**STRUCTURAL SYSTEMS:** Forms of structures, Conditions of equilibrium, Degree of freedom, Linear and Nonlinear behavior, One, two, three dimensional structural systems, Determinate and indeterminate structures [Static and Kinematics]. **ANALYSIS OF TRUSSES:** Method of joints and Method of sections,	**08**
II	**DEFLECTION OF BEAMS -** Moment area method, Conjugate beam method. **DEFLECTION OF TRUSS**: Unit load method. **STRAIN ENERGY :** Strain energy and complimentary strain energy, Strain energy due to axial load, bending and shear, Theorem of minimum potential energy, Law of conservation of energy, and Principle of virtual work.	**08**
III	**ROLLING LOAD AND INFLUENCE LINES:** Rolling load analysis for simply supported beams for several point loads and UDL. Influence line diagram for reaction, SF and BM at a given section. **ARCHES AND CABLES** Three hinged circular and parabolic arches with supports at same levels and different levels, Determination of thrust, shear and bending moment, Analysis of cables under point loads and UDL, length of cables (Supports at same levels and at different levels).	**07**
IV	**MOMENT DISTRIBUTION METHOD:** Introduction, Definition of terms- Distribution factor, Carry over factor, Analysis of beams and orthogonal rigid jointed plane frames (non-sway) with kinematic indeterminacy less than/equal to three. **SLOPE DEFLECTION METHOD:** Analysis of continuous beams only.	**09**

	KANI'S METHOD: Analysis of sway frames with kinematic indeterminacy less than/equal to three.	
V	**STIFFNESS MATRIX METHOD OF ANALYSIS:** Introduction, Development of stiffness matrix for prismatic beam element and plane truss element and Analysis of continuous beams, plane truss and axially rigid plane frames by stiffness method with kinematic indeterminacy □ 3. **FLEXIBILITY MATRIX METHOD OF ANALYSIS:** Introduction, Development of flexibility matrix for prismatic beam and relationship between stiffness and flexibility matrix, analysis of continuous beams and frames.	**08**

Course Outcomes: At the end of the course the student will be able to :	
1	Understand the basic structural systems, classification and parameters required for structural analysis.
2	Interpret the concept of strain energy, moving loads, lateral and gravity loads applied in the structural systems.
3	Analyze and solve problems of determinate and indeterminate structures using various approaches.

Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations, visit to in around water and waste water treatment plants, disposal and reuse Units.

Suggested Text Book(s):	
1	Basic Structural Analysis, C S Reddy, Tata McGraw Hill Education Pvt. Ltd., 3rd Edition ISBN-13: 978-0070702769.
2	Theory of Structures, S Ramamrutham & R Narayan, Dhanpat Rai & Co., 9th Edition, ISBN – 13: 978-934378103.
3	Structural Analysis Vol-2, S S Bhavikatti, Vikas Publishing House Fourth Edition, ISBN-13-978-9325968806.

Reference Book(s):	
1	Structural Analysis, R C Hibbler, Pearson Publication, 8th edition, ISBN-13: 978-0132570534.
2	Elementary Structural Analysis, Norris C H, Wilbur J B, International Student edition, McGraw Hill International Book, ISBN-13: 978-8131721414.
3	Structural Analysis, Devdas Menon, Narosa Publishing House, ISBN: 978-8173197505.
4	Theory of Structures, Volume 2, S P Gupta, G S Pandit & R Gupta, Tata McGraw Hill Publication Company Ltd.

Process of Ascertaining (both CIE and SEE):
50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE). A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (36 Marks out of 100) in the semester End examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together.

Continuous Internal Evaluation (CIE):

Two Tests each of **20 Marks (duration 01 hour**) has been conducted in each semester.

First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester.

The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason.

Two assignments each of **05 Marks (taken average at the end)**

First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester.

Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**)

CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the CO^s and PO^s and PSO^s.

At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks.

(For each CIE, the portion of the syllabus should not be common / repeated). **CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓										✓
CO3	✓	✓	✓	✓								✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**COMPUTER AIDED BUILDING PLANNING AND DRAWING**						
Course Code	**21CVL405**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	0	**0**	**2**	**0**	**3**	**15**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course Objectives:	
1	Expose to the bye-laws and develop skills to prepare civil engineering drawings using Auto-CAD.
2	Apply engineering concepts to draw various components of the structure.
3	Application of MS Excel for solving simple civil engineering problems.

Unit No.	Syllabus	No. of Hours
I	**Drawing Basics:** Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962. Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio.	**02**
II	**Tools in Auto-CAD:** **Drawing tools:** Lines, Circle, Arc, Poly line, Multiline, Polygon, Rectangle, Spline, Ellipse. **Modify tools:** Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet. **Using Text:** Single line text, Multiline text, Spelling, Edit text. **Special Features:** View tools, Layers concept, Dimension tools, Hatching, Customizing toolbars, Working with multiple drawing.	**02**
III	**Simple Engineering drawings with Auto-CAD** Cross section of foundation, masonry wall. Lintel and Chajja. Line diagram for school building and primary health center.	**04**
IV	**Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings:** i) Single and Two bed room building. ii) Two storied building (Ground and First floor) iii) Pitched roof.	**05**
V	**MS Excel :** i) Draw SFD and BMD for beams subjected to point load, UDL and UVL. ii) Horizontal curves, super elevation, cutting and filling of earth work.	02

Course Outcome: The students will be able to	
1	Implement the fundamentals of building planning and drawing.
2	Use the modern tools like AutoCAD for building planning and drawing.
3	Understand and Interpret the drawings for field implementation.
4	Examine spread sheet concepts in civil engineering applications.

Teaching - Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations, visit to Industry and Residential buildings.

Suggested Text Book(s):	
1	MG Shah, CM Kale, SY Patki, "Building drawing with an integrated approach to Built Environment Drawing", Tata McGraw Hill Publishing co. Ltd, New Delhi.
2	Gurucharan Singh, "Building Construction", Standard Publishers, & distributors, New Delhi.
3	Malik RS and a Meo GS, "Civil Engineering Drawing", Asian Publishers/Computech Publication Pvt Ltd

Suggested Reference Book(s):	
1	Time Saver Standard by Dodge F.W, F.W Dodge Corp.
2	2. IS: 962-1989 (Code of practice for architectural and building drawing).
3	3. National Building Code, BIS, New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓				✓			✓
CO2					✓				✓			✓
CO3	✓					✓		✓				✓
CO4	✓				✓	✓		✓				✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**CONSTRUCTION METHODS AND EQUIPMENTS**						
Course Code	**21CVT4081**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

	Course Objectives:
1	Basic principles of construction techniques and methods.
2	Understand terminology and Units of measurements related to equipment usage in industrial, heavy civil, and commercial projects
3	Perform comparative cost analysis, selection, application and utilization of equipment.

Unit No.	Syllabus	No. of hours
I	**CONSTRUCTION METHODS:** Conventional and Modern methods of construction of building elements. Different stages of construction. Types of formworks. Elements of pre-cast and Pre-fabricated construction.	**03**
II	**MECHANIZATION:** General data on mechanized construction equipment. Construction equipment and their characteristics. Advantages and disadvantages of Mechanization.	**03**
III	EQUIPMENT- I: Excavating and earth moving equipment, Piles and Pile driving equipment.	**03**
IV	**EQUIPMENT- II:** Lifting equipment, Drilling equipment and Blasting.	**03**
V	**EQUIPMENT MANAGEMENT:** Planning process and estimation of cost of equipment. Cost of owning and operating construction equipment. Equipment life and replacement analysis.	**03**

	Course Outcomes: At the end of the course the student will be able to:
1	Learn different methods and techniques of construction.
2	Understand the types and purpose of use of equipment.
3	Perform cost analysis and selection of equipment.

	Teaching Learning Process: These are sample Strategies, which the teacher can use to accelerate the attainment of the various course outcomes.
1	Power point Presentation, Video.
2	Video tube, NPTEL materials.
3	Quiz/Assignments/Open book test to develop skills.

4	Adopt problem based learning (PBL) to develop analytical and thinking skills.
5	Encourage collaborative learning in the class with site visits related to the subject and impart practical knowledge.

Text Book(s):	
1	Sharma, S.C., "Construction equipment and its management", Khanna Publishers., 6th Edition
2	Peurifoy R L, "Construction Planning, Equipment and Methods", Mc Graw Hill, 8th Edition.
3	Spence, W.P. and Kultermann, E., "Construction materials, methods and techniques", Cengage Learning.
4	Illingworth, J.R., "Construction methods and planning", CRC Press, 2nd Edition.

Web links and Resources:	
1	Construction methods and equipment management https://nptel.ac.in/courses/105103206

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
Seminars / Quiz (to assist in GATE preparations). Demonstrations in the lab. Self-Study on simple topics. Virtual lab experiments.

Process of Ascertaining (both CIE and SEE):
50% weightage given for each Continuous Internal Evaluation (CIE) and Semester End Exam (SEE). A student shall be considered to have fulfilled the academic requirements and earned the credits allotted to each subject / course by securing not less than 35% (20 Marks out of 50) in the semester End examination (SEE), and a minimum of 40% (20 marks out of 50) in the sum total of the Continuous Internal Evaluation (CIE) taken together. **Continuous Internal Evaluation (CIE):** Two Tests each of **20 Marks (duration 01 hour**) has been conducted in each semester. First test at the end of 5th week of the semester and Second test at the end of the 10th week of the semester. The Makeup test at the end of the 15th week of the semester given for the students for whom are not attended the test One and Two due to genuine (medical, participating in academic or extracurricular activities, sport etc.) reason. Two assignments each of **05 Marks (taken average at the end)** First assignment at the end of 4th week and Second assignment at the end of 9th week of the semester. Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**) CIE, Assignments and Group discussion / Activities / Seminar / Quiz will be planned suitably to attain the CO^s and PO^s and PSO^s. At the end of the 13th week of the semester, the sum of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be **scaled** out of 50 marks. (For each CIE, the portion of the syllabus should not be common / repeated). **CIE methods / question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

Semester End Examination (SEE):

Theory SEE will be conducted by Institute as per the scheduled timetable, with common question papers for the subject of **duration 03 hours**.

The question paper will have ten questions. Each question is set for 20 marks and there will be 2 questions from each Units / module. Each of the two questions under a Unit / module should have a maximum of 3 sub-questions, **should have a mix of topics** under that Unit / module. The students have to answer 5 full questions, selecting one full question from each Unit / module.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			✓				✓					✓
CO2	✓	✓			✓		✓	✓				✓
CO3			✓		✓	✓					✓	✓

Dr. Ambedkar Institute of Technology, Bengaluru - 560056
Department of Civil Engineering

Course Title	**SOIL AND WATER CONSERVATION ENGINEERING**						
Course Code	**21CVT4082**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 01Hours**		

Course Objectives: To	
1	Study the concept of Soil erosion, water erosion and its classification, soil loss estimation with prediction and control measures.
2	Achieve Water erosion control measures, stabilization of sand dunes, assess rate of sedimentation and elementary lay out design procedure.
3	Gain the knowledge about grassed waterways and design, factors affecting wind erosion, design of wind breaks.

Unit No.	Syllabus	No. of Hours
I	**Soil erosion**: Introduction, causes and types, Geological and accelerated erosion, Erosion agents, Factors affecting and effects of erosion. **Water erosion**: Mechanics and forms, Gullies – Classification and stages of development of water erosion.	**03**
II	**Soil loss estimation**: Universal soil loss equation (USLE) and modified USLE, Rainfall Erosivity -estimation by KE >25 and EI 30 methods, Soil erodibility and its managementfactors. **Measurement of soil erosion:** Runoff plots, soil samplers. Gully and ravine reclamation - principles of gully control - vegetative measures, temporarystructures and diversion drains.	**03**
III	**Water erosion control measures**: Agronomical measures - contour farming, strip cropping, conservation tillage and mulching **Engineering measures**: Bunds and terraces. Bunds - contour and graded bunds - design and surplussing arrangements Terraces - level and graded broad base terraces, bench terraces - planning, Elementary design and layout procedure, contour stonewall and trenching.	**03**
IV	**Grassed waterways and design, Wind erosion**: Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures.	**03**

V	**Design of wind breaks:** Design principles of wind breaks and shelter belts and stabilization of sand dunes, Land capability classification. Rate of sedimentation, silt monitoring and storage loss intanks.	**03**

	Course Outcomes: At the end of the course the student will be able to
1	Analyze the various causes for soil and water erosion, estimate the water and soil loss in land and tanks.
2	Evaluate the soil conservation and water conservation measure by various Engineering methods and principles.
3	Examine the design principles of the wind breaks, shelter belts, and stabilization of sand dunes

	Suggested Text Book(s):
1	Murthy, V.V.N. 2002. Land and Water Management Engineering. 4th Edition, Kalyani Publishers, New Delhi.
2	Singh Gurmel, Venkataraman, C., Sastry, G. and Joshi, B.P. 1996. Manual of Soil and Water ConservationPractices. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3	Dr. A Mishra and Dr. B C Mal, Soil and water conservation AGRIMOON.com

	Suggested Reference Book(s):
1	Fangmeier, W., Elliott, W.J., Workman, S., Huffman, R. and Schwab, G.O. 2005. Soil and Water Conservation Engineering, 5th Edition, Cengage Learning, Inc., Clifton Park, USA.
2	Frevert, R.K., Schwab, G.O. Edminster, T.W. and Barnes, K.K. 2009. Soil and Water Conservation Engineering, 4th Edition, John Wiley and Sons, New York.
3	Michael, A.M. and Ojha, T.P. 2003. Principles of Agricultural Engineering. Volume II. 4th Edition, Jain Brothers, New Delhi.

CO - PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓	✓	✓		✓			✓
CO2	✓				✓	✓	✓		✓			✓
CO3	✓		✓				✓		✓			✓

Dr. Ambedkar Institute of Technology, Bengaluru – 560056
Department of Civil Engineering

Course Title	**ECOLOGY AND ENVIRONMENT**						
Course Code	**21CVT4083**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours / Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 01 Hours**		

Course Objectives:	
1	Understand the Basic Concept and Principles of Ecology Applicable to different Levels of Organization, and Environment, and Interactions Among Organisms.
2	Investigate and Understand the Soil Science, Biogeographic Regions and Vegetation of India. Making a Start with Autecology of Species.
3	Study the Land Pollution and its Impact on Biodiversity and Wildlife Conservation

Unit No.	Syllabus	No. of Hours
I	**Introduction:** Definition of Ecology, historical background, history of ecology in India, terminology of ecology, basics concepts of ecology: Holism, Ecosystem, Succession, and Conservation, Major divisions of ecology: based on taxonomic groups, based on habitat, based on levels of organization. **Environment:** definition, scope, need for public awareness.	**03**
II	**Biotic Factor (Interactions Among Organisms):** Types of interaction: Positive interaction, Negative Interaction. **Autecology of Species:** Purpose of Autecology, biological clocks, Lebig's Law of the minimum, Shelford's Law of tolerance, Combined concept of limiting factors, Ecological concept of species and individuals.	**03**
III	**Soil Science:** What is Soil, Formation of Soil, Factors in Soil Formation, Soil Profile, Soil Classification, Climate and Soil Formation, Components and Properties of Soil. **Biogeographic Regions and Vegetation of India:** Soils of India, Climate and Climatic Regions of India, Biogeographic Regions (Zones) of India, Forest Vegetation of India, Grassland Vegetation of India, Diverse Flora and Fauna of India.	**03**
IV	**Land Pollution:** Definition, Land Use in India, Land Degradation, Causes of Land Pollution: Metal Land Pollution, Pesticide Land Pollution, Radioisotope Land Pollution, Solid Waste Land Pollution. Effects of Land Pollution, Prevention of Land Pollution.	**03**
V	**Biodiversity and Wildlife Conservation:** Definition of Biodiversity, Measuring of Biodiversity, Global Biodiversity, Conservation of Biodiversity, Ecology V/S Economy, Bioethics and Conservation, Threats to Biodiversity,	**03**

	Present Scenario of Biodiversity and Wildlife Conservation in India, National Parks and Sanctuaries.	

Course Outcomes: At the end of the course the student will be able to :	
1	Analyze and Discuss the Basic Concept of Ecology and its Divisions, Environment, Interactions Among Organisms and Autecology of Species.
2	Characterize and Explain Soil Science, Biogeographic Regions and Vegetation of India.
3	Identify the Land Pollution and its Effect on Biodiversity and Wildlife Conservation.

Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations, site visit to experience the ecological system of any type.

Suggested Text Book(s):	
1	P. N. Awadhutwar and V. S. kute "Environment Ecology and Nature Conservation" Sankalp Publication, 1 January 2022
2	Majid Husain, "Objective Environment & Ecology", GK Publications Pvt. Ltd.; Second edition, 23 November 2019.
3	Vaishali Anand "Environment and Ecology", McGraw Hill; First edition, 10 July 2020.
4	Pranav Kumar, "Fundamentals of Ecology and Environment", Pathfinder Publication; 3rd edition 1 January 2021.

Suggested Reference Book(s):	
1	P. D. Sharma, "Ecology and Environment" Rastogi Publications, Meerut, Second Reprint 2018-19.
2	Dhyeya, "Ecology & Environment", DHYEYA, 30 November 2021.
3	Vinay Kumar G.B., "Question Bank on Environment and Ecology" Oxford University Press; First edition, 1 March 2020.
4	S. Theodore Bhaskaran, "Sprint of the Blackbuck: Writings on Wildlife and Conservation in South India", Penguin India, 12 April 2010.

Practical Based Learning (Suggested Activities in Class)/ Practical Based learning:
http://nptel.ac.in https://swayam.gov.in https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

Process of Ascertaining (both CIE and SEE):
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together Continuous internal Examination (CIE) Two Tests (preferably in MCQ pattern with 20 questions) each of 20 Marks (duration 01 hour)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester

Two assignments each of 10 Marks

1. First assignment at the end of 4th week of the semester
2. Second assignment at the end of 9th week of the semester

Group discussion / Activities / Seminar / Quiz **05 Marks** (**duration 01 hours**), and it is suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

The sum of total marks of two tests, two assignments, and Group discussion / Activities / Seminar / Quiz will be for 50 marks and shall be scaled for the same.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure minimum of 35% of the maximum marks meant for SEE.

CO - PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓	✓					✓
CO2	✓		✓	✓		✓	✓					✓
CO3	✓		✓			✓	✓					✓

Dr. Ambedkar Institute of Technology, Bengaluru – 560056
Department of Civil Engineering

Course Title	**CARTOGRAPHY AND GIS CONCEPTS**						
Course Code	**21CVT4084**						
Category	**Ability Enhancement Course (AEC)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**0**	**0**	**1**	**15**	**1**
CIE Marks:50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 01 Hours**		

Course Learning Objectives:	
1	An understanding of fundamental cartographic concepts.
2	Understand and prepare different kinds of maps.
3	Recognize the benefits and limitations of some common map projections, and the fundamental importance of scale.
4	Create credible reference and thematic maps in page, tabloid, and larger sizes.
5	Develop an idea about concept and components of Geographical Information System.

UNIT – I	
CARTOGRAPHY: Principle of cartography, definitions, Elements of map, Elements of common surveyors' projections, Utility of map, Study of topo-map on 1: 50000 and 1 : 250000	**3 Hrs**
UNIT – II	
CARTOGRAPHIC TECHNIQUES: Introduction to Base materials, instruments, inks and pens. Drawing of points, lines., Point symbols, line symbols, area symbols & relief features, principles of lettering, type of lettering., Lettering devices., Map numbering, Difference between map & photo	**3 Hrs**
UNIT – III	
MAP REPRODUCTION: Process camera, photographical copying techniques, colour separation, negative. Plate making, offset and rotary printing process. Computerized Map Reproduction Technique.	**3 Hrs**
UNIT – IV	
MAP PROJECTION: Principles; Different types of projection and their properties - Mercator, Transverse Mercator (TM), Universal Transverse Mercator (UTM), Grids etc. Computation in Grid – Geographical to UTM and vice versa.	**3 Hrs**
UNIT – V	
GIS (Geographical Information System): Basic Principles, GIS Hardware & Software, Historical Development of GIS - Components of GIS, Data Representation, Data Capture, raster-vector formats, data conversion methods, Projections, Coordinate systems and registrations, Spatial analysis, Application of RS based GIS, Case study on GIS application in Water Resources projects and agriculture.	**3 Hrs**

Course Outcomes: The students will be able to	
CO1	Can acquire good knowledge about different procedure of map making and various projection system of map
CO2	Develop a broad knowledge about latitude, longitude,meridians, parallels etc.
CO3	Can prepare more accurateand précised map by applying different quantitative method
CO4	Demonstrate good cartographic technique regarding map layout and assess maps made by others
CO5	Can differentiate between GIS & Cartography

Process of Ascertaining(both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Two Tests (preferably in MCQ pattern with 20 questions) each of 20 Marks (duration 01 hour)

1. First test at the end of 5thweek of the semester
2. Second test at the end of the 10thweek of the semester

Two assignments each of 10 Marks

1. First assignment at the end of 4thweek of the semester
2. Second assignment at the end of 9thweek of the semester

Group discussion / Activities /Seminar/ Quiz 05 Marks (duration 01 hours), and it is suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

The sum of total marks of two tests, two assignments, and Group discussion / Activities /Seminar/ Quiz will be for50 marks and shall be scaled for the same.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure minimum of 35% of the maximum marks meant for SEE.

Suggested Text Book(s):	
1	Campbell, J.B. (2006). Introduction to Remote Sensing. 4th edn. Guilford Press.
2	P.R. Wolf: 2000 (2nd) Ed, Elements of Photogrammetry, McGraw Hill ins

Suggested Reference Book(s):	
1	Cracknell, A. (2007). Introduction to Remote Sensing 2nd. edn. Taylor and Francis.
2	Rampal, K.K., (2004), Textbook of Photogrammetry, John-Wiley & Sons
3	Lillesand T.M., Kiefer R.W. and Chipman J.W. (2003) Remote Sensing and Image Interpretation, 5th ed., Wiley.
4	Zorn H.C. (1980) Introductory Course in Photogrammetry, 6th Ed. ITC, Netherlands.

CO - PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓	✓					✓
CO2	✓		✓	✓		✓	✓					✓
CO3	✓		✓			✓	✓					✓

2018-2019

2019-2020

2020-2021

Dr.Ambedkar Institute of Technology, Bengaluru – 560 056
Scheme of Teaching and Examination from the Academic Year 2018-19 2019-20,2020-21
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

I SEMESTER B.E (PHYSICS GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week				Examination			Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BC	18MA11	Calculus and Linear Algebra	Mathematics	Science	3	2	--	03	50	50	100	4
2	BC	18PH12	Engineering Physics	Physics	Science	4	--	--	03	50	50	100	4
3	ES	18EE13	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	2	--	03	50	50	100	3
4	ES	18CV14	Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	2	--	03	50	50	100	3
5	ES	18MEL15	Engineering Graphics and Design	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6	BC	18PHL16	Engineering Physics Laboratory	Physics	Science	--	--	2	03	50	50	100	1
7	ES	18EEL17	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
8	Hu	18HS11/ 18HS12	English/ Kannada	Humanities	Humanities	1	--	2	02	50	50	100	1
					TOTAL	**13**	**06**	**08**	**21**	**350**	**350**	**700**	**20**

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UG- 2018-19

Dr.Ambedkar Institute of Technology, Bengaluru – 560 056
Scheme of Teaching and Examination from the Academic Year 2018-19
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

II SEMESTER B.E (CHEMISTRY GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week		Examination					Credits
						Theory Lecture	Tutorial	Practical/ Drawin	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BC	18MA21	Advanced Calculus and Numerical Methods	Mathematics	Science	3	2	--	03	50	50	100	4
2	BC	18CH22	Engineering Chemistry	Chemistry	Science	4	--	--	03	50	50	100	4
3	ES	18CS23	C Programming for Problem Solving	Computer Science and Engineering	Computer Science and	2	2	--	03	50	50	100	3
4	ES	18ELN24	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	2	--	03	50	50	100	3
5	ES	18ME25	Elements of Mechanical Engineering	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	2	--	03	50	50	100	3
6	BC	18CHL26	Engineering Chemistry Laboratory	Chemistry	Science	--	--	2	03	50	50	100	1
7	ES	18CSL27	Computer Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	03	50	50	100	1
8	Hu	18HS21/ 18HS22	English /Kannada	Humanities	Humanities	1	--	2	02	50	50	100	1
					TOTAL	**13**	**08**	**06**	**23**	**400**	**400**	**800**	**20**

Note: BC: Science Course, ES: Engineering Science, Hu: Humanity and Social Science.

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SCHEME OF TEACHING AND EXAMINATION from Academic Year 2018-19

B.E (Civil Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

III SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BC	18MA31	Transform calculus and Special functions	Mathematics	2	2	--	03	50	50	100	3
2	PC	18CV31	Building Materials and Construction	CV	3	---	---	03	50	50	100	3
3	PC	18CV32	Strength of Materials	CV	4	---	---	03	50	50	100	4
4	PC	18CV33	Surveying	CV	4	---	---	03	50	50	100	4
5	PC	18CV34	Fluid Mechanics	CV	4	---	---	03	50	50	100	4
6	PC	18CV35	Applied Engineering Geology	CV	3	---	---	03	50	50	100	3
7	PC	18CVL36	Civil Engg. Material Testing Laboratory	CV	---	---	2	03	50	50	100	1
8	PC	18CVL37	Surveying Practice	CV	---	---	3	03	50	50	100	1
9	HS	18HS31/32	Constitution of India Professional Ethics and Human Rights/ Environmental Science	HS/CV	1	--	--	02	50	50	100	1
10	MC	18HS33	Soft skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**19**	**02**	**05**	**29**	**500**	**450**	**950**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
11	MC	18MAD31	Basic Engg Mathematics - I	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, MC: Mandatory Course.

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SCHEME OF TEACHING AND EXAMINATION from Academic Year 2018-19

B.E (Civil Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

IV SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BC	18MA41	Numerical methods and Probability	Mathematics	2	2	--	03	50	50	100	3
2	PC	18CV41	Water Supply Engineering	CV	3	---	---	03	50	50	100	3
3	PC	18CV42	Analysis of Determinate Structures	CV	4	---	---	03	50	50	100	4
4	PC	18CV43	Hydraulics and Hydraulic Machines	CV	4	---	---	03	50	50	100	4
5	PC	18CV44	Hydrology and Irrigation Engineering	CV	3	---	---	03	50	50	100	3
6	PC	18CV45	Concrete Technology	CV	4	---	---	03	50	50	100	4
7	PC	18CVL46	Computer Aided Building Planning and Drawing	CV	---	1	3	03	50	50	100	1
8	PC	18CVL47	Concrete & Highway materials Lab	CV	---	---	2	03	50	50	100	1
9	HS	18HS41/42	Constitution of India Professional Ethics and Human Rights/ Environmental Science	HS/CV	1	--	--	02	50	50	100	1
10	MC	18HS43	Employability skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**25**	**03**	**05**	**29**	**500**	**450**	**950**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
	MC	18MAD41	Basic Engg Mathematics - II	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, NCMC: Non-Credit Mandatory Course.
ENV: Environmental Studies, CIP: Constitution of India Professional Ethics and Human Rights

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SCHEME OF TEACHING AND EXAMINATION from Academic Year 2018-19

B.E (Civil Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

V SEMESTER

Sl. No.	Course and		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	HS	18HS51/52	M&E / IPR (title as per BOS decision)	Hu	3	--	--	03	50	50	100	3
2	PC	18CV51	Wastewater Treatment and Disposal	CV	3	--	--	03	50	50	100	3
3	PC	18CV52	Design of RCC Structural Elements	CV	4	--	--	03	50	50	100	4
4	PC	18CV53	Analysis of Indeterminate Structures	CV	4	--	--	03	50	50	100	4
5	PC	18CV54	Geotechnical Engineering	CV	2	2	--	03	50	50	100	3
6	PE	18CV55X	Professional Elective - 1	CV	3	--	--	03	50	50	100	3
7	OE	18CV56X	Open Elective - A	CV	3	--	--	03	50	50	100	3
8	PC	18CVL57	Hydraulics and Hydraulic Machinery Laboratory	CV	--	--	2	03	50	50	100	1
9	PC	18CVL58	Computer Aided Design Laboratory	CV	--	--	2	03	50	50	100	1
10	HS	18HS55	Placement Training	Hu	2	--	--	03	50	--	50	PP/NP
				TOTAL	**25**	--	**4**	**30**	**500**	**450**	**950**	**25**

Electives

Course code	Professional Electives - 1
18CV551	Transportation Engineering
18CV552	Theory of Elasticity
18CV553	Ground Improvement Techniques
18CV554	Advanced Surveying
18CV555	Ground Water Hydrology
	OPEN ELECTIVE - A
18CV561	Air Pollution and Control
18CV562	Integrated Solid Waste Management

Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT for open electives) offered by any Department.

Selection of an open elective is not allowed provided:

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2018-19

B.E (Civil Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

Professor and Head
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Dr. Ambedkar Institute of Technology
Bangalore - 560 0..

VI SEMESTER

Sl. No.	Course and		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	HS	18HS61/62	M&E/IPR	Hu	3	--	--	03	50	50	100	3
2	PC	18CV61	Design of Steel Structures	CV	3	2	--	03	50	50	100	4
3	PC	18CV62	Railways, Airport, Tunnel and Harbour Engineering	CV	3	--	--	03	50	50	100	3
4	PC	18CV63	Foundation Engineering	CV	2	2	--	03	50	50	100	3
5	PE	18CV64X	Professional Elective - 2	CV	3	--	--	03	50	50	100	3
6	OE	18CV65X	Open Elective – B	CV	3	--	--	03	50	50	100	3
7	PC	18CVL66	Computer Aided Drawing of RC and Steel structures	CV	--	--	2	03	50	50	100	1
8	PC	18CVL67	Geotechnical Engineering Laboratory	CV	--	--	2	03	50	50	100	1
9	M	18CVM68	Mini-Project					03	50	50	100	2
10	PC	18CVL69	Extensive Survey Project	CV	--	--	2	03	50	50	100	1
11	HS	18HS66	Placement Training	Hu	2	--	--	03	50	--	50	PP/NP
			TOTAL		**20**	**2**	**6**	**33**	**550**	**500**	**1050**	**24**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Internship: All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters.

A University examination will be conducted during VIII semester and prescribed credit are added to VIII semester.

Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 2	Open Elective - B
18CV641	Pre-Stressed Concrete	Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT for open electives) offered by any Department. Selection of an open elective is not allowed provided,
18CV642	Alternate Building Materials and Technologies	
18CV643	Traffic Engineering	

18CV644	Open Channel Hydraulics	• The candidate has studied the same course during the previous semesters of the programme. • The syllabus content of open elective is similar to that of Departmental core courses or professional electives. • A similar course, under any category, is prescribed in the higher semesters of the programme. Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.
18CV645	Earth and Earth Retaining Structures	
Open Elective - B		
18CV651	Integrated Solid Waste Management	
18CV652	Photogrammetry and Remote Sensing	

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SCHEME OF TEACHING AND EXAMINATION from Academic Year 2018-19
B.E (Civil Engineering)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

VII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18HS71/72	CMEP / OSHA	IM/CV	2	--	--	03	50	50	100	2
2	PC	18CV71	Design of RC & Steel Structures	CV	4	---	---	03	50	50	100	4
3	PC	18CV72	Estimation and Valuation	CV	4	---	---	03	50	50	100	4
4	PE	18CV73X	Professional Elective - 3	CV	3	---	---	03	50	50	100	3
5	PE	18CV74X	Professional Elective - 4	CV	3	--	--	03	50	50	100	3
6	OE	18CV75X	Open Elective - C	CV	3	--	--	03	50	50	100	3
7	PC	18CVL76	Environmental Engg. Laboratory	CV	---	---	2	03	50	50	100	1
8	PC	18CVL77	Advanced Civil Engg. Laboratory	CV	---	---	2	03	50	50	100	1
8	Project	18CVP78	Project Work Phase - I	CV	--	--	2	03	50	50	100	2
9	INT	18CVI79	Internship	(If not completed after VI semester examinations, it has to be carried out during the intervening vacations of VII and VIII semesters)								--
TOTAL					**19**	**--**	**6**	**27**	**450**	**450**	**900**	**23**

Note:
PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course
CMEP: Cost Management of Engineering Projects, OSHA: Occupational Safety and Health Administration

Internship:
All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters.
A SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester.
Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 3	Open Elective - B
18CV731	Pavement Materials and Construction	

18CV732	Photogrammetry and Remote Sensing	Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT for open electives) offered by any Department. Selection of an open elective is not allowed provided, ✓ The candidate has studied the same course during the previous semesters of the programme. ✓ The syllabus content of open elective is similar to that of Departmental core courses or professional electives. ✓ A similar course, under any category, is prescribed in the higher semesters of the programme. ✓ Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.
18CV733	Environmental Impact Assessment	
18CV734	Design of Bridges	
18CV735	Structural Dynamics	
18CV736	Construction Project Management	
18CV737	Reinforced Earth Structures	

Electives : 4

Course code	Professional Elective
18CV741	Water Resources Engineering
18CV742	Advanced Foundation Design
18CV743	Pavement Design
18CV744	Earthquake Resistant Design of Structures
18CV745	Solid Waste Management
18CV746	Quality Management System in Civil Engineering
18CV747	Hydraulic Structures & Irrigation drawing

Electives : B

Course code	Open Elective - C
18CV751	Ecology and Environmental Impact Assessment
18CV752	Urban Transport Planning
18CV753	Photo Geology and Remote Sensing

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SCHEME OF TEACHING AND EXAMINATION from Academic Year 2018-19

B.E (Civil Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

VIII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18HS81/82	CMEP / OSHA	IM /CV	2	--	--	03	50	50	100	2
2	Project	18CVP81	Project Work Phase - II	CV	--	--	2	03	50	50	100	10
3	Seminar	18CVS82	Technical Seminar	CV	--	--	2	03	50	50	100	1
4	INT	18CVI83	Internship	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semesters.)				03	50	50	100	2
TOTAL					**02**	--	**4**	**12**	**200**	**200**	**400**	**15**

Note:

PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

CMEP: Cost Management of Engineering Projects, OSHA: Occupational Safety and Health Administration

Internship:

Those, who have not pursued /completed the internship will be declared as failed and have to complete during subsequent SEE examination after they satisfy the internship requirements.

Total 175 Credit Distributions for all semester B.E. (Civil Engineering) Programme.

Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
Credits	20	20	24	24	25	24	23	15	175

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Syllabus for 2018-19 Batch (2019-20,2020-21)

Semester: III	
Course Title: BUILDING MATERIALS AND CONSTRUCTION	
Course Code: **18CV31**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand engineering properties of various materials used in civil engineering construction and their applications.
2	To understand the techniques and requirements involved in designing the components of buildings and method of construction.
3	To gain the knowledge in the field of civil engineering and to achieve economy in the construction.

UNIT – I	
INTRODUCTION TO BUILDING MATERIALS: **STONES:** Quarrying of stones, Tests on stones, properties and uses, Deterioration and preservation of stone work, **BRICKS:** Ingredients of good brick earth, manufacturing of Bricks, classification and qualities of bricks, Test on Bricks. **CEMENT:** Introduction, Ingredients, Manufacturing, types. **CEMENT CONCRETE BLOCKS:** Ingredients, Stabilized mud blocks, Sizes requirement of good blocks, **MORTAR**: Definition, types, Proportions and Requirements of a good Mortar. **TIMBER:** Timber, classification, seasoning of timber. Defects in timber, preservation of timber, uses & their properties. Plywood, Block Board, Particle Board, Laminates.	**08 Hrs**
UNIT – II	
FOUNDATION: Function and requirements of a good foundation, Types of foundations, Preliminary investigation of soil, Safe Bearing Capacity of Soil, Introduction to spread, combined, strap, mat and pile foundations, Design of shallow foundations. **MASONRY:** Classification of Masonry, Definition of terms used in Masonry, Classification of stone masonry, Joints in stone masonry, Introduction to load bearing and partition walls. Bonds in Brick work - English Bond, Flemish Bond, and Reinforced Brick Masonry, Characteristics and requirements of good brick masonry.	**08 Hrs**
UNIT – III	
ARCHES, LINTEL AND BALCONY: Elements of an arch, Classification of arches, Stability of arch, Definition and classification of Lintels, Definition and functions of Chejja, Canopy & Balcony. **DOORS AND WINDOWS:** Doors and windows, Definition of technical terms, Types of Doors, Types of windows, commercially available windows and doors (PVC, CPVC and Aluminium). **ROOFS AND FLOORS:** Types of Roofs & Roofing materials, Flat roof (RCC), Types of pitched roofs, Wooden Truss,	**08 Hrs**

Steel trusses, Types of flooring, Factors affecting selection of flooring materials.	
UNIT – IV	
STAIRS AND FORM WORK: Definition of technical terms, Requirements of good stair, Types of Stairs, Geometrical design of RCC Dog-legged and open well stairs (Plan and sectional elevation). Introduction to formwork and scaffolding, Formwork details for RCC Column, Beams and Floors, Shoring and under pinning. **PLASTERING, PAINTING AND DAMP PROOFING:** Purpose of plastering, Methods of plastering, Materials of plastering. Paints, Constituents of paints & types. Purpose of Painting, Application of Paints to new and old surfaces. Damp Proofing - Causes of Dampness, Effects of Dampness, Methods of Damp Proofing.	**08 Hrs**
UNIT – V (Blended Learning)	
GREEN BUILDING: Introduction to green building, fundamentals of building science, Green Design, Green Construction Methods, Energy Auditing, Green Products and Miscellaneous Topics, Life-Cycle Assessment and Precast building, Passive Design Strategy, Carbon Footprint.	**07 Hrs**

Course Outcomes: The students will be able to	
1	Gain knowledge on the use of various construction materials.
2	Gain knowledge on types of foundations, classification of Masonry structures, Arches and lintels and their applications.
3	Understand types of Doors, windows, roofs and floors.
4	Explain the construction of Staircase, Plastering, painting and damp proofing and green building concept.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Building Construction, B.C Punmia, India.
2	Building Construction, Rangawala P.C. Charter Publishing House, Anand, India.
3	Building Construction, Sushil Kumar, Standard Publication and Distributors, New Delhi.

Reference Books:	
1	A Text Book Building Materials, by P.G. Varghese, Prentice-Hall of India Pvt. Ltd., Publication.
2	Engineering Materials, Rangawala P.C. Charter Publishing House, Anand, India.
3	Concrete Technology – Theory and Practice, M.S. Shetty, S. Chand and Co, New Delhi, 2002.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓						
CO2			✓									
CO3		✓										
CO4		✓					✓		✓			

Syllabus for 2018-19 Batch UG (CV)

Semester: III	
Course Title: STRENGTH OF MATERIALS	
Course Code: **18CV32**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3Hrs

Course Learning Objectives:	
1	To focus on the determination of mechanical properties of the material, stress strain behavior, temperature stresses and elastic behavior of materials under various loading condition,
2	To analyze the statically determinate structures and to calculate the bending stresses, shear stresses in beams.
3	To study the deflection of statically determinate beams under transverse loading and elastic stability of columns.
4	To study the behavior of shafts and thick and thin cylinders under different types of loading.

UNIT – I	
SIMPLE STRESS AND STRAIN: Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress – Strain Diagram for structural steel and non-ferrous materials, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Elongation member due to self– weight .	**10 Hrs**
UNIT – II (Blended Learning)	
SIMPLE STRESS AND STRAIN (CONTINUED): Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Thermal stresses (including thermal stresses in compound bars). **COMPOUND STRESSES:** Introduction, Stress components on inclined planes, General two-dimensional stress system, Principal planes and stresses, Mohr's circle of stresses.	**10 Hrs**
UNIT – III	
BENDING MOMENT AND SHEAR FORCE IN BEAMS: Introduction, Types of beams loadings and supports, Shearing force in beam, Bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering point loads, UDL, UVL and Couple.	**11 Hrs**
UNIT – IV	
BENDING STRESS, SHEAR STRESS IN BEAMS: Introduction – Bending stress in beam, Assumptions in simple bending theory, Pure bending derivation of Bernoulli's equation, Modulus of rupture, section modulus, Flexural rigidity, Expression for shear stress in beam, Shear stress diagram for rectangular, symmetrical 'I' and 'T' section (Flitched beams not included). Determination of Shear centre and its importance. **DEFLECTION OF BEAMS:** Introduction – Definitions of slope, deflection, Elastic curve-derivation of differential equation of flexure, Sign convention, Slope and deflection for standard loading classes using Macaulay's method for prismatic beams and overhanging beams subjected to point loads, UDL and Couple.	**11 Hrs**

UNIT – V	
TORSION OF CIRCULAR SHAFTS: Introduction – Pure torsion-torsion equation of circular shafts, Strength and stiffness, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections. Thin and thick cylinders including derivations and numerical problems. **ELASTIC STABILITY OF COLUMNS:** Introduction – Short and long columns, Euler's theory on columns, Effective length slenderness ration, radius of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems,	**10 Hrs**

Course Outcomes: The students will be able to	
1	Explain the concept of simple and compound stresses, strains in various metals and their behaviour when subjected to external force and temperature.
2	Examine the behavior of structural members subjected to Transverse forces and their applications concerned to civil engineering problems.
3	Solve the problems on deflection, bending and shear stresses in beams.
4	Explain the elastic stability of columns and torsion of shafts.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Strength of Materials, Subramanyam, Oxford University Press, Edition 2008
2	Strength of Materials, Basavarajaiah and Mahadevappa Universities Press (2009).
3	Strength of Materials, R. K Bansal, Lakshmi Publications (P) Ltd.,

Reference Books:	
1	Strength of Materials, Singer Harper and Row Publications.
2	Elements of Strength of Materials, Timoshenko and Young Affiliated East-West Press.
3	Strength of Materials, S. Ramamrutham, Dhanpath Rai, Publishing Co.
4	Strength of materials, Hibbeler, PEARSON Publishers.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓				✓			
CO2		✓	✓		✓		✓			✓		
CO3		✓	✓			✓	✓			✓		
CO4	✓		✓	✓	✓	✓	✓			✓		✓

Syllabus for 2018-19 Batch UG (CV)

Semester: III	
Course Title: SURVEYING	
Course Code: **18CV33**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To transfer the objects on the ground to the sheet for the planning and analysis.
2	To give exposure to all instruments used for linear; angular, horizontal and vertical measurements.
3	To prepare topographical maps, earth work estimation, aligning of transport systems, calculation of capacity water storage systems, etc.

UNIT – I	
INTRODUCTION: Definition of Surveying, Classification of Surveys, Uses of Surveying, Units of Measurements, Basic principles of surveying, Errors, Classification, Precision and accuracy. **COMPASS SURVEYING:** Meridians and bearings, Principle, working and use of - Prismatic compass, Surveyor's compass, Magnetic bearing, true bearings, WCB and Reduced bearing. Dip and Declination, Traverse - closed and open traverse, Local attraction	**10 Hrs**
UNIT – II (Blended Learning)	
CONTOURING: Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours. **AREAS AND VOLUMES:** Calculation of area from cross staff surveying, Calculation of area of a closed traverse by coordinates method. Computations of volumes by trapezoidal and prismoidal rule.	**10 Hrs**
UNIT – III	
INTRODUCTION TO LEVELING: Principles and basic definitions, Fundamental axes and parts of a dumpy level, Types of adjustments and objectives, Temporary adjustments of a dumpy level, Curvature and refraction correction, Type of leveling, Simple leveling, Profile leveling, Cross sectioning, Fly leveling, Booking of levels, Rise and fall method and Height of instrument method, Fly back leveling. **THEODOLITE SURVEYING:** Study and uses of Theodolite and temporary Adjustments.	**10 Hrs**
UNIT – IV	
TRIGNOMETRIC LEVELLING: Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method. **TACHEOMETRY:** Basic principle, Types of tacheometric survey Tacheometric equation for horizontal line of sight and inclined line of sight in fixed hair method, Anallactic lens in external focusing telescopes, Reducing the constants in internal focusing telescope, Subtence bar method.	**11 Hrs**
UNIT – V	
CURVE SETTING:	**11 Hrs**

SIMPLE AND COMPOUND CURVES: Types of curves, Setting out simple curves by linear methods and Rankine's deflection method. Elements of Compound curves, Setting out of compound curves. **TRANSITION AND VERTICAL CURVES:** Characteristics of Transition curves, Length of Transition curve, Setting out cubic Parabola, Basic terminology of Vertical curves – Numerical problems.	

Course Outcomes: The students will be able to	
1	Explain the fundamental principles of surveying using chain, compass and its accessories.
2	Define the various concepts of levelling with respect to vertical and angular measurements using conventional and modern instruments.
3	Apply the procedural knowledge for measuring distance and elevation by trigonometric and tacheometric levelling and setting out of curves with earthwork calculations.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Surveying Vol. I and II, B.C. Punmia, Laxmi Publications, New Delhi.
2	Surveying Vol. I and II, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.
3	Surveying and Levelling – R Subramanian. Oxford University Press (2007).
4	Text Book of Surveying – C. Venkataramiah. Universities Press. (2009 Reprint).

Reference Books:	
1	Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.
2	Surveying , Arora
3	Maps by Survey of India.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										✓
CO2	✓	✓		✓		✓		✓				
CO3	✓	✓	✓	✓					✓			

Syllabus for 2018-19 Batch UG (CV)

Semester: III	
Course Title: FLUID MECHANICS	
Course Code: **18CV34**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 =100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To introduce the properties of fluids and classification of fluids.
2	To introduce the concept of static pressure of fluid and its measurements.
3	To introduce the students to kinetic and kinematics of fluid flow.
4	To study the different devices used for measurement of velocity and discharge of fluid flow.

UNIT – I	
BASIC PROPERTIES OF FLUIDS: Introduction, Definition of Fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension and Capillarity. Newton's law of viscosity (theory and problems).Capillary rise in a vertical tube and between two plane surfaces (theory and problems). **PRESSURE AND ITS MEASUREMENT:** Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure. Vapour pressure. Measurement of pressure using a simple, differential and inclined manometers (theory and problems).	**11 Hrs**
UNIT – II	
HYDROSTATIC PRESSURE ON SURFACES: Basic definitions, equations for hydrostatic force and depth of centre of pressure for Vertical and inclined submerged laminae (plane and curved) – Problems. **KINEMATICS OF FLOW:** Introduction, methods of describing fluid motion, definitions of types of fluid flow, streamlines, path line, stream tube. Three dimensional continuity equations in Cartesian Coordinates (derivation and problems). General Continuity equation (problems). Velocity potential, Stream function, Equipotential line, Stream line- problems, Stream function.	**11Hrs**
UNIT – III	
DYNAMICS OF FLUID FLOW: Introduction, Energy possessed by a fluid body. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Problems on applications of Bernoulli's equation (with and without losses). Application of Bernouli's equation (Venturimeter, Orificemeter, Pitot Tube and Pitot static tube) - problems	**10 Hrs**
UNIT – IV	
FLOW THROUGH PIPES: Introduction, losses in pipe flow, Darcy-Weisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe-problems. Minor losses in pipe flow, equation for head loss due to sudden expansion and contraction - problems. Water hammer in pipes - problems.	**10 Hrs**
UNIT – V (Blended Learning)	
DEPTH AND VELOCITY MEASUREMENTS, NOTCHES AND WEIRS: Introduction, Measurement of depth, point and hook gauges, self-recording gauges. Staff gauge, Weight gauge, float gauge. Measurement of velocity- single and double gauges, pitot	**10 Hrs**

tube, Current meter. **Discharge measurements:** Introduction, Triangular notch, Rectangular notch, Cipolletti notch, Rotometer, Ogee weir and Broad crested weir, Small orifices, mouth pieces, Venturi flume – Problems.	

Course Outcomes: The students will be able to	
1	Analyse the properties of fluids.
2	Determine /measure static fluid pressure.
3	Define the kinematics and kinetics of flow and measurement of velocity and discharge.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	A Text Book of Fluid mechanics & Hydraulic Machines'- R.K.Rajput, S.Chand & Co, New Delhi, 2006 Edition.
2	'Principles of Fluid Mechanics and Fluid Machines'- N.Narayana Pillai, Universities Press (India), Hyderabad, 2009 Edition.
3	'Text Book Of Fluid Mechanics & Hydraulic Machines'- R.K.Bansal, Laxmi Publications, New Delhi, 2008 Edition.
4	Hydraulics and Hydraulic Machines- Dr. P. N. Modi and Seth, McGraw Hill Publications.

Reference Books:	
1	Fundamentals of Fluid Mechanics – Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, Wiley India, New Delhi, 2009 Edition.
2	'Introduction To Fluid Mechanics' – Edward j. Shaughnessy,jr; Ira m. Katz:; James p Schaffer, Oxford University Press, New Delhi, 2005 Edition.
3	Fluid Mechanics' – Streeter, Wylie, Bedford New Delhi, 2008(Ed)
4	Fluid Mechanics and Turbomachines'- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition
5	A Text book of Fluid mechanics and Hydraulic machines – Chandramouli and others
6	Fluid Mechanics, K L Kumar.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							
CO2	✓	✓			✓							✓
CO3	✓		✓				✓			✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: III	
Course Title: APPLIED ENGINEERING GEOLOGY	
Course Code: **18CV35**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To introduce the basics of engineering Geology and its applications in various fields of civil engineering construction.
2	To study the various processes involved in the formation of rocks and minerals.
3	To understand the behaviour of rock structure upon construction of civil engineering structures.

UNIT – I	
INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology. **MINERALOGY:** Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles); Kaolin (Paper, paint and textile);Asbestos (AC sheets); Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement); Mica Group (Electrical industries); Ore minerals - Iron ores(Steel); Chromite (Alloy); Bauxite (aluminium); Chalcopyrite (copper).	**08 Hrs**
UNIT – II	
PETROLOGY: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.	**08 Hrs**
UNIT – III	
STRUCTURAL GEOLOGY, GEOMORPHOLOGY AND SEISMOLOGY: Landforms – Aeolian, Coastal and Fluvial. Study of Geo-morphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges. Watershed management, Floods and their control, River valley, Drainage pattern – parameters and development; Coastlines and their engineering considerations. Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes, Earthquake intensity, Richter Scale, Seismograph, Seismic zones- World and India, Tsunami – causes and effects. Early warning system. Reservoir Induced Seismicity; Landslides – causes and their control.	**08 Hrs**
UNIT – IV (Blended Learning)	
HYDROGEOLOGY: Groundwater Exploration - Electrical Resistivity and Seismic methods, Resistivity curves, Water Bearing Formations, Aquifer types and parameters - Porosity, Specific yield and retention, Permeability, Transmissibility and Storage Coefficient. Types of dams, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's contributing to the success of a reservoir. Purposes of Tunnelling, Effects of Tunnelling on the ground Role of Geological Considerations	**08 Hrs**

(lithological, structural and ground water) in Tunnelling over break and lining in tunnels	
UNIT – V	
GEODESY: Study of Topographic maps and Contour maps; Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS) and Global Positioning System (GPS) – Concept and their use resource mapping. LANDSAT Imagery –Definition and its use. Impact of Mining, Quarrying and Reservoirs on Environment. Natural Disasters and their mitigation.	**07 Hrs**

Course Outcomes: The students will be able to	
1	Exhibit the geological knowledge in various infrastructure developments, economic growth of a region.
2	Explain the mineral resources at National and International Level, and asses the properties of building materials and their application in construction.
3	Assess the various structural features and explain various geological tools using in ground water and natural resources exploration.

Text Books:	
1	Text book of Geology by P.K. Mukerjee, World Press Pvt. Ltd. Kolkatta
2	Text of Engineering and General Geology by Parbin Singh, Published by S. K. Kataria and Sons, New Delhi.

Reference Books:	
1	A text book of Engineering Geology by Chenna Kesavulu, Mac Millan India Ltd
2	Dimitri P Krynine, William R Judd, “Principles of Engineering Geology and Geotechnics” CBS publishers & Distributors-2003

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓	✓					✓
CO2	✓	✓		✓		✓	✓					✓
CO3	✓	✓		✓	✓	✓	✓					

Syllabus for 2018-19 Batch UG (CV)

Semester: III	
Course Title: CIVIL ENGINEERING MATERIAL TESTING LABORATORY	
Course Code: **18CVL36**	Evaluation Procedure:
Credits: **01**	CIE + Record+ SEE Marks = 20 + 30 + 50 = 100
Teaching Hours: 26 Hrs (L:T:P:0:0:2)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Expose students to understand the fundamental modes of loading on structures through different demonstrations.
2	Illustrate the function of various methods on materials testing.
3	Examine the mechanical properties of materials under static and dynamic loading.

UNIT – I	
1. Tension test on Mild steel and HYSD bars. 2. Compression test of Mild Steel, Cast iron and Wood. 3. Torsion test on Mild Steel circular sections	**6 Hrs**
UNIT – II	
4. Bending Test on Wood Under two point loading 5. Shear Test on Mild steel 6. Impact test on Mild Steel (Charpy and Izod) 7. Test on Springs	**6 Hrs**
UNIT – III	
8. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's 9. Test on Bricks and Tiles	**4 Hrs**
UNIT – IV (Blended Learning)	
10. Tests on Fine aggregates – Moisture content, Clay Content, Specific gravity, Bulk density, Sieve analysis and Bulking of sand	**4 Hrs**
UNIT – V	
11. Tests on Coarse aggregates – Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis. 12. Demonstration of Strain gauges and Strain indicators	**6 Hrs**

Course Outcomes: The students will be able to	
1	Evaluate the impact of Engineering properties of a material used in various components of Civil Engineering structures.
2	Demonstrate the responsibilities in the areas of materials testing.
3	Identify, formulate and solve Engineering problems of structural elements subjected to flexure.

Question paper pattern:
Two questions are to be set – one from group experiments and the other as individual experiment. Group Experiments: Tension, Compression Torsion and Bending Tests Individual Experiments: Remaining tests

Text Books:	
1	Testing of Engineering Materials, Davis, Troxell and Hawk, International Student Edition – McGraw Hill Book Co. New Delhi.
2	"Testing of Metallic Materials", Suryanarayana A K, Prentice Hall of India Pvt. Ltd.

	New Delhi.
3	"Material Testing Laboratory Manual", Kukreja C B- Kishore K. Ravi Chawla Standard Publishers & Distributors 1996.
4	Concrete Manual, M.L. Gambhir – Dhanpat Rai & Sons- New Delhi.
5	Relevant IS Codes: IS:1608(1962), IS:1608(1972), IS:1786(2008), IS:1499(1977), IS:1598(1977), IS:1500(1983), IS:1501(Part-I, 1984), IS:1501(Part-II,1984), IS:1586(2000), IS:1077(1992), IS:3495(Part-I,1992), IS:3495(Part-II,1992),

Reference Books:	
1	Mechanical Testing of Materials", Fenner, George Newnes Ltd. London
2	"Experimental Strength of Materials", Holes K A, English Universities Press Ltd. London.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓			✓	✓					
CO2								✓				✓
CO3	✓				✓							✓

Syllabus for 2018-19 Batch UG (CV)

Semester: III	
Course Title: SURVEYING PRACTICE	
Course Code: **18CVL37**	Evaluation Procedure:
Credits: **01**	CIE + Record+ SEE Marks = 20 + 30 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:0:0:3)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To use different survey equipment's for linear and angular measurements.
2	To determine elevation, area enclosed and alignment of civil engineering structures.
3	To calculate distance between inaccessible objects.
4	To expose to the state of the art equipment's like Total Station.

UNIT – I	
Exercise – 1 Setting out of rectangle, hexagon using tape/chain, compass and other accessories. Measurement of bearing of the sides of a closed traverse & adjustment of closing error by Bowdich method and Transit method. **Exercise – 2** To determine the distance between two inaccessible points using compass.	**06 Hrs**
UNIT – II	
Exercise – 3 To determine difference in elevation between two points using fly levelling technique & to conduct fly back levelling. Recording of levels using both HI and Rise & Fall methods. **Exercise – 4** To determine difference in elevation between two points using reciprocal levelling and to determine the collimation error. **Exercise – 5** To conduct profile levelling for water supply /sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a given formation level. **Exercise – 6** Interpolation of contours by block levelling.	**09 Hrs**
UNIT – III (Blended Learning)	
Exercise – 7 Total Station: Introduction, Exposure to use of total station: traversing, longitudinal section, block levelling, Distance between two in-accessible points, data processing usage of relevant software's for preparation of contour drawings. **Exercise – 8** Measurement of horizontal angles by the method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite.	**06 Hrs**
UNIT – IV	
Exercise – 9 To determine the elevation of an object by single plane method, when base is accessible and inaccessible. **Exercise – 10** To determine the distance and difference in elevation between two inaccessible points by double plane method. **Exercise – 11** To determine the tacheometric constants using horizontal and inclined line of sight. To Determine the gradients between the two points by Tachometric method.	**08 Hrs**
UNIT – V	

Exercise – 12 To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced. **Exercise – 13** To set out simple curves using Rankine's deflection angles method. **Exercise – 14** To set out compound curve with angular methods using theodolite only.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Demonstrate the fundamental principles of Engineering surveying using chain, compass, theodolite and its accessories.
2	Apply the procedural knowledge for measuring distance and elevation by trigonometric and tacheometric levelling for setting out of curves and earthwork calculations.
3	Illustrate the Civil Engineering projects using conventional and advanced surveying equipment's.

Question paper pattern:
Two questions are to be set, the student has to write both the questions and conduct one experiment.

Text Books:	
1	Surveying Vol–I and II–B.C. Punmia, Laxmi Publications, New Delhi.
2	Surveying Vol. I and II, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi
3	Surveying and Levelling –R Subramanian. Oxford University Press (2007)

Reference Books:	
1	Fundamentals of Surveying - Milton O. Schimidt–Wong, Thomson Learning.
2	Text Book of Surveying – C. Venkataramiah. Universities Press.(2009 Reprint)
3	Maps by Survey of India.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓			✓			✓		
CO2	✓	✓		✓		✓						
CO3	✓	✓			✓		✓					✓

Syllabus for 2018-19 Batch UG (CV)

Semester: III / IV	
Course Title: ENVIRONMENTAL SCIENCE	
Course Code: **18HS32 / 42**	Evaluation Procedure:
Credits: **01**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 13 Hrs (L:T:P:S:1:0:0:0)	SEE Duration: 2 Hrs

Course Learning Objectives:	
1	To familiarize and understand the environment as the whole and to know about components of the environment, Natural Resources and Energy Patterns in the environment.
2	To gain the confidence to bring awareness about environmental pollution, effect, its prevention among the community and environmental issues.
3	To understand the importance of environmental protection and sustainable development.

UNIT – I	
INTRODUCTION: Concept of environmental studies. Definition of environment, component of the environment and structure of the atmosphere. Study of different ecosystems. **HUMAN ACTIVITIES AND ITS EFFECT ON ENVIRONMENT:** Agriculture, Industry, Mining, Transportation, & Urbanization.	**3 Hrs**
UNIT – II (Blended Learning)	
NATURAL RESOURCES: Forest Resources, Water Resources, Mineral Resources, Food Resources and Land Resources **ENERGY:** Definition of energy and energy resources, different types of energy-conventional and non-conventional energies.	**4 Hrs**
UNIT – III	
ENVIRONMENTAL POLLUTION AND EFFECTS: Air pollution, Water pollution "water born and water induced disease", Soil pollution and Noise pollution. **CURRENT ENVIRONMENTAL ISSUES OF IMPORTANCE:** Population Growth, Climate Change and Global warming, Acid Rain, Ozone layer depletion	**3 Hrs**
UNIT – IV	
ENVIRONMENTAL PROTECTION: Episodes (Los Angeles smog, Minamata disease in Japan 1945, Bhopal (India) gas tragedy 1984) Legislation to control and protect the environment, education at different level about environmental awareness. **ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABLE DEVELOPMENT:** **RAINWATER HARVESTING:** Definition and methods.	**3 Hrs**

Course Outcomes: The students will be able to	
1	Understand the Environment and its pollution in respect of different human activities.
2	Analyse the importance of natural resources, different energy resources and its conservation.
3	Understand the environmental pollution and its effects and the value of environment protection by studying past episode.
4	Adopt the suitable scheme for sustainable development through importance of environmental impact assessment and rainwater harvesting.

Question paper pattern:
• The question paper will have fifty objective questions carrying equal marks. • Each objective question will be for 01 marks. • The students will have to answer fifty questions.

Text Books:	
1	Ranjit Daniels R.J. and Jagdish Kirshnaswamy, (2009), "Environmental Studies", Wiley India Private Ltd., New Delhi.
2	Benny Joseph (2005), "Environmental Studies", Tata McGraw - Hill Publishing Company Limited.
3	Rajagopalan R. (2005), "Environmental Studies – From Crisis to Cure", Oxford Univesity Press.

Reference Books:	
1	Raman Sivakumar, (2005), "Principles of Environmental Science and Engineering", Second Edition, Thomson Learning, Singapore.
2	Tyler Miller Jr. G. (2006), "Environmental Science – Working with the Earth", Eleventh Edition, Thomson Brooks/Cole.
3	Meenakshi P. (2006), "Elements of Environmental Science and Engineering", Prentice Hall of India Private Limited, New Delhi.
4	Prakash S.M. (2007), "Environmental Studies", Elite Publishers, Mangalore.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓	✓					
CO2					✓	✓	✓					
CO3	✓	✓					✓					
CO4			✓		✓		✓					

Syllabus for 2018-19 Batch UG (CV)

Semester: IV	
Course Title: WATER SUPPLY ENGINEERING	
Course Code: **18CV41**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Analyse the variation of water demand and estimate water requirement for a community
2	Evaluate the sources and conveyance systems for raw and treated water
3	Study drinking water quality standards and illustrate the qualitative analysis of water
4	Design physical, chemical, and biological treatment methods to ensure safe and potable water Supply.

UNIT – I	
INTRODUCTION: Water crisis, Conservation of water resources, need for protected water supply. **DEMAND OF WATER:** Types of water demands -domestic demand, institutional and commercial, public use, fire demand. Factors affecting per capita demand. Population forecasting - different methods with merits and demerits. Variations in demand of water. Peak factor, Design period and factors governing design period. Numerical problems.	**8 Hrs**
UNIT – II (Blended Learning)	
SOURCES, COLLECTION AND CONVEYANCE OF WATER: Surface and Subsurface sources-suitability with regard to quality and quantity. Intake structures-different types of intakes; factors for selection and location of intakes. Pumps-Necessity, types-Power of pumps; factors for the selection of a pump. Pipes - Design of the economical diameter of rising main; Nomograms-Use; Pipe appurtenances.	**8 Hrs**
UNIT – III	
QUALITY OF WATER: Objectives of water quality management, Concept of safe water, wholesomeness and palatability. Water borne, water based, water washed and vector diseases. **EXAMINATION OF WATER:** Sampling - objectives, methods, preservation techniques, physical, chemical and microbiological examinations, using analytical & instrumental techniques, drinking water BIS, ICMR standards & WHO guidelines, health significance of fluoride, nitrates, hardness and heavy metals like mercury, cadmium, arsenic.	**8 Hrs**
UNIT – IV	
WATER TREATMENT: Objectives- Treatment flow-chart. Aeration-Principles, types of Aerators. Sedimentation: Theory, settling tanks, types, design. Coagulant aided sedimentation, jar test, chemical feeding, flash mixing and clariflocculator. Filtration; Mechanism-theory of Filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design-excluding under drainage system back washing of filters. Operational problems in filters.	**8 Hrs**
UNIT – V	
DISINFECTION: Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. UV rays. Treatment of swimming pool water. Fluoridation and De-fluoridation, bio-organic based water treatment techniques RO and membrane technique.	**7 Hrs**

DISTRIBUTION SYSTEM: Methods- Gravity, Pumping, Combined gravity and pumping system. Layouts: Dead end, Radial, Grid iron, Circular system. Network analysis in distribution system – Hardy cross method, Numerical problems. Hazen - Williams formula.	

Course Outcomes: The students will be able to	
1	Estimate average and peak water demand for a community.
2	Evaluate available sources of water, quantitatively and qualitatively and make an appropriate choice for a community.
3	Evaluate water quality and environmental significance of various parameters and plan a suitable treatment system.
4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Water supply Engineering – S. K. Garg, Khanna Publishers
2	Environmental Engineering I – B C Punmia and Ashok Jain
3	Water Supply & Sanitary Engineering, G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company.

Reference Books:	
1	Hammer, M.J., (1986), Water and Wastewater Technology, SI Version, 2nd Edition, John Wiley and Sons.
2	Karia, G.L., and Christian, R.A., (2006), Wastewater Treatment, Concepts and Design Approach, Prentice Hall of India Pvt. Ltd., New Delhi.
3	Metcalf and Eddy, (2003), Wastewater Engineering, Treatment and Reuse, 4th Edition, Tata McGraw Hill Edition, Tata McGraw Hill Publishing Co. Ltd.
4	Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986), Environmental Engineering – McGraw Hill Book Co.
5	Raju, B.S.N., (1995), Water Supply and Wastewater Engineering, Tata McGraw Hill Pvt. Ltd., New Delhi.
6	Sincero, A.P., and Sincero, G.A., (1999), Environmental Engineering – A Design Approach – Prentice Hall of India Pvt. Ltd., New Delhi.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓	✓									
CO3	✓	✓	✓	✓	✓		✓					
CO4			✓		✓						✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: IV	
Course Title: ANALYSIS OF DETERMINATE STRUCTURES	
Course Code: **18CV42**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **04**	
Teaching Hours: 52 Hrs(L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To learn the arrangement of structural elements to support the external loads and to find the response of a structure to a given loading,
2	To analyze and to determine the deflection of beams, bent beams and Truss joints
3	To analyze the beams under moving loads and to study the concept of influence lines, which are useful in the design.
4	To evaluate the forces in statically determinate arches and cables.

UNIT – I	
STRUCTURAL SYSTEMS Forms of structures, Conditions of equilibrium, Degree of freedom, Linear and Nonlinear behaviour, One, two, three dimensional structural systems, Determinate and indeterminate structures [Static and Kinematics]. **ANALYSIS OF TRUSSES:** Method of joints and Method of sections.	**10 Hrs**
UNIT – II	
DEFLECTION OF BEAMS - Moment area method. **DEFLECTION OF BEAMS -** Conjugate beam method **STRAIN ENERGY :** Strain energy and complimentary strain energy, Strain energy due to axial load, bending and shear, Theorem of minimum potential energy, Law of conservation of energy, Principle of virtual work.	**11 Hrs**
UNIT – III	
STRAIN ENERGY continued The first and second theorem of Castigliano's, problems on beams, frames, Betti's law, Clarke-Maxwell's theorem of reciprocal deflection. Deflection of beams (Propped cantilever and Fixed beams) Deflection of truss joints using unit load method	**11 Hrs**
UNIT – IV	
ROLLING LOAD AND INFLUENCE LINES: Rolling load analysis for simply supported beams for several point loads and udl. Influence line diagram for reaction, SF and BM at a given section	**10 Hrs**
UNIT – V (Blended Learning)	
ARCHES AND CABLES Three hinged circular and parabolic arches with supports at same levels and different levels, Determination of thrust, shear and bending moment, Analysis of cables under point loads and UDL, length of cables (Supports at same levels and at different levels).	**10 Hrs**

Course Outcomes: The students will be able to	
1	Understanding the different form of structures, Structural Indeterminacy and determination of forces in the various members of a truss.

2	Determine the deflection of statically Determinate beams, inclined beams and plane frames.
3	Analyze statically determinate beams by Influence lines method in selecting the right type of section consistent with economy and safety of the structure.
4	Analyze the three hinged arches and suspension cable bridges.

Text Books:	
1	Basic Structural Analysis, Reddy C. S., Tata McGraw Hill, New Delhi.
2	Strength of Materials and theory of structures, Vol I & II, B.C. Punmia and R.K. Jain Laxmi Publication New Delhi
3	Theory of Structures, Pandit and Guptha, Vol. – I, Tata McGraw Hill, New Delhi.

Reference Books:	
1	Elementary Structural Analysis, Norris and Wilbur, International Student Edition. McGraw Hill Book Co: New York
2	Structural Analysis, 4th SI Edition by Amit Prasanth & Aslam Kassimali, Thomson Learning.
2	Analysis of Structures, Thandava Murthy, Oxford University Press, Edition 2005
4	Structural Analysis, Hibbeler, Pearson Publishers

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓		✓			✓			
CO2		✓	✓	✓	✓							
CO3	✓	✓		✓						✓		
CO4			✓	✓	✓		✓		✓			✓

Syllabus for 2018-19 Batch UG (CV)

Semester: IV	
Course Title: HYDRAULICS AND HYDRAULIC MACHINES	
Course Code: **18CV43**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S-4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the components involved in open channels to minimize the losses and maximize discharge at different stages of flows.
2	To increase the efficiency of the system identifying the unknown variables which are acting on the flow system. Using dimensional analysis it helps to obtain the desired solution for the complicated problems,
3	To increase the water energy, design and planning and understanding the basic principles of the practical application.

UNIT – I	
UNIFORM FLOW IN OPEN CHANNELS: Introduction, Geometric properties of Rectangular, Triangular, Trapezoidal and Circular channels. Chezy's equation, Manning's equation-problems. Most economical open channels- Rectangular, Triangular, Trapezoidal and Circular channels- problems. **NON-UNIFORM FLOW IN OPEN CHANNELS:** Introduction, Specific energy, Specific energy diagram, Critical depth, Conditions for Critical flow- Theory & problems. Hydraulic jump in a Horizontal Rectangular Channel- Theory and problems. Dynamic equation for Non-Uniform flow in an Open channel, Classification of Surface profiles- simple Problems.	**11 Hrs**
UNIT – II	
DIMENSIONAL ANALYSIS AND MODEL STUDIES: Introduction, Systems of units, Dimensions of quantities, Dimensional Homogeneity of an equation. Analysis- Raleigh's method, Buckingham's Π theorem- problems. Model Studies, Similitude, Non-dimensional numbers: Froude models-Undistorted and Distorted models. Reynold's models- Problems.	**10 Hrs**
UNIT – III	
IMPACT OF JET ON VANES: Introduction, Impulse- Momentum equation. Direct impact of a jet on a stationary flat plate, Oblique impact of a jet on a stationary flat plate, Direct impact on a moving plate, Direct impact of a jet on a series of a jet on a series of flat vanes on a wheel. Conditions for maximum hydraulic efficiency. Impact of a jet on hinged Flat plate- problems. **IMPACT OF JET ON CURVED VANES:** Introduction, Force exerted by a jet on a fixed curved vane, moving curved vane. Introduction to concept of velocity triangles, Impact of jet on a series of curved vanes-problems.	**12 Hrs**
UNIT – IV	
TURBINES: General layout of Hydroelectric power plant and thermal power plant, Surge tank, Introduction to Turbines, Classification of Turbines. **PELTON WHEEL TURBINES:** Components, working, Maximum power, efficiency, working proportions- problems. **KAPLAN TURBINES:**	**10 Hrs**

Introduction, Components, Working principle, Discharge of the Turbines, Number of Blades- Problems. Draft Tube, Importance of Draft tube, Unit quantities.	
UNIT – V (Blended Learning)	
CENTRIFUGAL PUMPS: Introduction, Classification, Priming. Heads and Efficiencies. Equation for work done, minimum starting speed. Multistage Centrifugal Pumps (Pumps in Series and parallel). Characteristic Curves for a Single stage Centrifugal Pumps- problems. Lay-out of Thermal Power plant.	**9 Hrs**

Course Outcomes: The students will be able to	
1	Explain the planning and design of economical hydraulic structures.
2	Apply the basic principle of hydraulics to simplify the fluid flow.
3	Understand the methodology adopted for generating hydroelectric power using turbines.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Text Book Of Fluid Mechanics & Hydraulic Machines- R.K. Bansal, Laxmi Publications, New Delhi, 2008 Edition.
2	Hydraulics and Hydraulic Machines- Dr. P. N. Modi and Seth, McGraw Hill Publications.

Reference Books:	
1	Fundamentals of Fluid Mechanics – Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, Wiley India, New Delhi, 2009 Edition.
2	Introduction To Fluid Mechanics – Edward j. Shaughnessy,jr; Ira m. Katz, James P Schaffer, Oxford University Press, New Delhi, 2005 Edition.
3	A Text Book of Fluid mechanics & Hydraulic Machines- R.K. Rajput, S. Chand & Co, New Delhi, 2006 Edition.
4	Principles of Fluid Mechanics and Fluid Machines'- N.Narayana Pillai, Universities Press (India), Hyderabad, 2009 Edition.
5	Fluid Mechanics – Streeter, Wylie, Bedford New Delhi, 2008(Ed)
6	Fluid Mechanics and Turbomachines- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓		✓			✓		✓	
CO2	✓	✓				✓						
CO3		✓	✓									

Syllabus for 2018-19 Batch

Semester: IV	
Course Title: HYDROLOGY AND IRRIGATION ENGINEERING	
Course Code: **18CV44**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the Hydrological Cycle.
2	To gain the knowledge of Irrigation and Methods of Irrigation.
3	To understand planning and design of hydraulic structures.

UNIT – I	
HYDROLOGY: Introduction, Hydrologic cycle (Horton's representation). Global Water budget. **PRECIPITATION:** Introduction, forms of precipitation, types of precipitation, measurement of precipitation (Simon's gauge & Syphon gauge only), selection of rain gauge station. Adequacy of rain gauges, methods of computing average rainfall, interpolation of missing data. Hyetograph and mass curve of rainfall, losses from precipitation. **EVAPORATION:** Definition, factors affecting, measurement (Class A pan). Estimation using empirical methods (Meyer's and Rohwer's equation), evaporation control. **EVAPO-TRANSPIRATION**: Definition, factors affecting, measurement, estimation (Blaneycriddle method).	**8 Hrs**
UNIT – II	
INFILTRATION: Definition, factors affecting, measurement (double ring infiltrometer), infiltration indices, Horton's equation of infiltration. **RUN OFF**: Definition, Process, Factors affecting and measurement of Run Off. **HYDROGRAPHS:** Definition, components of hydrographs, unit hydrograph and its derivation from simple storm hydrograph, base flow separation, Preparation of Unit hydrograph- problems.	**8 Hrs**
UNIT – III	
ESTIMATION OF FLOOD AND FLOOD ROUTING: Definition of flood, factors affecting flood, methods of estimation (envelope curves, empirical formulae, rational method). **FLOOD ROUTING:** Introduction to hydrological routing, relationship of out flow and storage, general storage equation, Muskingum routing method. **WATER REQUIREMENT OF CROPS:** Introduction, definitions, crop seasons of India, water requirement of a crop, duty, delta, base period. Consumptive use. Irrigation efficiencies.	**8 Hrs**
UNIT – IV	
IRRIGATION: Introduction, need for irrigation, advantages and disadvantages of irrigation, environmental impacts of irrigation, Systems of irrigation: Gravity irrigation, lift irrigation, well irrigation, tube well irrigation, infiltration galleries, sewage irrigation, and supplemental irrigation. **SOIL-WATER-CROP RELATIONSHIP**:	**8 Hrs**

Introduction, soil profile, physical properties of soil, soil classification. Indian soils, functions of irrigation soils, maintaining soil fertility, soil-water-plant relationship, soil-moisture. Irrigation relationship, frequency of irrigation.	
UNIT – V (Blended Learning)	
CANALS: Definition, Types of canals, Alignment of canals, Design of canals by Kenedy's and Lacey's methods- Problems. **RESERVOIR PLANNING:** Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, safe yield, problems, Reservoir sedimentation, life of a reservoir, economic height of a dam, Environmental effects of reservoirs. .	**7 Hrs**

Course Outcomes: The students will be able to	
1	Explain the hydrological Cycle, types of Precipitation, Measurement of Rainfall, Run Off, Infiltration, Evaporation and Evapo-Transpiration.
2	Explain causes of flood, Estimation of Flood and Flood Routing. Classification, alignment and Design of Canals, Irrigation, advantages and Disadvantages, Methods and types of Irrigation.
3	Explain types of Reservoirs, storage zones, calculation of reservoir capacity, safe yield, Economical height of a reservoir, life of a reservoir, Sedimentation, Environmental effects of a Reservior etc.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Engineering Hydrology – Subramanya. K; Tata McGraw Hill New Delhi-2008 (Ed)
2	Hydrology- Madan Mohan Das, Mim Mohan Das-PHI Learning private Ltd. New Delhi-2009 (Ed)
3	Alternative Building Materials Technology -Jagadish, K.S., 2008, New Age International.
4	A Text Book Of Hydrology - Jayarami Reddy, Laksmi Publications, New Delhi-2007 (Ed)
5	Irrigation, water Resources and water power Engineering- P.N. Modi- standard book house, New Delhi.
6	Irrigation and Water Power Engineering - Madan Mohan Das & Mimi Das Saikia; PHI Learning pvt. Ltd. New Delhi 2009 (Ed).

Reference Books:	
1	Hydrology & Soil Conservation Engineering - Ghanshyam Das- PHI Learning Private Ltd., New Delhi-2009 (Ed)
2	Hydrology & Water Resources Engineering- Patra K.C. Narosa Book Distributors Pvt. Ltd. New Delhi-2008 (Ed)
3	Hydrology & Water Resources Engineering- R.K. Sharma & Sharma, Oxford and IBH, New Delhi
4	Irrigation Engineering and Hydraulic structures- S. K. Garg- Khanna Publication, New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓					✓				✓	
CO2	✓											
CO3	✓		✓			✓			✓		✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: IV	
Course Title: CONCRETE TECHNOLOGY	
Course Code: **18CV45**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **04**	
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the properties of concrete making materials like Cement, fine aggregate, coarse aggregate, water and admixtures.
2	To study the properties of concrete in fresh and hardened state which are useful in estimating the strength and durability of concrete.
3	To acquire the knowledge of concrete mix design by various methods.
4	To acquire knowledge of special concrete.

UNIT – I	
Concrete making materials : Introduction. **Cement:** Chemical composition, hydration of cement, types of cement, testing of cement-Field testing, Fineness by sieve test and Blaine's air permeability test, Normal consistency, setting time, soundness, Compression strength of cement and grades of cement, Quality of mixing water, importance of Bouge's compounds, Structure of a hydrated cement paste, volume of hydrated product. **Aggregates:** **Fine aggregate** - Specific gravity, bulking, moisture content, Sieve analysis, deleterious materials. **Coarse aggregate** – Importance of size, shape and texture. Grading of aggregates – Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion test. Properties of M sand and filtered sand. **Admixtures:** **Chemical admixtures** - Mechanisms of chemical admixture, Plasticizers and super plasticizers and effect of concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizers, retarders, accelerators, Air-entraining admixtures, new generation superplasticizers. **Mineral admixtures -** Fly ash, Silica fume, GGBS and their effect on concrete property in fresh and hardened state.	**11 Hrs**
UNIT – II	
Properties of concrete: **Fresh concrete:** Workability: Introduction, Factor affecting workability, Measurement of workability – slump, flow tests, Compaction factor and Vee-Bee consist-meter tests, Segregation and bleeding, Rheology of concrete in terms of Bingham's parameter. Process of manufactures of concrete: Batching, Mixing, Transporting, Placing, Compaction and Curing. **Hardened concrete:** Factor affecting strength, W/C ratio, A/c ratio, gel space ratio, Maturity concepts, and tests on hardened concrete. Factors affecting strength.	**11 Hrs**
UNIT – III	
Elasticity: Relation between Modulus of Elasticity and strength, factors affecting modulus of elasticity, Poisson ratio, Shrinkage – plastic shrinkage and drying shrinkage, Factors affecting shrinkage,	**10 Hrs**

Creep – Measurement of creep, factors affecting creep, effect of creep. **Durability:** Definition, significance, permeability, Factors affecting durability - Sulphate attack, Chloride attack, carbonation, freezing and thawing, Factors contributing to cracks in concrete – plastic shrinkage, settlement cracks, construction joints, Thermal expansion, transition zone, structural design deficiencies. **NDT tests:** Rebound Hammer test, Ultra Sonic Pulse Velocity test, Penetration and Pull out test.	
UNIT – IV	
Concept of concrete mix design: Factors affecting mix design, Variables in proportioning, exposure conditions, Procedure of mix design as per IS 10262-2009, Numerical examples of Mix design.	**10 Hrs**
UNIT – V (Blended Learning)	
Special concrete: **Self-compacting concrete:** Concept, materials, properties and application. **Fiber reinforced concrete:** Fibers types and properties, behaviour of FRC in compression, tension including pre-cracking stage and post-cracking stages and application. **Ferro cement:** Materials, techniques of manufacture, properties and application. **Light weight concrete:** Materials, properties, types and application. **RMC concrete:** Manufacture, transporting, placing, precautions, methods of concreting-Pumping, under water concreting, shotcrete. **High performance concrete and High density concrete:** Materials, properties and applications.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Explain the properties of the concrete materials.
2	Analyse the properties and behaviour of concrete in fresh and hardened state.
3	Design the proportioning of concrete mix for particular application.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	"Concrete Technology"-Theory and Practice, M.S. Shetty, S.Chand and Company, New Delhi, 2002.
2	Concrete Technology-A.R.Santakumar. Oxford University Press (2007).
3	"Concrete Mix Design"-N.Krishna Raju, Sehgal - publishers.

Reference Books:	
1	"Recommended guidelines for concrete mix design" - IS:10262,BIS Publication
2	Advanced Concrete Technology Processes- John Newman, Ban Seng Choo, - London.
3	Concrete- P.K. Mehta, P J M Monteiro,- Prentice Hall, New Jersey (Special Student Edition by Indian Concrete Institute Chennai)

Code Books	
1	IS 456: 2000 – Properties of the concrete materials

2	IS 10262: 2009 – Mix Design of Concrete

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓	✓						
CO2	✓	✓	✓									✓
CO3	✓	✓	✓		✓	✓						

Syllabus for 2018-19 Batch UG (CV)

Semester: IV	
Course Title: COMPUTER AIDED BUILDING PLANNING AND DRAWING	
Course Code: **18CVL46**	Evaluation Procedure:
Credits: **01**	CIE + Record+ SEE Marks = 20 +30 + 5 + 50= 100
Teaching Hours: 13+39 Hrs (L:T:P:1:0:3)	SEE Duration: 4 Hrs

Course Learning Objectives:	
1	Expose to the bye-laws to set civil engineering drawings for various purpose.
2	Develop skills to prepare civil engineering drawings using AutoCAD.
3	Apply the drawing concepts to draw various components of the structure in different planes.

Part A	
Unit 1: Drawing Basics: Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962. Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio.	**4 Hrs**
Unit 2: Simple Engineering drawings with CAD drawing tools: Lines, Circle, Arc, Poly line, Multiline, Polygon, Rectangle, Spline, Ellipse, Modify tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet, Using Text: Single line text, Multiline text, Spelling, Edit text, Special Features: View tools, Layers concept, Dimension tools, Hatching, Customizing toolbars, Working with multiple drawings	**16 Hrs**
Part B	
Unit 3: Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings: ✓ Two bed room building. ✓ Two storeyed building (Ground and First floor). ✓ Pitched roof.	**16 Hrs**
Unit 4: Development of line diagram for following building: ✓ Primary health Centre. ✓ Primary school building. ✓ College canteen. ✓ Office building-Subdivision/Divisional office for Engineers.	**8 Hrs**
Unit 5: (Blended learning) For a given single line diagram, preparation of water supply, sanitary and electrical layouts.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the fundamentals of building planning and drawing.
2	Apply the modern tools like AutoCAD for building planning and drawing.
3	Interpret the drawings in a professional set up.

Question Paper pattern:
Compulsory question from Unit 3. One question each from Unit 4 and 5.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓				✓			✓
CO2					✓				✓			✓
CO3	✓					✓		✓				✓

Syllabus for 2018-19 Batch UG (CV)

Semester: IV	
Course Title: CONCRETE AND HIGHWAY MATERIALS LABORATORY	
Course Code: **18CVL47**	Evaluation procedure:
Credits: **01**	CIE + Record + SEE Marks = 20 + 30 + 50 = 100
Teaching Hours: 26 Hrs (L:T:P:0:0:2)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the properties of concrete in fresh and hardened state by Destructive and Non-destructive tests.
2	To classify and select the suitable aggregate material for the infrastructural projects.
3	To analyse the bituminous material behaviour & their properties for the effectiveness of various projects.

Sl No	**Syllabus contents**	**Teaching hours**
	PART-A	
1	**CEMENT:** Normal Consistency, Setting time, Soundness by Autoclave method, Compression strength test and Air permeability test for fineness, Specific gravity of cement.	**5 Hrs**
2	**FRESH CONCRETE:** Workability – slump, Compaction factor, Vee Bee test and flow table test. **HARDENED CONCRETE:** Compression strength and Split tensile tests. Test on flexural strength of RCC beams, Permeability of concrete.	**6 Hrs**
3	**Non-destructive Tests on Hardened Concrete:** Rebound hammer Test and Ultrasonic pulse velocity Tester	**2 Hrs**
	PART-B	
4	**SOIL: (Blended Learning)** Density of Soil by Sand replacement method, Core cutter method, CBR Test.	**4 Hrs**
5	**AGGREGATES:** Crushing, abrasion, impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and water absorption	**5 Hrs**
6	**BITUMINOUS MATERIALS AND MIXES:** Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity, Marshall Stability tests.	**4 Hrs**

Course Outcomes: The students will be able to	
1	Analyse the properties of concrete by various methods as per IS codes used in various construction activities.
2	Evaluate the characteristics of aggregates and their physical properties suitable for construction activities.
3	Discuss the behaviour of bituminous material with different climatic conditions and their Engineering properties.

Text Books:	
1	Highway Material Testing Laboratory Manual by Khanna S K and Justo CEG Nemi Chand & Bros.
2	M. L. Gambhir: Concrete Manual: Dhanpat Rai & sons New – Delhi.
3	Relevant IRC codes and MoRT & H specifications.

Scheme of Examination:
Any two of the above exercise (one from each part) is to be conducted in the examination by the student.

CO-PO Mapping												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓										✓
2	✓				✓					✓		
3	✓				✓							✓

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Wastewater Treatment and Disposal	
Course Code: **18CV51**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To create the knowledge about the importance of proper collection and conveyance of waste water and conveyance of storm water.
2	To create the importance of providing the water carriage system of sewerage at all places for the healthy community.
3	To bring out the knowledge and importance of waste water treatment and disposal.
4	To provide best underdrainage system with sustainable concept.

UNIT – I	
INTRODUCTION: Necessity for sanitation, methods of sewage disposal, types of sewerage systems and their suitability. **QUANTITY OF SEWAGE:** Dry weather flow, factors effecting dry weather flow, Estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration.	**8 Hrs**
UNIT – II (Blended Learning)	
SEWER APPURTENANCES: Catch basins, manholes, flushing tanks, oil and grease traps, drainage traps. **MATERIALS OF SEWERS:** Sewer materials, shapes of sewers, laying of sewer, jointing and testing of sewers, ventilation and cleaning of sewers.	**8 Hrs**
UNIT – III	
DESIGN OF SEWERS: Hydraulic formulae for velocity, effects of flow variations on velocity, self-cleansing and non-scouring velocities, design of hydraulic elements for circular sewers flowing full and for partially full. (No derivations). **WASTEWATER CHARACTERIZATION:** Physical Chemical and biological characteristics concepts of aerobic and anaerobic activity CNS cycles, more emphasis on BOD and COD. Their significance and problems on BOD.	**8 Hrs**
UNIT – IV	
DISPOSAL OF EFFLUENTS: By dilution phenomenon, oxygen sag curve, Zones of purifications, Sewage farming, sewage sickness disposal standards on land and surface water. Numerical Problems on Disposal of Effluents, Treatment of Wastewater: Flow diagram of municipal sewage treatment plant. Primary treatment: Screening, grit chambers, skimming tanks, primary sedimentation tanks – Designs criteria and design examples.	**7 Hrs**
UNIT – V	
SECONDARY TREATMENT: Suspended growth and fixed film bioprocess. Tricking filter- Types, Theory, operation and designs. **Activated sludge process** - Principles and flow diagram, F/M Ratio, Designs of ASP. Anaerobic Sludge digestion, Sludge digestion tanks, Design of sludge drying beds. Low cost waste treatment method - Septic tanks, oxidation ditch and oxidation pond- Design. Reuse and recycle of waste water.	**8 Hrs**

Course Outcomes: After completing the course, the students will be able to	
1	Review the sewerage systems practiced, Sewer Appurtenances, Materials and Quantification of Wastewater at various places and conditions.
2	Design the Sewer and analyse Physical, Chemical and Biological Characteristics of Wastewater.
3	Empathize on Primary and Secondary Treatment Methods and Various Wastewater Disposal Approaches.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Water Supply and Sewerage, Steel. E.W. & Terence J.M. Ghees, Mc Graw – Hill International Book Co.
2	Water Supply & Sanitary Engineering, G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company (2015, Ninth Edition)
3	Wastewater Engineering – S. K. Garg, Khanna Publishers
4	Environmental Engineering II – B C Punmia and Ashok Jain

Reference Books:	
1	Water and waste water Engineering Vol-II- fair, Gayer and Okun, Willey publishers, New York.
2	Wastewater Treatment, Disposal and Reuse, Metcalf and Eddy Inc. Tata Mc Graw Hill Publications (2003 Edition).
3	Water and Wastewater Technology-SI Version, Hammer.M.J. (1986), 2nd Edition, John Wiley and Sons.
4	Environmental Engineering, Peavy, H.S., Rowe, D. R. and Tchobanoglous, G. McGraw Hills, New York 1985.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓					✓					✓
CO2		✓	✓	✓			✓					✓
CO3		✓		✓								✓

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Design of RCC Structural Elements	
Course Code: **18CV52**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the working stress method and limit state method specifications for RCC structures.
2	To analyse problems on RCC structural elements such as beams, columns, slabs, staircase and footings.
3	To evaluate and design problems on various specifications of relevant IS codes and SP provisions.

UNIT – I	
GENERAL FEATURES OF REINFORCED CONCRETE: Introduction, design loads, materials for reinforced Concrete and Code requirements. Design Philosophy – Working Stress Design concept, Limit State Design principles. Load factor, Characteristic and design loads, Characteristic and design strength. General aspects of Ultimate strength, Stress block parameters for limit state of collapse, Ultimate flexural strength of singly reinforced rectangular sections. Ultimate flexural strength of doubly reinforced rectangular sections. Ultimate flexural strength of flanged sections. Ultimate shear strength of RC sections, Ultimate torsional strength of RC sections, Concepts of development length, anchorage and cover to reinforcement. Analysis examples of singly reinforced, doubly reinforced, flanged sections, shear strength and development length. General Specification for flexure design of beams.	**11 Hrs**
UNIT – II	
DESIGN OF BEAMS: Design procedures for critical sections for moment and shears. Anchorages of bars, check for development length. Reinforcement requirements, Slenderness limits for beams to ensure lateral stability, Design examples for simply supported and Cantilever beams for rectangular and flanged sections.	**11 Hrs**
UNIT – III	
DESIGN OF SLABS: General considerations of design of slabs, rectangular slabs spanning in one direction, Rectangular slabs spanning in two directions for various boundary conditions. Design of simply supported, cantilever and continuous slabs as per IS specification.	**10 Hrs**
UNIT – IV	
DESIGN OF COLUMNS AND FOOTINGS: **Design of Columns:** General aspects, effective length of column, loads on columns, slenderness ratio for columns, minimum eccentricity. Design of short axially loaded columns and column subjected to combined axial load and uni-axial moment and biaxial moment using SP –16 charts. **Design of footings:** Introduction, Proportioning of footing for equal settlement, Design basis for limit state method, Design of isolated rectangular footing for axial load and uni-axial moment.	**10 Hrs**
UNIT – V(Blended Learning)	
DESIGN OF STAIR CASES: General features, types of stair case, loads on stair cases, effective span as per IS, distribution of loading on stairs. Design of stair cases, with waist slabs: Calculation of deflection (Theoretical method), Cracking in structural concrete members, Calculation of deflections and crack width.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Apply the concepts and principles of Limit state method to design RC structural elements.

2	Analyse RC structural elements using limit state method for singly and doubly reinforced RC sections.
3	Design RC structural elements such as beams, slab, columns, footings and staircase as per IS code provisions.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:

1	Design of Reinforced Concrete Structures - Krishnaraju N and Pranesh. R.N, 2nd Edition, CBS Publishers and Distributors, New Delhi, 2003, ISBN 978-81-224-1460-8
2	Design of RCC Structural Elements – S. S. Bhavikatti, Vol - I, New Age International Publications, New Delhi.

Reference Books:

1	Design of Reinforced Concrete Structures- Unnikrishnan and Devadas Menon, 4thEdition, PHI New Delhi, 2003, ISBN 978-0070495043.
2	Limit State Design of Reinforced Concrete- Varghese P.C, 2nd Edition, Eastern Economy Edition, Prentice –Hall of India Pvt Ltd, New Delhi, 2004, ISBN 9788120320390.
3	Fundamentals of Reinforced concrete Design-by M.L. Gambhir, PHI Learning Private Limited 2008-2009.
4	IS 456:2000, SP 16 Table.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓									✓		
CO2		✓							✓	✓		
CO3	✓		✓				✓		✓	✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Analysis of Indeterminate Structures	
Course Code: **18CV53**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To apply the knowledge of mathematics, science and Engineering fundamentals to solve relatively complex engineering structures.
2	To analyse Indeterminate beams, Single and Multi-storey frames and acquire the knowledge of draw shear force and bending moment diagrams using various methods.
3	To study the behavior of structures under dynamic loading.

UNIT – I	
INTRODUCTION: Degree of static and kinematic indeterminacy – Beams, plane frames and trusses, Methods of analysis of indeterminate structures – Force and displacement methods. **FORCE METHOD OF ANALYSIS:** **ANALYSIS OF BEAMS:** **Consistent Deformation method** - Propped Cantilever Beam and Fixed Beams only. **Clapeyron's Theorem of Three Moments** – Continuous Beams and Fixed Beam only.	**10 Hrs**
UNIT – II	
DISPLACEMENT METHOD OF ANALYSIS: **SLOPE DEFLECTION METHOD:** Introduction, Sign convention, Development of slope-deflection equations and Analysis of Beams and Orthogonal Rigid jointed plane frames (Sway and non-sway, members assumed to be axially rigid) with kinematic redundancy less than/equal to three. (Members to be axially rigid).	**10 Hrs**
UNIT – III	
MOMENT DISTRIBUTION METHOD: Introduction, Definition of terms- Distribution factor, Carry over factor, Development of method and Analysis of beams and orthogonal rigid jointed plane frames (non-sway, members assumed to be axially rigid) with kinematic redundancy less than/equal to three. (Members to be axially rigid). Analysis of beams and frames-sway analysis with kinematic redundancy ≤ 3.	**11 Hrs**
UNIT – IV	
KANIS METHODS: Introduction, Basic Concept, Analysis of Continuous beams and Analysis of rigid jointed non-sway frames. **STIFFNESS MATRIX METHOD OF ANALYSIS**: Introduction, Development of stiffness matrix for plane truss element and axially rigid plane framed structural elements. And Analysis of plane truss and axially rigid plane frames by stiffness method with kinematic indeterminacy ≤ 3. **FLEXIBILITY MATRIX METHOD OF ANALYSIS**: Introduction, Development of flexibility matrix for plane truss element and axially rigid plane framed structural elements.	**11 Hrs**
UNIT – V (Blended Learning)	
BASIC PRINCIPLES OF DYNAMICS: Basic principles of Vibrations and causes, periodic and a periodic motion, harmonic and non-harmonic motion. Period and frequency. Free and Forced Vibration, Resonance, Damping and Equations of Single Degree of Freedom System with and without damping.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Identify Indeterminate structures and determine Degree of Indeterminacy.
2	Acquire the knowledge to analyze the statically indeterminate beams and joint frames subjected to gravity and sway loads by displacement and force methods.
3	Analyze and draw shear force and bending moment diagrams for Indeterminate beams and multistory frames.
4	Analyze the performance of structure for dynamic loading to select the safe and efficient structural elements.

Text Books:	
1	Basic Structural Analysis- Reddy C.S. - Second Edition, Tata McGraw Hill Publication Company Ltd.
2	Theory of Structures Vol. 2 - S.P. Gupta, G.S. Pandit and R. Gupta, Tata McGraw Hill Publication Company Ltd.
3	Structural Analysis-II -S. S. Bhavikatti – Vikas Publishers, New Delhi.
4	Structural Dynamics-by M. Mukhopadhyay, Ane Books Pvt ltd, Publications.

Reference Books:	
1	Structural Analysis- by Hebbeler, Pearson Publishers.
2	Basics of Structural Dynamics and Aseismic Design By Damodhar Swamy and Kavita PHI Learning Private Limited.
3	Structural Analysis- D.S. Prakash Rao, A Unified Approach, University Press.
4	Structural Analysis, 4th SI Edition by Amit Prasanth and Aslam Kassimali, Thomson Learning.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓		✓						✓
CO2		✓		✓	✓				✓			
CO3	✓		✓	✓	✓				✓			
CO4		✓	✓		✓	✓			✓			✓

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Geotechnical Engineering	
Course Code: **18CV54**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:2:2:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the importance of soil and its properties in Civil Engineering applications.
2	To demonstrate the index properties and engineering properties of different soils and Soil Structure.
3	To interpret the various factors influencing the soil behaviour.
4	To summarize the significance of soils and its behaviour in various applications of Civil engineering.

UNIT – I	
SOIL IN ENGINEERING PRACTICE: Origin and formation of soil, Basic types of soils, Three Phase and Two phase representation Diagram (dry, partially saturated, fully saturated and submerged soils), Basic definitions of terms - Voids ratio, Porosity, Air content, Degree of saturation, Percentage Air Voids, Water content, Specific Gravity of soil solids and soil mass, Unit weights - Dry, Bulk, Saturated and Submerged and their inter relationships. **COMPACTION OF SOIL:** Principle of compaction, Standard Proctor's compaction test, Factors affecting compaction, Effect of compaction on Engineering properties of soil, Field compaction control (water content and dry density), Proctor's needle, Compacting equipments and their suitability.	**11 Hrs**
UNIT – II (Blended Learning)	
INDEX PROPERTIES OF SOIL AND THEIR DETERMINATION: Laboratory methods of determination of index properties of soil: Water content (Oven Drying method & Rapid Moisture methods), Specific gravity of soil solids (Pycnometer and Density bottle method), Particle size distribution (Wet, Dry sieve analysis and Sedimentation analysis – Theory and use of Hydrometer), In-situ density (Water displacement, Core cutter and Sand replacement methods), Relative Density, Relative Compaction, Consistency limits: Liquid Limit - (A. Casagrande's and Cone penetration methods), Plastic limit – (Rolling thread method) and Shrinkage limit – (Mercury displacement method), Activity of Clay, Sensitivity and Thixotropy. **CLASSIFICATION SYSTEM OF SOILS:** Field identification of soils, IS classification, IS Plasticity chart. **SOIL STRUCTURE AND CLAY MINERALOGY:** Valence bonds, Soil-Water system, Electrical diffuse double layer, Adsorbed water, Base-exchange capacity, Isomorphous substitution. Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite.	**11 Hrs**
UNIT – III	
PERMEABILITY: Darcy's law - assumption and validity, Seepage velocity, Discharge velocity and coefficient of percolation. Coefficient of permeability and its determination - laboratory (Constant head and Variable) and field (Confined and Unconfined aquifer), Factors affecting permeability, Capillary Phenomena. **EFFECTIVE STRESS CONCEPT:** Geo-static stresses: (Total stress, Effective stress and Neutral stress), Concept of effective stress under different conditions of soils (Submerged soil mass with water table Above and At the ground surface, Partially submerged, Surcharge and soil mass with Capillary rise), Stresses affected by direction of flow of water (Upward and downward), Quick sand phenomena.	**10 Hrs**
UNIT – IV	

CONSOLIDATION OF SOIL: Terzaghi's Mass - Spring analogy, Terzaghi's one dimensional consolidation theory assumption and limitations (no derivation), Pre-consolidation pressure and its estimation by A. Casagrande's method. Laboratory one dimensional consolidation test, Determination of consolidation characteristics of soils - Compression index and Coefficient of consolidation (Square root of time and Logarithmic time fitting method).	**10 Hrs**
UNIT – V	
SHEAR STREGNTH OF SOIL: Concept of shear strength, Mohr's circle construction, Mohr's and Mohr's - Coulomb's theory, Terzaghi's total and effective stress principle, Classification of shear tests based on drainage conditions and simulate their field conditions, Measurement of shear parameters: Direct shear box test, Triaxial compression test, Unconfined compression test and vane shear test. Shear strength characteristics od sand and clay.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Evaluate index properties of soils, analyse and interpret the experimental data to identify and classify the soil.
2	Describe structure of soils, soil water systems and evaluate permeability and effective stresses in soils.
3	Explain the concepts and evaluate compressible characteristics and shear strength parameters of soil.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C, Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering- Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Bowles J E , Foundation analysis and design, Tata McGraw- Hill Publications
2	Shashi K. Gulathi and Manoj Datta, Geotechnical Engineering, Tata McGraw Hill Publications
3	T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley & Sons.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓					✓	✓		
CO2	✓	✓		✓								
CO3		✓	✓	✓								✓

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Transportation Engineering	
Course Code: **18CV551**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To comprehend the knowledge of different modes of transportation systems, history, development of highways and the organizations associated with research and development in INDIA.
2	To understand the Highway planning and development considering the essential criteria's such as Engineering and financial aspects, regulations and policies, socio economic impact.
3	To illustrate the different aspects of horizontal and vertical geometric elements for safe and efficient movement of vehicles.
4	To evaluate pavement and its components, pavement construction activities and its requirements and to evaluate the highway economics by B/C, NPV, IRR methods.

UNIT – I	
PRINCIPLES OF TRANSPORTATION ENGINEERING: Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute. **HIGHWAY DEVELOPMENT AND PLANNING:** Road types and classification, road patterns, planning surveys, master plan – saturation system of road planning, phasing road development in India, problems on best alignment among alternate proposals Salient Features of 3rd and 4th twenty year road development plans and Policies, Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCL) Road development plan - vision 2021.	**8 Hrs**
UNIT – II	
HIGHWAY ALIGNMENT AND SURVEYS: Ideal Alignment, Factors affecting the alignment, Engineering surveys - Map study, Reconnaissance, Preliminary and Final location & detailed survey, Reports and drawings for new and re-aligned projects. **HIGHWAY ECONOMICS:** Highway user benefits, VOC using charts only - Examples, Economic analysis - annual cost method, Benefit Cost Ratio method, NPV-IRR methods with Examples, Highway financing - BOT-BOOT concepts.	**8 Hrs**
UNIT – III	
HIGHWAY GEOMETRIC DESIGN: Importance, Terrain classification, Design speed, Factors affecting geometric design, Cross sectional elements – Camber, width of pavement, Shoulders, Width of formation, Right of way with Typical cross sections. **Sight Distance**-Restrictions to sight distance, Stopping sight distance, Overtaking sight distance, overtaking zones- Examples on SSD and OSD with Sight distance at intersections. **Horizontal alignment** - Radius of Curve, Super elevation, Extra widening, Transition curve and its length, setback distance – Examples on the said above. **Vertical alignment** - Gradient-summit and valley curves with examples. **HIGHWAY DRAINAGE:** Significance and requirements, Surface drainage system and design - Examples, sub surface drainage system, design of filter materials with examples.	**8 Hrs**

UNIT – IV (Blended Learning)	
PAVEMENT MATERIALS: **Subgrade soil** - desirable properties - HRB soil classification, determination of CBR and modulus of subgrade reaction with Examples on CBR and Modulus of subgrade reaction. **Aggregates** - Desirable properties and list of tests used in laboratory. **Bituminous materials** - Explanation on Tar, bitumen, cutback and emulsion with List of tests on bituminous materials.	**7 Hrs**
UNIT – V	
PAVEMENT DESIGN: Pavement types, component parts of flexible and rigid pavements and their functions, design factors, ESWL and its determination - Examples. **Flexible pavement** - Design of flexible pavements as per IRC: 37-2001- Examples. **Rigid pavement** - Westergaard's equations for load and temperature stresses- Examples- Design of slab thickness only as per IRC: 58-2002. **PAVEMENT CONSTRUCTION:** Earthwork – cutting and Filling, Preparation of subgrade, Specification and construction of i) Granular Subbase. ii) WBM Base iii) WMM base iv) Bituminous Macadam v) Dense Bituminous Macadam vi) Bituminous Concrete vii) Dry Lean Concrete sub base and PQC viii) concrete roads.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the basic principles of transportation engineering and factors affecting highway alignment for development of best Road planning and alignment.
2	Illustrate the factors which affects geometric design of highway with various properties and specifications of pavement materials used for road construction.
3	Apply the procedural knowledge for design, construction and maintenance of Flexible and pavement layers as per IRC codes.

Text books:	
1	Highway Engineering – S K Khanna and C E G Justo, Nem Chand Bros, 10th Edition, Roorkee.
2	Highway Engineering - L R Kadiyali, Khanna Publishers, New Delhi.
3	Transportation Engineering – K P Subramanium, Scitech Publications, Chennai.
4	Transportation Engineering – James H Banks, Mc. Graw. Hill Pub. New Delhi.
5	Highway Engineering – R. Sreenivasa Kumar, University Press. Pvt. Ltd. Hyderabad.

Reference books:	
1	Specifications for Roads and Bridges - MoRT & H, IRC, New Delhi.
2	Transportation Engineering – C. Jotin Khisty, B. Kent Lal, PHI Learning Pvt. Ltd. New Delhi.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓		✓								
2	✓	✓		✓	✓			✓				
3	✓	✓	✓	✓								

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Theory of Elasticity	
Course Code: **18CV552**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To learn the basics of stress strain behaviour, compatibility, equilibrium equation and boundary conditions involved in continuum mechanics.
2	To impart knowledge on the basic concepts of theory of elasticity and solve the Structural Engineering problems
3	Analyse the behaviour of elastic solids under different loading conditions.

UNIT: I	
Introduction to Mathematical theory of elasticity, definition of continuum, stress and strain at a point, Strain- displacement relations, Differential equations of equilibrium, boundary conditions, compatibility equations, Two-dimensional problems in rectangular coordinates, Two-dimensional problems in polar coordinates.	**08 Hrs**
UNIT: II	
Plane stress and plane strain, Principal stresses and strains, measurement of surface strains, strain rosettes, Mohr's circle of stress and strain, analytical method	**07 Hrs**
UNIT: III	
Generalised Hooke's Law, St. Venant's principle, Airy's stress function, problems, Stress polynomials – for Two Dimensional cases only bending of a cantilever beam subjected to end load, effect of shear deformation in beams, Simply supported beam subjected to UDL	**08 Hrs**
UNIT: IV	
Axisymmetric stress distribution - Rotating discs, Lame's equation for thick cylinder, Effect of circular hole on stress distribution in plates subjected to tension, compression and shear, stress concentration factor.	**08 Hrs**
UNIT: V (Blended learning)	
Torsion: Inverse and Semi-inverse methods, stress function, torsion of circular, elliptical, triangular sections.	**08 Hrs**

Course Outcomes: The students will be able to	
1	Apply the knowledge of mechanics and mathematics to solve continuum problems.
2	Analyse and evaluate the stress and strain behaviour of objects.
3	Formulate boundary value problems and calculate stresses and strains.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	S P Timoshenko and J N Goodier, "Theory of Elasticity", McGraw-Hill International Edition, 1970
2	S Valliappan, "Continuum Mechanics - Fundamentals", Oxford &IBH Pub. Co. Ltd., 1981
3	L S Srinath, "Advanced Mechanics of Solids", Tata - McGraw-Hill Pub., New Delhi, 2003.

Reference Books:	
1	G. W. Housner and T. Vreeland, Jr., "The Analysis of Stress and Deformation", California Institute of Tech.CA, 2012.
2	Abdel-Rahman Ragab and Salah EldininBayoumi, "Engineering Solid Mechanics: Fundamentals and Applications", CRC Press, 1998.
3	A. C. Ugural and Saul K.Fenster, "Advanced Strength and Applied Elasticity", PrenticeHall, 2003.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓									✓		
CO2		✓							✓	✓		
CO3	✓		✓				✓		✓	✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Ground Improvement Techniques	
Course Code: **18CV553**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Understand the various soil stabilization techniques for highly complex soils.
2	Discuss the concepts of ground improvement techniques for various soil conditions.
3	Illustrate the various techniques of soil stabilization and modification.
4	Summarize the methods to improve unstable ground.

UNIT – I	
GROUND IMPROVEMENT: Definition, Objectives of soil improvement. Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique. **GROUTING:** Introduction, Effects of grouting, Chemicals and materials used, Types of grouting, Grouting procedure, Applications of grouting.	**08 Hrs**
UNIT – II	
MECHANICAL MODIFICATION: Type of mechanical -modification, Aim of modification, compaction, Principle of modification for various types of soils, Effect of grain size distribution on compaction for various soil types like BC soil. Lateritic soil, coarse-grained soil, micaceous soil, Field compaction static, dynamic, impact and vibratory type, Specification of compaction.	**08 Hrs**
UNIT – III	
HYDRAULIC MODIFICATION: Definition, aim, principle, techniques, gravity drain, lowering of water table, multistage well point, vacuum dewatering, discharge equations, design of dewatering system including pipe line effects of dewatering. Drainage of slopes, preloading, vertical drains, sand drains.	**08 Hrs**
UNIT – IV	
CHEMICAL MODIFICATION: Definition, aim, special effects, and methods. Techniques -sandwich technique, admixtures, cement stabilization. Hydration - effect of cement stabilization on permeability, Swelling and shrinkage. Criteria for cement stabilization, Assessment of ground condition for preloading, Electro kinetic dewatering).	**08 Hrs**
UNIT – V (Blended Learning)	
STABILIZATION: Suitability, process, special effects, criteria for lime stabilization, Other chemicals, chlorides, hydroxides, lignin, hydrofluoric acid , Fly ash in cement stabilization, Properties of chemical components, reactions and effects, Bitumen, tar or asphalt in stabilization.	**07 Hrs**

Course Outcomes: The students will be able to	
1	Describe the in-situ methods of soil improvement projects.
2	Explain the ground improvement methods and its application.
3	Analyse the effect of admixtures on soil and the soil stabilization.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Ground Improvement Techniques, Purushothama Raj. P. Firewall Media Publisher, 2004 ISBN8170088372
2	Engineering principles of ground modification, Manfied Hausmann, McGraw Hill Pub. Co., New York., 2008 ISBN0070272794
3	Methods of treatment of unstable ground, Bell, F.G., Butterworths, London. 2007, ISBN0408001666

Reference Books:	
1	Bowles J E , Foundation analysis and design, McGraw- Hill Publications
2	Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-. , Tata McGraw Hill Publications
3	T.W. Lambe and R.V. Whitman, Soil Mechanics-, John Wiley & Sons.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓				✓						
CO3		✓	✓							✓		

Syllabus for 2018-19 batch UG (CV)

Semester: V	
Course Title: Advanced Surveying	
Course Code: **18CV554**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + group activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study Theory of errors, triangulation adjustment.
2	Field Astronomy, Hydrographic surveying and electronic distance measurements.

UNIT – I	
THEORY OF ERRORS AND TRIANGULATION ADJUSTMENT: Errors and Classification of errors Precision and accuracy, Laws of weights and accidental errors. **PROBABILITY:** Probability distribution function and density function-normal distribution. RMS error-measure of precision. Rejection of observations-principles of least squares-Normal equations	**08 Hrs**
UNIT – II	
METHOD OF CORRELATES: Triangulation adjustment. Angle adjustment, station adjustment and figure adjustment.	**08 Hrs**
UNIT – III	
ELECTRONIC DISTANCE MEASUREMENT (EDM): Introduction, Electro Magnetic (EM) Waves. Phase comparison and modulations. Instruments – Geodimeter, Tellurimeter, Distomat – Range finders – Radars. Introduction to GPS Total station.	**08 Hrs**
UNIT – IV (Blended Learning)	
FIELD ASTRONOMY: Earth celestial sphere. Solar system Position by altitude and Azimuth system-spherical triangle and spherical trigonometry. Astronomical triangle. Nepiers rule. **TIME:** Siderial time, day and year-solar time and day-Greenwich mean time-standard time. Meridian and azimuth-their determination-latitude and its determination.	**07 Hrs**
UNIT – V	
HYDROGRAPHIC SURVEYING: Methods of soundings. Instruments. Three point Problem. Tidal and Stream discharge measurement. **SETTING OUT WORKS:** Introduction. Setting out of buildings, culverts, bridge, pipeline and sewers, tunnels.	**08 Hrs**

Course Outcomes: The students will be able to	
1	Explain the probability method for various adjustments related to surveying.
2	Explain the elements of hydrographic surveying and EDM for setting out works.
3	Apply the factual elements of field astronomy and their utilization with respect to latitude and longitude and its determination.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit.

- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Surveying Vol–I and II– B.C. Punmia, Laxmi Publications (2005), New Delhi.
2	Surveying Vol. I and II, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.
3	Surveying Levelling-Part I & II – Kanitkar T.P. & Kulkarni S.V. – Pune Vidhyarthi Gruh Prakashana.

Reference Books:	
1	Introduction to Surveying- James, M. Anderson and Edward, M. Mikhail – Mc Graw Hill Book Co 1985.
2	Analysis and survey measurements- M. Mikhalil and Gracie, G. - Van Nostrand Reinhold Co (NY)-1980.
3	Plane and Geodetic Surveying for Engineers - David Clark -Vol I & II-CBS publishers and distributors, New Delhi.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓				✓				✓			
CO3	✓			✓						✓		✓

Syllabus for 2018-19 batch UG (CV)

Semester: V	
Course Title: Ground Water Hydrology	
Course Code: **18CV555**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + group activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Understanding Ground Water hydrology and modelling of Ground Water regime.
2	To study the concept of Darcy's law with respect to permeability.
3	To study the well hydraulics with respect to confined and unconfined aquifers.

UNIT – I	
INTRODUCTION: Importance. Vertical distribution of sub-surface water. Occurrence in different types of rocks and soils. Definition of aquifer, Aquifuge, Aquitard and Aquiclude. Confined and unconfined aquifers. **AQUIFER PROPERTIES:** Aquifer parameters – Specific yield, Specific retention, Porosity, Storage coefficient, derivation of the expression. Determination of specific yield. Land subsidence due to ground water withdrawals and numerical examples.	**07 Hrs**
UNIT – II	
DARCY'S LAW AND HYDRAULIC CONDUCTIVITY: Introduction. Darcy's law. Hydraulic conductivity. Coefficient of permeability and Intrinsic permeability, Transmissibility, Permeability in Isotropic, Anisotropic layered soils. Steady one dimensional flow, different cases with recharge. **WELL HYDRAULICS – STEADY FLOW:** Introduction. Steady radial flow in confined and unconfined aquifers. Pumping tests and numerical examples.	**08 Hrs**
UNIT – III	
WELL HYDRAULICS – UNSTEADY FLOW: Introduction. General equation derivation; Theis method, Cooper and JaCob method, Chow's method. Solution of unsteady flow equations and numerical examples.	**08 Hrs**
UNIT – IV (Blended Learning)	
GROUND WATER DEVELOPMENT: Types of wells. Methods of constructions. Tube well design. Dug wells. Pumps for lifting water: Working principles, Power requirements and numerical examples.	**08 Hrs**
UNIT – V	
GROUND WATER EXPLORATION: Seismic method, Electrical resistivity method, Borehole geo-physical techniques, Electrical logging, Radioactive logging, Induction logging, Sonic logging and Fluid logging and numerical examples. **GROUND WATER RECHARGE AND RUNOFF:** Recharge by vertical leakage. Artificial recharge. Ground water runoff. Ground water budget and numerical examples.	**08 Hrs**

Course Outcomes: The students will be able to	
1	Explain aquifer properties, well hydraulics, ground water models, use of geophysical methods, water quality, well designing and well construction.
2	Discuss ground Water development and deal with rural water supply schemes.

3	Develop runoff estimation and recharge.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Ground Water- H.M. Raghunath, - Wiley Eastern Limited, New Delhi.
2	Ground Water Hydrology- K. Todd, - Wiley and Sons, New Delhi.
3	Numerical Ground Water Hydrology- A.K. Rastogi, - Penram, International Publishing (India), Pvt. Ltd., Mumbai.

Reference Books:	
1	Ground Water Hydrology- Bower H- McGraw Hill, New Delhi.
2	Ground Water and Tube Wells- Garg Satya Prakash, - Oxford and IBH, New Delhi.
3	Ground Water Resource Evaluation- W.C. Walton, - McGraw Hill - Kogakusha Ltd., New Delhi.
4	Water wells and Pumps – Michel D.M., Khepar. S.D., Sondhi. S.K., McGraw Hill Education – 2nd Edition.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓				✓				✓			
CO3	✓			✓						✓		✓

Syllabus for 2018-19 Batch

Semester: V	
Course Title: Air Pollution and Control	
Course Code: **18CV561**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand primary pollutants and study the formation of secondary air pollutants in the atmosphere.
2	To study the influential factors (meteorological parameters) of air pollutants transportation in the atmosphere.
3	To study the effects of air pollution on receptor (human, different species, and environment, etc.,
4	To design the various control methods for air pollution and to create awareness through community participation and legislation.

UNIT – I	
INTRODUCTION: Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behavior and Fate of air Pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced smog, Air Pollution Inventories. **EFFECTS OF AIR POLLUTION:** On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes – London Smog, Los Angeles Smog & Bhopal Gas Tragedy.	**08 Hrs**
UNIT – II	
METEOROLOGY: Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Wind rose, General Characteristics of Stack Plumes, Meteorological Models –Gaussian Plume Model.	**07 Hrs**
UNIT – III	
METEOROLOGY: (Contd.) Factors to be considered in Industrial Plant Location and Planning. **SAMPLING AND ANALYSIS:** Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement.	**08 Hrs**
UNIT – IV	
AIR POLLUTION CONTROL METHODS: Air Pollution Control Methods – Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment, Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odours and their control. Indoor Air Pollution.	**08 Hrs**
UNIT – V (Blended Learning)	
AIR POLLUTION DUE TO AUTOMOBILES: Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. **ENVIRONMENTAL ISSUES:** ✓ Acid Rain ✓ Global Warming ✓ Ozone Depletion in Stratosphere ✓ Indoor Air Pollution **ENVIRONMENTAL LEGISLATION:** Environmental Policy, Environmental Protection	**08 Hrs**

Act, Air Pollution Standards.	

Course Outcomes: The students will be able to	
1	Realise the various sources and formation of pollutants thoroughly.
2	Understand the behaviour of pollutants in the atmosphere and the importance of the meteorological parameters.
3	Understand the effect of air pollutants on receptors (human, different species and surrounding environment) and to prevent and control the global air pollution.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books	
1	Air Pollution by M.N Rao and HVN Rao 2017 edition
2	Air Pollution by Rajni kand and Keshav Kant, Khanna Publishing 2019 edition
3	Air Pollution control by KVSG Murali Krishna USP Publishers 2017
4	Air Pollution and control by Anjaneyalu, 2017 edition

Reference Books:	
1	Boubel, R.W., Donald, L.F., Turner, D.B., and Stern, A.C., (1994), Fundamentals of Air Pollution – Academic Press.
2	Crawford, M., (1980), Air Pollution Control Theory –TMH Edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi
3	Henry. C. Perkins, (1980), Air Pollution –McGraw Hill.
4	Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986), Environmental Engineering –Mc Graw Hill Book Co
5	Sincero, A.P and Sincero, G.A., (1999), Environmental Engineering – A Design Approach –Prentice Hall of India.
6	Wark, K., Warner, C.F. and Davies, W.T., (1998), Air Pollution- Its Origin and Control –Harper & Row Publishers, New York

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓	✓					
CO2		✓			✓				✓	✓		
CO3			✓		✓	✓	✓			✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: SOLID WASTE MANAGEMENT	
Course Code: **18CV562**	Evaluation Procedure:
Credits: 03	CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Impart the knowledge of present methods of the municipal waste management system and to analyze the drawbacks.
2	Understand various waste management statutory rules.
3	Identify the adverse effects of improper waste management on the environment.
4	Analyze different elements of solid waste disposal and management, design and develop recycling options

UNIT – I	
INTRODUCTION: Land Pollution – Definition, causes and effects, control of land pollution, scope and importance of solid waste management, properties of solid waste, functional elements of solid waste management, energy content - numericals. **SOURCES:** Classification and characteristics – municipal, commercial & industrial. Methods of quantification.	**07 Hrs**
UNIT – II	
COLLECTION AND TRANSPORTATION: Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, transfer means and methods, Factors affecting the location of transfer station, route optimization techniques and problems. **TREATMENT / PROCESSING TECHNIQUES:** Components separation, volume reduction, size reduction, chemical reduction and biological and thermal processing problems.	**08 Hrs**
UNIT – III	
INCINERATION: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolysis, design criteria for incineration. **COMPOSTING:** Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting, Gasification.	**08 Hrs**
UNIT – IV	
SANITARY LANDFILL: Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, requirements of fabrics in sanitary landfills, sanitary land fill lining with design aspects. Different types of Liners, transportation and migration of Leachate.	**08 Hrs**
UNIT – V (Blended Learning)	
DISPOSAL METHODS: Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal. E-	**08 Hrs**

waste and its disposal methods. **RECYCLE AND REUSE:** Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse. Energy production, By-Product recovery.	

Course Outcomes: The students will be able to	
1	Understand the existing municipal management system and identify their drawbacks.
2	Identify the adverse effects of improper waste management on the environment
3	Evaluate the flow of Municipal and waste as per the rules laid by Ministry of Environment & Forest
4	Design recycling and disposal options for municipal and plastic waste

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Integrated Solid Waste Management: Tchobanoglous: M/c Graw Hill.
2	Solid Waste Management in developing countries. Bhide and Sunderashan.
3	Environmental Engineering – Vol II.: S.K. Garg.

Reference Books:	
1	Environmental Engineering: Peavy and Tchobanoglous.
2	Biomedical waste handling rules – 2000.
3	Solid Waste Engineering by Vesilind.Pa Worrell & Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓			✓					
CO2	✓	✓			✓		✓					
CO3		✓			✓	✓	✓					✓
CO4			✓		✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Hydraulics and Hydraulic Machinery Laboratory	
Course Code: **18CVL57**	Evaluation Procedure:
Credits: **01**	CIE + Record + SEE = 20 + 30 + 50 = 100
Teaching Hours: 26 Hrs (L:T:P:S:0:0:2:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the measurement of flow of fluid in a pipe, notches and weirs.
2	To calibration of measuring equipments and their applications.
3	To study the performance of Pumps and Turbines.

Sl. No.	**Syllabus Contents**	**No. of Hours**
1	Calibration of collecting tank (gravimetric method). Calibration of pressure gauge (dead weight method).	01
2	Verification of Bernoulli's equation.	01
3	Calibration of 90^0 V-notch.	02
4	Calibration of Rectangular and Cipolletti notch.	02
5	Calibration of Broad- crested weir.	02
6	Calibration of Venturimeter.	02
7	Determination of Darcy's friction factor for a straight pipe.	02
8	Determination of Hydraulic coefficients of a vertical orifice.	02
9	Determination of vane coefficients for a flat vane and semi-circular vane.	02
10	Performance characteristics of a single stage centrifugal pump, Multi-stage Centrifugal Pump.	02
11	Performance characteristics of a Pelton wheel Turbine.	02
12	**(Blended Learning)** Performance characteristics of a Kaplan turbine.	02
13	Performance characteristics of Francis turbine.	02

Course Outcomes: The students will be able to	
1	Explain the principles of flow measuring devices by conducting the experiments.
2	Illustrate the calibration of velocity and discharge measuring equipments.
3	Demonstrate the performance of Hydraulic machines.

Question paper pattern:
The candidate has to conduct one experiment which carries 70 % of the total marks and viva-voce for 30 % of the total marks.

Reference Books:	
1	Hydraulics and Hydraulic Machines Laboratory Manual – Dr. N. Balasubramanya.
2	Experiments in Fluid Mechanics – Sarbjit Singh- PHI Pvt. Ltd.- New Delhi- 2009-12-30.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓	✓	✓							
CO2	✓		✓	✓	✓							
CO3		✓	✓		✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: Computer Aided Design Laboratory	
Course Code: **18CVL58**	Evaluation Procedure:
Credits: **01**	CIE + Record + SEE Marks = 20 + 30 + 50 = 100
Teaching Hours: 26 Hrs (L:T:P:0:0:2)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To achieve skill sets to prepare computer aided engineering drawings
2	To understand the details of construction of different building elements.
3	To learn the application of MS Excel to solve Civil Engineering problems.

UNIT – I	
Application of AUTOCAD to draw various structural components: Following drawings are to be prepared for the data given using AUTOCAD: i) Cross section of Foundation - masonry wall, RCC columns (isolated). ii) Different types of staircases. iii) Lintel and chejja. iv) RCC slabs and beams. v) Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan.	**10 Hrs**
UNIT – II	
STRUCTURAL ANALYSIS SOFTWARE (STAAD) Use of commercially available software for the analysis of i) Simple beams. ii) Continuous beams. iii) 2D Portal frames-single storied and multi-storeyed. iv) 3D portal frame analysis. v) Analysis of trusses.	**08 Hrs**
UNIT – III (Blended Learning)	
USE OF EXCEL IN CIVIL ENGINEERING PROBLEMS Use of spread sheet for the following civil engineering problems: i) SFD and BMD for Cantilever and simply supported beam subjected to uniformly distributed load and uniformly varying load acting throughout the span. ii) Design of singly reinforced and doubly reinforced rectangular beams. iii) Design of one way and two way slabs. iv) Computation of earthwork. v) Design of horizontal curve by offset method. vi) Design of super elevation.	**08 Hrs**

Question paper pattern:

One compulsory question from Unit-I and choice for unit-II and Unit-III.

Course Outcomes: The students will be able to	
1	Use of modern tools like AutoCAD for building planning and drawing.
2	Analyse different structural components using STAAD Pro.
3	Prepare worksheets for different Civil Engineering problems using excel.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					✓				✓	✓		
CO2		✓		✓	✓				✓	✓		
CO3		✓		✓	✓				✓	✓		✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: DESIGN OF STEEL STRUCTURES	
Course Code: **18CV61**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:3:2:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To know different terminologies related to steel design and construction in accordance with the latest codes.
2	To study limit state concept of steel design and detailing.
3	To understand design of members under axial loads like tension, compression and flexural loads.
4	To acknowledge design of Column bases, simple and gusseted base connections.

UNIT – I	
INTRODUCTION: Advantages and Disadvantages of Steel structures, Loads and Load combinations, Design considerations, Limit State Method (LSM) of design, Failure criteria for steel, Codes, Specifications and section classification. **BOLTED CONNECTIONS**: Introduction, Behaviour of Bolted joints, Design strength of ordinary Black Bolts, Design strength of High Strength Friction Grip bolts (HSFG), Pin Connections, Simple Connections, Moment resistant connections, Beam to Beam connections, Beam and Column splices, Semi rigid connections.	**11 Hrs**
UNIT – II	
WELDED CONNECTIONS: Introduction, Welding process, Welding electrodes, Advantages of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Effective areas of welds, Design of welds, Simple joints, Moment resistant connections, Continuous Beam to Column connections, Continuous Beam to Beam connections, Beam Column splices.	**10 Hrs**
UNIT – III	
DESIGN OF TENSION MEMBERS: Introduction, Types of tension members, Design of strands, Slenderness ratio, Behaviour of tension members, Modes of failure, Factors affecting the strength of tension members, Angles under tension, other sections, Design of tension member, Lug angles, Splices, Gussets. **DESIGN OF COMPRESSION MEMBERS**: Introduction, Failure modes, Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression members, Effective length of compression members, Design of compression members, Built up compression members.	**10 Hrs**
UNIT – IV	
DESIGN OF COLUMN BASES: Design of simple slab base and gusseted base. **DESIGN OF BEAMS**: Introduction, Beam types, Lateral stability of beams, factors affecting lateral stability, Behaviour of simple and built-up beams in bending(without vertical stiffeners), Design strength of laterally supported beams in Bending, Design strength of laterally unsupported beams, Shear strength of steel beams, Maximum deflection, Design of beams and purlins.	**11 Hrs**
UNIT – V(Blended Learning)	
PLASTIC BEHAVIOUR OF STRUCTURAL STEEL: Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorems of Plastic Analysis, Methods of Plastic analysis, Plastic analysis of	**10 Hrs**

continuous beams and Portal frames.	

Course Outcomes: The students will be able to	
1	Define the fundamental principles of structural analysis and steel design with welded and bolted connections.
2	Demonstrate the contemporary methodologies, specifications, loads, sections/shapes and current codes are used in the analysis and design of steel structural elements such as tension and compression members, beams, columns, column bases and connections.
3	Develop professional competencies in design and application of steel members in relevant Civil Engineering structures.
4	Identify the failure modes, safety and serviceability through discussions and analyses of various steel structural members.

Text Books:	
1	Design of Steel Structures, N. Subramanian, Oxford, 2008.
2	Limit State Design of Steel Structures, S.K Duggal. TATA Mc Graw Hill 2010.
3	Design of Steel Structures - Negi - Tata Mc Graw Hill Publishers.
4	Design of Steel Structures - Arya and Ajaman- Nem Chand & Bros. Roorkee.

Reference Books:	
1	K.S. Sai Ram, Design of Steel Structures, Pearson Publishers.
2	Dr. Ramachandra and Virendra Gehlot, Design of Steel Structures 1&2, SCIENTIFIC (INDIA). Publishers.
3	N. Subramanian, Design of Steel Structures (Limit state Design), Oxford Publishers.
4	Dr. Anand S. Arya & Dr. J.L. Ajmani, Design of Steel Structures, printed by N.C Jain, Roorkee press, Roorkee.
5	IS: 800, IS: 875 and Steel tables.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓									✓		
CO2		✓	✓							✓		✓
CO3			✓			✓		✓				✓
CO4		✓	✓	✓		✓						

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: RAILWAYS, AIRPORT, TUNNEL AND HARBOUR ENGINEERING	
Course Code: **18CV62**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the history and development of the role of railways, railway planning based on essential criteria's.
2	To summarize the various aspects of tracks like, geometrical elements, points and crossings, and significance of maintenance.
3	To plan and design of airport layout, facilities required for runway, taxiway and impart the knowledge about visual aids.
4	To apply the design features of tunnels, harbours, dock and necessary navigational aids; also expose them to various methods of tunneling and tunnel accessories.

UNIT-I	
INTRODUCTION TO RAILWAYS: Role of railways in transportation, Indian Railways, Selection of Routes, Permanent way and its requirements, Gauges and types, Typical cross sections-single and double line broad gauge (BG) track in cutting, embankment and electrified tracks, Coning of wheels and tilting of rails. **RAILS**: Functions-requirements - types and sections, length-defects-wear-creep-welding-joints, creep of rails. **SLEEPERS AND BALLAST:** Functions, requirements, Types, Track fitting and fasteners-Dog spike, screw spike and Pandrol clip, Fish plates, bearing plates, Calculation of quantity of materials required for laying a track-Examples, Tractive resistances and hauling capacity with examples.	**8 Hrs**
UNIT-II	
GEOMETRIC DESIGN: Necessity, Safe speed on curves, Cant-cant deficiency-negative cant-safe speed based on various criteria, (both for normal and high speed tracks) Transition curve, Gradient and types, grade compensation, Examples on above. **POINTS AND CROSSING:** Components of a turnout, Details of Points and Crossing, Design of turnouts with examples (No derivations) types of switches, crossings, track junctions. Stations and Types, Types of yards, Signalling-Objects and types of signals, station and yard Equipment-Turn table, Fouling mark, buffer stop, level crossing, track defects, and maintenance. **Embankment:** Blanketing, Description of Mono rail.	**8 Hrs**
UNIT-III	
INTRODUCTION TO AIRPORT ENGINEERING: Layout of an airport with component parts and functions, Site selection for airport, Aircraft characteristics affecting the design and planning of airport, Airport classification, Runway orientation using wind rose with examples. **RUNWAY:** Basic runway length-Corrections and examples, Runway geometrics, Taxiway-Factors affecting the layout, geometrics of taxiway, Design of exit taxiway with examples, Visual aids, Airport marking, lighting-Instrumental Landing System.	**7 Hrs**
UNIT- IV(Blended Learning)	
TUNNELS:	**8 Hrs**

Advantages and disadvantages, Size and shape of tunnels, Surveying-Transferring center line, and gradient from surface to inside the tunnel, Examples, Tunneling in rocks-methods, Tunneling methods in soils-Needle beam, Liner plate, Tunnel lining, Tunnel ventilation, vertical shafts, Pilot tunneling, mucking and methods, drilling and drilling pattern.	
UNIT-V	
HARBOURS: Harbour classifications, Layout with components, Natural phenomenon affecting the design of harbours - wind, wave and tide, currents, Breakwater-Types Wharf and Quays, Jetties and Piers, Dry dock and wet docks.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the factual knowledge of geometric design of railways and its considerations with different materials used for the construction of railway track.
2	Comprehend the basic components of air craft and airport facilities with the design of run way length and geometrics of various landing aids in an airport.
3	Illustrate the fundamental principles related to methods of tunneling and harbours with their layout and components.

Text books:	
1	Railway Engineering - Saxena and Arora, Dhanpat Rai & Sons, 7th edition, New Delhi.
3	Airport Planning and Design – Khanna Arora and Jain, Nem Chand Bros, 6th edition Roorkee.
4	Docks and Tunnel Engineering – R Srinivasan, Charaotar Publishing House, 28th edition, New Delhi.
5	Docks and Harbor Engineering –H P Oza and G H OzaCharaotar Publishing House, 7th edition, New Delhi.

Reference books:	
1	Railway Engineering – J S Mundrey, McGraw Hill Publications, 4th edition, New Delhi.
2	Indian Railway Track – M M Agarwal, Jaico Publications, 2nd edition, oxford university press, Bombay.
3	Surveying – B C Punmia, Laxmi Publications, 7th edition, New Delhi.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓	✓		✓							
2	✓	✓	✓			✓				✓		
3	✓	✓				✓						

Syllabus for 2018-19 Batch

Semester: VI	
Course Title: FOUNDATION ENGINEERING	
Course Code: **18CV63**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:2:2:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the compressibility characteristics of soil.
2	To interpret the soil condition at a given location and suggest the suitable foundation.
3	To summarize the various methods of soil investigation and foundations for Civil Engineering applications.

UNIT – I	
STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for different types of loads, Pressure distribution diagrams, Approximate and exact methods, Newmark's influence chart, Contact Pressure. **FOUNDATION SETTLEMENTS:** Immediate, Primary consolidation and Secondary settlement.	**11 Hrs**
UNIT – II	
LATERAL EARTH PRESSURE: Types of earth pressure (Active, Passive and at-rest earth pressure). Rankine's theory of applications (Dry, moist, submerged, partially submerged, uniform surcharge, layered cohesionless, cohesive and cohesive – friction backfill). **STABILITY OF EARTH SLOPES:** Factor of safety, Stability analysis of Infinite slopes by limiting equillbrium condition, Stability analysis of finite slopes by Swedish slip circle methods, Fellineous method, Taylor's stability number.	**11 Hrs**
UNIT – III	
BEARING CAPACITY OF SHALLOW FOUNDATION: Definitions of bearing capacity terms, Modes of shear failure, Terzaghi's and IS: 6403-1981 method bearing capacity equations - assumptions and limitations, Effect of ground water table and loading eccentricity on footing. Field methods to evaluation of allowable bearing capacity - Plate load test, Standard penetration test.	**10 Hrs**
UNIT – IV	
BEARING CAPACITY OF PILE FOUNDATION: Classification of piles, Load transfer mechanism, Pile capacity by static formulae, dynamic formulae and pile load test, pile group, efficiency, Bearing capacity and settlement of piles on clayey soils, Negative skin friction, Underreamer piles.	**10 Hrs**
UNIT – V (Blended Learning)	
SUBSURFACE EXPLORATION: Definition, Objectives and Planning of exploration program, Significant depth, Methods of exploration: Test pits, Borings (Auger, Wash, Rotary and Percussion borings), Stabilization of bore holes, Types of samples (undisturbed, disturbed, representative and non-representative samples, Types of Samplers (Standard split spoon sampler, Shell by tubes, Thin walled samplers, Piston sampler), Design features affecting sample disturbance (area ratio, Recovery ratio, inside and outside clearances), Estimation of depth of ground water table (Hvorslev's method), Geo-physical methods (Seismic refraction and electrical resistivity methods), Typical bore log. Number, spacing and depth of borings for various Civil engineering structures, Soil exploration report.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Compute lateral earth pressures exerted on the wall and stability of soil slopes.
2	Suggest and plan various soil exploration techniques and also estimate the state of stress below any type of loaded area.
3	Evaluate bearing capacity of soil to design a shallow and deep foundations.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C, Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering- Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India.
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Bowles J E , Foundation analysis and design, Tata McGraw- Hill Publications
2	Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering, Tata McGraw Hill Publications
3	T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley & Sons.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2		✓	✓									
CO3	✓	✓										✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: PRE-STRESSED CONCRETE	
Course Code: **18CV641**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To provide methods of design for bending, shear, and torsion of PSC structural elements.
2	To provide general principles of PSC members and design using the latest IS: 1343 code.
3	To give knowledge about the design of PSC members.

UNIT – I	
MATERIALS: High strength concrete and steel, Stress-Strain characteristics and properties. **BASIC PRINCIPLES OF PRESTRESSING:** Fundamentals, Load balancing concept, Stress concept, centre of Thrust. Different types of Prestressing, Methods of Prestressing operations, Prestressing systems, Pre-tensioning and post-tensioning systems, end anchorages. Step by step Procedure of Pre-tensioning and Post-tensioning methods. **ANALYSIS OF SECTIONS FOR FLEXURE:** Stresses in concrete due to prestress and loads, stresses in steel due to loads, Cable profiles. Numerical Problems.	**8 Hrs**
UNIT – II	
LOSSES OF PRE-STRESS: Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force. Problems on Losses during Prestress. **DEFLECTIONS:** Deflection of a pre-stressed member – Short term and long term deflections, Elastic deflections under transfer loads and due to different cable profiles. Deflection limits as per IS 1343. Effect of creep on deflection, load verses deflection curve, methods of reducing deflection. Problems on Short term and Long term deflections.	**8 Hrs**
UNIT – III	
LIMIT STATE OF COLLAPSE: Flexure - IS Code recommendations – Ultimate flexural strength of sections. Problems on Flexure. Shear - IS Code recommendations, shear resistance of sections, shear reinforcement. Limit state of serviceability – control of deflections and cracking. Problems on Shear.	**8 Hrs**
UNIT – IV (Blended Learning)	
DESIGN OF END BLOCKS: Transmission of prestress in pretension members, transmission length, Anchorage stress in post-tensioned members. Bearing stress and bursting tensile force-stresses in end blocks-Methods, I.S. Code, provision for the design of end block reinforcement. Problems on analysis and design.	**7 Hrs**
UNIT – V	
DESIGN OF BEAMS: Design of pre-tensioned and post-tensioned symmetrical and asymmetrical sections. Permissible stress, design of prestressing force and eccentricity, limiting zone of pre-stressing force cable profile.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the basic concept of pre-stressing, post-tensioning, behavior of PSC members and use of high tensile strength steel.
2	Analyze the pre-stress of bending stresses and its various losses.
3	Calculate deflection in PSC members with respect to short and long time application of forces.
4	Analyze and design of beams for flexure both serviceability and economic point of view.

Text Books:	
1	Pre-stressed Concrete- N. Krishna Raju, Tata McGraw Publishers.
2	Pre-stressed Concrete- P. Dayarathnam, Oxford and IBH Publishing Co.
3	Pre-stressed Concrete- N. Rajgopalan, Alpha Sceince Publishers.
4	Referring Code for Design of Prestressed Concrete structures - IS: 1343.

Reference Books:	
1	Design of pre-stressed concrete structures- T.Y. Lin and Ned H. Burns - John Wiley & Sons, New York.
2	Design of Prestressed Concrete by – Arthus H Nilson. Wiley Publishers.
3	Fundamental of pre-stressed concrete- N.C. Sinha & S.K. Roy, S.Chand Publishers.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓									✓		
CO2		✓										
CO3	✓	✓					✓					
CO4	✓	✓	✓	✓								✓

Syllabus for 2018-19 Batch UG (CV)

Semester: V	
Course Title: ALTERNATIVE BUILDING MATERIAL AND TECHNOLOGIES	
Course Code: **18CV642**	Evaluation Procedure: CIE+ Assignment+ Group Activity+ SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand environmental issues due to building materials and the energy consumption in manufacturing building materials
2	To study the various masonry blocks, masonry mortar and structural behaviour of masonry under compression.
3	To study the alternative building materials in the present context.
4	To understand the alternative building technologies which are followed in present construction field.

UNIT – I	
INTRODUCTION: Energy in building materials, Environmental issues concerned to building materials, Global warming and construction industry. Environmental friendly and cost effective building technologies. Requirements for building of different climatic regions. Traditional building methods and vernacular architecture	**8 Hrs**
UNIT – II	
ALTERNATIVE BUILDING MATERIALS: Characteristics of building blocks for walls, Stones and Laterite blocks, Bricks and hollow clay blocks, Concrete blocks, Stabilized blocks - Mud Blocks, Steam Cured Blocks, Fal-G Blocks and Stone Masonry Block, M-Sand. **LIME-POZZOLANA CEMENTS:** Raw materials, Manufacturing process, Properties and uses, Fibre reinforced concretes, Matrix materials, Fibres: metal and synthetic, Properties and applications, Fibre reinforced plastics, Matrix materials, Fibres: organic and synthetic, Properties and applications, Building materials from agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications Field quality control test methods.	**8 Hrs**
UNIT – III (Blended Learning)	
ALTERNATIVE BUILDING TECHNOLOGIES: Alternative for wall construction, Types, Construction method, Masonry mortars, Types, Preparation, Properties, Ferro cement and Ferro concrete building components. Materials and specifications, Properties, Construction methods, Applications Alternative roofing systems, Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes	**7 Hrs**
UNIT – IV	
STRUCTURAL MASONRY: Compressive strength of masonry elements, Factors affecting compressive strength. Strength of units, prisms/wallettes and walls, Effect of brick work bond on strength, Bond strength of masonry: Flexure and shear, Elastic properties of masonry materials and masonry. IS Code provisions, Design of masonry, compression elements and Concepts in lateral load resistance	**8 Hrs**
UNIT – V	
COST EFFECTIVE BUILDING DESIGN: Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost Analysis : Case studies using alternatives **EQUIPMENT FOR PRODUCTION OF ALTERNATIVE MATERIALS** Machines for manufacture of concrete, Equipment for production of stabilized blocks, Moulds and methods of production of precast elements	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the need of Alternative Building Materials in Construction industry.
2	Evaluate properties of mortar and other alternative construction materials.
3	Design methods for cost effective buildings by adopting cost effective materials and cost saving techniques.

Question Paper Pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Alternative building methodologies for engineers and architects, lecture notes edited: K.S. Jagadish and B.V. Venkatarama Reddy, Indian Institute of Science, Bangalore.
2	Structural Masonry- Henry, A.W: Macmillan Education Ltd., 1990.
3	Alternative building methodologies for engineers and architects, lecture notes edited: K.S. Jagadish and B.V. Venkatarama Reddy, Indian Institute of Science, Bangalore.
4	Structural Masonry- Henry, A.W: Macmillan Education Ltd., 1990.

Reference Books:	
1	RJS Spence and DJ Cook, “Building Materials in Developing Countries”, Wiley pub.
2	LEED India, Green Building Rating System, IGBC pub.
3	IGBC Green Homes Rating System, CII pub.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓	✓					✓
CO2	✓			✓								✓
CO3		✓	✓				✓					✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: TRAFFIC ENGINEERING	
Course Code: **18CV643**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the fundamental knowledge of traffic engineering, scope and its importance.
2	To describe the basic techniques for collecting and analysing traffic data, diagnosing problems with effective design of facilities.
3	To apply probabilistic and queuing theory techniques for the analysis of traffic flow situations and emphasis the interaction of flow efficiency and traffic safety.
4	To understand and analyse traffic issues including safety, planning, design, operation and Control by intelligent transport system and its applications in the present traffic scenario.

UNIT - I	
INTRODUCTION: Definition, objectives of Traffic Engineering and scope of Traffic Engineering. **TRAFFIC CHARACTERISTICS:** Road user characteristics, vehicular characteristics, static and dynamic characteristics, power performance of vehicles, Resistance to the motion of vehicles – Reaction time of driver – Problems on above.	**7 Hrs**
UNIT - II	
TRAFFIC STUDIES: Various types of traffic engineering studies, data collection, analysis objectives and method of study, Definition of study area – Sample size and analysis. **INTERPRETATION OF TRAFFIC STUDIES:** Classified traffic Volume at mid-block and intersections, PCU, origin and destination, spot speed, speed and delay, parking – on street parking & off street parking, Accident – causes, analysis measures to reduce accidents – problems on above.	**8 Hrs**
UNIT - III	
TRAFFIC FLOW THEORIES: Traffic flow theory, Green shield theory – Goodness of fit, correlation and regression analysis (linear only), Queuing theory, Car following theory and relevant problems.	**8 Hrs**
UNIT - IV	
STATISTICAL ANALYSIS: Poisson's distribution and application to traffic engineering. Normal Distribution – Significance tests for observed traffic data, Chi Square test – problems on above. Traffic forecast – simulation techniques.	**8 Hrs**
UNIT - V(Blended Learning)	
TRAFFIC REGULATION AND CONTROL: Driver, vehicle and road controls – Traffic regulations, one way, Traffic markings, Traffic signs, Traffic signals – Vehicle actuated and synchronized signals – Signals co-ordination. Webster's method of signal design, IRC method, traffic rotary elements and designs, traffic operation – Street lighting, Road side furniture, Relevant problems on above. **INTELLIGENT TRANSPORT SYSTEM:** Definition, Necessities, Application in the present traffic scenario.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Interpret the relation between various types of traffic engineering studies with respect to objectives and scope of traffic characteristics.
2	Apply the fundamental principles of statistics for analysing the traffic flow by various mathematical models.
3	Explain the relation between traffic flow, its regulation and control by improvising the various road elements with their design for safe traffic operations.

Text books:	
1	Traffic Engineering and Transport Planning – L.R. Kadiyali- Khanna Publishers, New Delhi.
2	Highway Engineering Nemchand& Bros- Khanna & Justo, Roorkee (UA).
3	Traffic Engg. - Matson and Smith:-Mc.Graw Hill and Co.
4	Traffic flow theory – Drew- Mc. Graw Hill and Co.

Reference books:	
1	Traffic Engineering. Pignataro- Prentice Hall.
2	Highway Capacity Manual – 2000.
3	An introduction to traffic engineering- JotinKhistey and Kentlal- PHI.
4	Traffic Engineering- Mc Shane &Roess- PHI.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓		✓								
2	✓	✓	✓									
3	✓	✓			✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: OPEN CHANNEL HYDRAULICS	
Course Code: **18CV644**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the open channel flow characteristics.
2	To study the Gradually varied flow and its different methods.
3	To understand the hydraulic jump concepts and surges.

UNIT – I	
INTRODUCTION: Difference between pipe flow and open channel flow, classification of flow, energy equation, momentum equation, kinetic energy and momentum factors.	**7 Hrs**
UNIT – II (Blended Learning)	
UNIFORM FLOW: Concepts, uniform flow equations, conveyance and hydraulic exponent for uniform flow, design of channels for uniform flow.	**8 Hrs**
UNIT – III	
CRITICAL FLOW: Concept of specific Energy – Classification of flow. Design of channel, Section Factor, Hydraulic exponent for critical flow critical depth as a flow measurement. **GRADUALLY VARIED FLOW:** Concepts, GVF equation, its different forms, Basic assumptions, Dynamic equation, Characteristics of flow profile and classification.	**8 Hrs**
UNIT – IV	
ANALYSIS OF FLOWS PROFILES: Method of singular point and transitional depth, Methods of computation, Practical problems. **GRADUALLY VARIED FLOW COMPUTATIONS:** Different methods, direct integration method, Bress's Solution, Chow's solution, direct method, standard step method.	**8 Hrs**
UNIT – V	
RAPIDLY VARIED FLOW: Concepts, hydraulic jump in rectangular channels, classification of jumps, characteristics of jump – length location height, application of hydraulic jump stilling basins, shape type-2 and type-4. Hydraulic jump in rectangular channels, Sloping channels, Jump in nonrectangular channels, application of hydraulic jump as energy desipator.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Analyse flow characteristics in open channel.
2	Classify critical flow and gradually varied flow.
3	Design the flow profiles before and after hydraulic jump.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit.

• The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Open Channel Hydraulics: Subramanya, Tata Mc Graw Hill Publishing Co Ltd, New Delhi
2	Open Channel Flow – Madan Mohan Das, Prentice Hall of India Pvt. Ltd. and New Delhi 2008 Edition.
3	Flow through Open Channels – Rajesh Srivastava, Oxford Press, New Delhi 2008 Edition.

Reference Books:	
1	Open Channel Hydraulics: French, Mc Graw Hill Book Company, New Delhi.
2	Fluid Mechanics: Modi and Seth, Standard Book Home, New Delhi.
3	Open Channel Hydraulics: Henderson, Mr. Millan Publishing Co. Ltd., New York.
4	Open Channel Hydraulics: VenTe Chow,Mc Graw Hill Book Company, New Delhi.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓								✓
CO2	✓		✓			✓						
CO3		✓		✓			✓					✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: EARTH AND EARTH RETAINING STRUCTURES	
Course Code: **18CV645**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To broadly familiar with the importance of geotechnical engineering problems related field.
2	To understand the types of lateral earth pressure and its use in the design of retaining structures.
3	To check the stability of earthen slopes, retaining walls, sheet piles and braced cuts.
4	To estimation of seepage quantity through earthen dams and sheet piles.

UNIT – I	
STABILITY OF EARTH SLOPES: Types of slopes, causes and type of failure of slopes. Factor of safety, Stability analysis of Infinite slopes by limiting equillbrium condition, Stability analysis of finite slopes by Swedish slip circle method, Method of slices, Fellineous method, Taylor's stability number. Stability of slopes under steady seepage, sudden drawdown and during construction.	**8 Hrs**
UNIT – II (Blended Learning)	
SEEPAGE ANALYSIS: Laplace equation, Flow nets – characteristics and applications, Flow nets for sheet piles and below dam. Phreatic line – A. Casagrande's method – with and without filter, Flow through dams, Design of dam filters.	**7 Hrs**
UNIT – III	
LATERAL EARTH PRESSURE: Types of earth pressure (Active, Passive and at-rest earth pressure). Rankine's and Coulomb's Earth pressure theories – Assumptions and limitations. Rankine's theory of applications (Dry, moist, submerged, partially submerged, uniform surcharge, layered cohesionless, cohesive and cohesive – friction backfill).	**8 Hrs**
UNIT – IV	
RETAINING WALLS: Types of retaining walls, Failure of retaining walls by sliding, overturning and bearing. Stability and principles of the design of retaining walls – Gravity retaining walls, cantilever retaining walls, counterfort retaining walls, modes of failure of retaining walls, drainage of the backfill.	**8 Hrs**
UNIT – V	
BULK HEADS: Cantilever sheet pile walls and Anchored cantilever sheet pile walls in cohesion less soils and in clay. **BRACED CUTS:** Lateral earth pressure on sheeting and Design of various components of bracings.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Determine the factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures.
2	Determine the quantity of seepage through earth retaining structures.
3	Analyse and design the various components and check the safety of retaining wall, sheet pile and braced cut.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C, Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering - Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Bowles J E , Foundation analysis and design, McGraw- Hill Publications
2	Shashi K. Gulathi&ManojDatta, Geotechnical Engineering, Tata McGraw Hill Publications
3	T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley & Sons.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓				✓						
CO3		✓	✓									

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: INTEGRATED SOLID WASTE MANAGEMENT	
Course Code: **18CV651**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Credits: 03	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Impart the knowledge of present methods of the municipal waste management system and to analyze the drawbacks.
2	Understand various waste management statutory rules.
3	Identify the adverse effects of improper waste management on the environment.
4	Analyze different elements of solid waste disposal and management, design and develop recycling options

UNIT – I	
INTRODUCTION: Land Pollution – Definition, causes and effects, control of land pollution, scope and importance of solid waste management, properties of solid waste, functional elements of solid waste management, energy content - numericals. **SOURCES:** Classification and characteristics – municipal, commercial & industrial. Methods of quantification.	**07 Hrs**
UNIT – II	
COLLECTION AND TRANSPORTATION: Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, transfer means and methods, Factors affecting the location of transfer station, route optimization techniques and problems. **TREATMENT / PROCESSING TECHNIQUES:** Components separation, volume reduction, size reduction, chemical reduction and biological and thermal processing problems.	**08 Hrs**
UNIT – III	
INCINERATION: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolysis, design criteria for incineration. **COMPOSTING:** Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting, Gasification.	**08 Hrs**
UNIT – IV	
SANITARY LANDFILL: Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, requirements of fabrics in sanitary landfills, sanitary land fill lining with design aspects. Different types of Liners, transportation and migration of Leachate.	**08 Hrs**
UNIT – V (Blended Learning)	
DISPOSAL METHODS: Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal. E-waste and its disposal methods. **RECYCLE AND REUSE:** Material and energy recovery operations, reuse in other industries, plastic wastes,	**08 Hrs**

environmental significance and reuse. Energy production, By-Product recovery.	

Course Outcomes: The students will be able to	
1	Understand the existing municipal management system and identify their drawbacks.
2	Identify the adverse effects of improper waste management on the environment
3	Evaluate the flow of Municipal and waste as per the rules laid by Ministry of Environment & Forest
4	Design recycling and disposal options for municipal and plastic waste

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Integrated Solid Waste Management: Tchobanoglous: M/c Graw Hill.
2	Solid Waste Management in developing countries. Bhide and Sunderashan.
3	Environmental Engineering – Vol II.: S.K. Garg.

Reference Books:	
1	Environmental Engineering: Peavy and Tchobanoglous.
2	Biomedical waste handling rules – 2000.
3	Solid Waste Engineering by Vesilind.Pa Worrell & Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓			✓					
CO2	✓	✓			✓		✓					
CO3		✓			✓	✓	✓					✓
CO4			✓		✓							

Syllabus for 2017-18 Batch UG (CV)

Semester: VI	
Course Title: PHOTOGRAMMETRY AND REMOTE SENSING	
Course Code: **18CV652**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To obtain information about physical objects through process of recording, measuring and interpreting the photographs of the area.
2	To deals with the photo interpretation, recognizing and identifying the objects and judging their significance through careful systematic analysis.
3	To acquire the knowledge of Remote sensing and its applications.

UNIT – I	
PHOTOGRAMMETRY: Introduction, basic definitions, terrestrial photogrammetry, photo theodolite, horizontal and vertical angles from terrestrial photographs, horizontal position of a point from photographic measurements, elevation of points by photographic measurements, determination of focal length.	**7 Hrs**
UNIT – II	
AERIAL PHOTOGRAMMETRY: Advantages, vertical, tilted and oblique photographs, geometry of vertical photographs, scale of vertical photograph over flat and variable terrain, ground coordinates, computation of length of a line, computation of flying height, relief displacement, overlaps, flight planning, computation of required number of photographs for a given area, ground control in photogrammetry. Basics of stereoscopy, stereoscopes, uses, parallax. Basic elements in photographic interpretation. Introduction to digital photogrammetry.	**8 Hrs**
UNIT – III	
REMOTE SENSING: Introduction, Ideal remote sensing system, basic principles of electromagnetic remote sensing, electromagnetic energy, electromagnetic spectrum, interaction with earth's atmosphere, interaction with earth- surface materials, spectral reflectance of earth surface materials. **REMOTE SENSING PLATFORMS AND SENSORS:** Introduction, platforms- IRS, Land sat, SPOT, Cartosat, IKONOS. Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal).	**8 Hrs**
UNIT – IV	
DATA MODELS: Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Relational Database, Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure and data conversion.	**8 Hrs**
UNIT – V (Blended Learning)	
APPLICATIONS OF REMOTE SENSING: Applications in land use land cover analysis, change detection, water resources, urban planning, environmental and geological applications.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain topographic mapping of large area and also the preparation of special purpose map for various engineering projects such as highways, railway, Dams, Harbors.
2	Apply the Remote sensing technology in various fields of Civil Engineering.
3	Apply the knowledge of remote sensing in design of urban planning and water resource projects.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Principles of GIS - Peter A Burrough Reachael A Mc. Donnel - (Oxford).
2	The GIS Book - George B. Korte, P.E. - 5thEdn, Thomson Learning.
3	Remote sensing and image interpretation - Lillesand - (John Wiley and Sons).

Reference Books:	
1	Geographical Information system: Bemhard Sen-Wiley publications.
2	GIS and Computer cartography - Christopher Jones - (Longman).

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							
CO2	✓					✓						
CO3		✓			✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: COMPUTER AIDED DRAWING OF RC AND STEEL STRUCTURES	
Course Code: **18CVL66**	Evaluation Procedure:
Credits: **01**	CIE + Record + SEE = 20 + 30 + 50 = 100
Teaching Hours: 26 (L:T:P:S:0:0:2:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the selection of proper material, size, proportion and shape of each member and its connecting details.
2	To learn reinforcement detailing of structural elements with the use of proper grade of steel and concrete.
3	To develop drawings of various sections and take up the field problems related to steel construction.
4	To design of structural elements and their connections in accordance with latest code of practice (IS 456-2000, IS-800-2007).

Unit-I	
LAYOUT DRAWING: General layout of building showing, position of columns, footings, beam-slabs with standard notations and bar bending schedule.	**12 Hrs**
Detailing of Beam and Slab floor system, continuous beams and bar bending schedule.	
STAIRCASES: Dog legged, Open well and bar bending schedule.	
RC COLUMN FOOTINGS:(Blended learning) Column and footing (Square and Rectangle) and bar bending schedule.	
Unit-II	
CONNECTIONS: Bolted and welded, beam-beam, Beam column, seated, stiffened and un-stiffened.	**14 Hrs**
COLUMNS: Splices, Column-column of same and different sections. Lacing and battens.	
COLUMN BASES: Slab base and gusseted base, grillage foundation.	

Course Outcomes: The students will be able to	
1	Develop the final layout of structure, draw the reinforcement detailing and estimate steel quantity for various structural elements.
2	Design for safety and serviceability of various RC and steel structural members.
3	Illustrate the conclusions through drawings using drafting tools.

Text Books:	
1	Structural Design & Drawing Reinforced Concrete & Steel- N. Krishnaraju, University Press.
2	Reinforced Concrete Structures - B.C. Punmia – Laxmi Publishing Co.
3	S. Krishnamoorthy, Structural Design and Drawing (Concrete Structures), CBS publishers, New Delhi. Tata McGraw publishers.
4	Design of Steel Structures - Arya and Ajaman- Nem Chand & Bros. Roorkee.

Reference Books:	
1	Reinforced Concrete Design – S.N.Sinha, McGrawHill Education.
2	Design of Steel Structures - N. Subramanian: Oxford University, Press.
3	Design of Steel Structures - Negi - Tata Mc Graw Hill Publishers.
4	N. Subramanian, Design of Steel Structures, Oxford University, Press.

5	IS: 456-2000, IS: 800 – 2007, SP 6 (1) – 1984 or Steel Table.

Examination Pattern:

There will be TWO questions from each units with ONE choice in each unit.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓									✓		✓
CO2		✓		✓					✓			
CO3					✓				✓	✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: GEOTECHNICAL ENGINEERING LABORATORY	
Course Code: **18CVL67**	Evaluation Procedure:
Credits: **01**	CIE + Record + SEE = 20 + 30 + 50 = 100
Teaching Hours: 26 Hrs (L:T:P:S:0:0:2:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To perform laboratory tests to determine index properties of soil as per IS code procedures.
2	To perform tests to determine compaction, permeability, shear strength and consolidation characteristics of soil.

Sl. No.	**Syllabus Contents**	**No. of Hours**
1	Identification of gravel type, sand type, silt type and clay types soils. Tests for determination of Specific gravity (for coarse and fine grained soils). Tests for determination of Water content (Oven drying method).	02
2	Grain size analysis of soil sample (Wet sieve analysis and Hydrometer test).	02
3	In situ density by core cutter and sand replacement methods.	02
4	Consistency Limits – Liquid Limit (A.Casagrande and Cone Penetration Method), Plastic limit and Shrinkage limit.	04
5	**(Blended learning)** Standard Proctor Compaction Test and Modified Proctor Compaction Test.	02
6	Determination of relative density of sand.	02
7	Coefficient of permeability by constant head and variable head methods.	04
8	Shear Strength Tests: (undrained conditions) a) Direct Shear Box Test. b) Tri-axial Compression Test. c) Unconfined Compression Test.	06
9	a) Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor's needle. b) Demonstration of Free Swell Index, Differential free swell test. c) Demonstration of Consolidation Test - Determination of compression index and coefficient of consolidation. d) Demonstration of Laboratory vane shear test.	02

Course Outcomes: The students will be able to	
1	Classify the soils based on index properties and field identification.
2	Determine OMC and MDD, plan and assess field compaction program.
3	Understand shear strength and consolidation parameters to assess shear strength characteristics of the soil samples.

Reference Books:	
1	Manual of Soil Laboratory Testing - Head K.H., (1986) - Vol. I, II, III, Princeton Press, London.
2	BIS Codes of Practice: IS: 2720(Part-3/Sec. 1) – 1987; IS: 2720 (Part – 2)- 1973; IS: 2720 (Part – 4) – 1985; IS: 2720 (Part – 5) – 1985; IS: 2720 (Part – 6) – 1972; IS: 2720 (Part – 7) – 1980; IS: 2720 (Part – 8) – 1983; IS: 2720 (Part – 17) – 1986; IS: 2720 (Part - 10) – 1973; IS: 2720 (Part – 13) – 1986; IS: 2720 (Part 11) – 1971; IS: 2720 (Part 15) – 1986; IS: 2720 (Part 30) – 1987; IS: 2720 (Part 14) – 1977; IS: 2720 (Part – 14) – 1983; IS: 2720 (Part – 28) – 1974; IS: 2720 (Part – 29) – 1966, IS: 2720 (Part-60) 1965.
3	Engineering Properties of Soil and Their Measurements - Bowles J.E. (1988), - McGraw Hill Book Co. New York.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓						
CO2		✓	✓									
CO3		✓	✓									

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: MINI PROJECT	
Course Code: **18CVM68**	Evaluation Procedure:
Credits: **02**	Project presentation + Report + SEE= 20 + 30 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:0:0:4:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To define and develop a systematic procedure to carry out projects in various fields of Civil Engineering.
2	To develop innovative ideas to carry out the work in various field of Civil Engineering projects.

Syllabus Contents	**No. of Hours**
Design and Analysis of Multi-storey Frames. Design of Shallow and Pile foundation. Projects on highway topics. Study of the properties of various engineering materials and their applications Civil Engineering problems. Study of water and waste water qualities and their applications. Solid waste Management solutions. Projects on interdisciplinary in nature and societal issues are allowed.	13 (T) + 39 (P)

Note:

- A Mini-Project work involving investigation, develop and design of the above mentioned projects in various fields of Civil Engineering can be carried out as 4 Hours per week.
- The student should be submit the Mini-Project report at the end of the semester.

Course Outcomes: The students will be able to	
1	Define and develop practical knowledge in the field of Civil Engineering projects.
2	Identify, prepare and develop ability to carry out a project in the field of Civil Engineering.
3	Develop the skills to prepare and presentation skills to exhibit the project works to the society.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓	✓			✓					✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: EXTENSIVE SURVEY PROJECT	
Course Code: **18CVL69**	Evaluation Procedure:
Credits: **01**	CIE + Record + SEE = 20 + 30 + 50 = 100
Teaching Hours: 56 Hrs (7 days) (L:T:P:S:0:0:8:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To train and expose to gain knowledge in Irrigation engineering, Highway engineering, Water supply and Sanitary Engineering
2	To locate suitable sites for New Tank Project.
3	To exercise Restoration and Renovation of Old Tank to increase its storage capacity.
4	To train for selection of suitable sites for construction of underground and overhead storage tanks

Sl. No.	**Syllabus Contents**	**No. of Days**
1	General instructions, Reconnaissance of the sites and fly levelling to establish bench marks.	01
2	**NEW TANK PROJECTS:** The work shall consist of i) Alignment of center line of the proposed bund, Longitudinal and cross sections of the center line. ii) Capacity contours. iii) Details at Waste weir and sluice points. iv) Canal alignment.	02
3	**WATER SUPPLY AND SANITARY PROJECT:** Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population. Preparation of village map by any suitable method of surveying (like plane tabling), location of sites for ground level and overhead tanks underground drainage system surveys for laying the sewers.	01
4	**HIGHWAY PROJECT:** Preliminary and detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road**.**	01
5	**OLD TANK PROJECTS:** The work shall consist of i) Alignment of center line of the existing bund, Longitudinal and cross sections of the centre line. ii) Capacity contours to explore the quantity. iii) Details at existing Waste weir and sluice points.	02

Note:
All projects should be carried out using Total Station only.

Course Outcomes: The students will be able to	
1	Develop plans, maps and relative drawings for the construction and execution of Hydraulic structures such as New tank Project and Restoration of Old tanks.
2	Develop plans, maps and relative drawings for the construction of roads.
3	Develop plans, maps and relative drawings for the construction of water supply and sanitation structures.

Text Books:	
1	Surveying Vol–I and II– B.C. Punmia, Laxmi Publications, New Delhi.
2	Surveying Vol. I and II, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi
3	Surveying and Levelling – R Subramanian, Oxford University Press (2007)
4	Text Book of Surveying – C. Venkataramiah, Universities Press.(2009 Reprint)

Reference Books:	
1	Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.
2	Surveying , Arora
3	Maps by Survey of India.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓	✓			✓					✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VII / VIII	
Course Title: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)	
Course Code: **18HS72 / 82**	Evaluation Procedure:
Credits: **02**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 26 Hrs. (L:T:P:S) - 2:0:0:0	SEE Duration: 2 Hrs

Course Learning Objectives:	
1	To gain an historical, economic, and organizational perspective of occupational safety and health.
2	To investigate current occupational safety and health problems and solutions.
3	To identify the forces that influence occupational safety and health.
4	To demonstrate the knowledge and skills needed to identify work place problems and safe work practice.

UNIT - I	
OCCUPATIONAL HAZARD AND CONTROL PRINCIPLES: Safety, History and development, National Safety Policy. Occupational safety and Health Act (OSHA), Occupational Health and Safety administration - Laws governing OSHA and right to know. Accident – causation, investigation, investigation plan, Methods of acquiring accident facts, Supervisory role in accident investigation.	**6 Hrs**
UNIT - II	
ERGONOMICS AT WORK PLACE: Ergonomics Task analysis, Preventing Ergonomic Hazards, Work space Envelops, Visual Ergonomics, Ergonomic Standards, Ergonomic Programs. Emergency Response - Decision for action – purpose and considerations.	**5 Hrs**
UNIT - III	
FIRE PREVENTION AND PROTECTION: Fire Triangle, Fire Development and its severity, Effect of Enclosures, early detection of Fire, Classification of fire and Fire Extinguishers. Electrical Safety.	**5 Hrs**
UNIT – IV (Blended Learning)	
HEALTH CONSIDERATIONS AT WORK PLACE: Types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE) – types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability.	**5 Hrs**
UNIT - V	
OCCUPATIONAL HEALTH AND SAFETY CONSIDERATIONS: Handling of chemicals and safety measures in water and wastewater treatment plants and labs, Construction material manufacturing industries like cement plants, RMC Plants, precast plants and construction sites. Policies, roles and responsibilities of workers, supervisors and managers.	**5 Hrs**

Course Outcomes: The students will be able to	
1	Acquire knowledge on OSHA policies, Laws and regulations.
2	Identify hazards in the workplace that pose a danger or threat to the safety or health, or that of others.
3	Control unsafe or unhealthy hazards and propose methods to eliminate the hazards.
4	Discuss the role of health and safety in the workplace and effects of industries on environment.
5	Identify workplace hazards, safety considerations and roles and responsibilities of workers, supervisors and managers.

Question paper pattern:
• Each unit has two full questions with internal choice. • Each full question will have a maximum of two sub question. • Each full question will be for 10 Marks. • Students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	S Sharma, Vineet Kumar, "Safety, Occupational Health and Environmental Management in Construction". Khanna Publisher, 2013.
2	R K Jain, Sunil S Rao, "Industrial Safety, Health and Environment Management Systems". Createspace Independent Publishing Flat form, 2000.
3	Charles D Reese, "Occupational Safety and Health Fundamental principles and Philosophies", Tailor and Francis Ltd, 2017.
4	Sudhakar Paul T Rani, "Occupational Safety and Health", Createspace Independent Publishing Platform, 2018.
5	Akhil Kumar Das, "Principles of Fire Safety Engineering-Understanding Fire and Fire Protection-", PHI Learning Pvt. Ltd, 2019.
6	Lakhwinder Pal Singh, "Work study and Ergonomics", Cambridge University Press, 2018.
7	Industrial safety Sectional Committee CHD8, IS-14489:2018; Occupational Health and Safety Audit- Code' of Practice (First Revision) Bureau of Indian Standards.

Reference Books:	
1	Mishra R K, "Safety Management", AITBS Publisher.
2	Rana S P, Goswami P K, and Indu Rathee, "Handbook of Occupational Safety and Industrial Psychology". S. Chand and Company Ltd, 2014.
3	Narayanaraju G (Secretary to GOI), "The Occupational Safety, Health and Working Conditions Code, 2020", NO. 37 OF 2020, Govt. of India, Ministry of Law and Justice.
4	Goetsch D. L., "Occupational Safety and Health for Technologists, Engineers and Managers", Prentice Hall Publishers, 2010.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2					✓							
CO3					✓							
CO4							✓					
CO5									✓			✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: DESIGN OF RC AND STEEL STRUCTURES	
Course Code: **18CV71**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **04**	
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To gain knowledge about the behavior of RC and Steel structural elements and understand field problems in construction.
2	To learn the Design and detailing of various RC structural elements based on Limit state design as per latest Code of Practice IS: 456, IS: 3370 [Part IV].
3	To learn the Design and detailing of various Steel structures and their connections based on Limit state design as per latest Code of Practice IS: 800.

PART – A : DESIGN AND DETAILING OF RC STRUCTURES	**No. of Hours**
Design and Detailing of Rectangular Combined Footing - Slab and Beam Type.	**8 Hrs**
Design and Detailing of Retaining Walls [Cantilever and Counter fort Type].	**9 Hrs**
Design and Detailing of Circular and Rectangular Water tanks resting on a ground and free at top [Flexible base and Rigid base] using IS: 3370 [Part IV] only.	**9 Hrs**
PART – B : DESIGN AND DETAILING OF STEEL STRUCTURES	
Design and Detailing of Gantry Girder.	**8 Hrs**
Design and Detailing of Roof Truss [Forces in the members to be given].	**9 Hrs**
Design and Detailing of Bolted and Welded Plate Girder.	**9 Hrs**

Course Outcomes: The students will be able to	
1	Analyze and Design of RC structures like Combined Footing, Retaining walls, Water tank and Portal Frame.
2	Analyze and Design of Steel structures like Trusses, Gantry girder and Plate Girders.
3	Illustrate their conclusions through drawings manually.

Question paper pattern:

PART A:

- ✓ Design and detailing of RC shall be done as per IS: 456 and IS: 3370 code.
- ✓ Two questions to be set out of which one question to be answered [50% weightage].
- ✓ Design [30% weightage] + Detailing [20% weightage] of RCC structure.

PART B:

- ✓ Design and detailing of Steel shall be done as per IS: 800 Code and by the use of IS Steel table.
- ✓ Two questions to be set out of which one question to be answered [50% weightage].
- ✓ Design [30% weightage] + Detailing [20% weightage] of Steel structure.

Text Books	
1	Structural Design and Drawing of Reinforced Concrete and Steel - N Krishna, Oxford University Press.
2	Reinforced Concrete Structures - B C Punmia – Laxmi Publishers.
3	Design of Steel structures - N. Subramnian, Oxford University Press.
4	Design of Steel structures - Negi, Tata McGraw Hill Publishers.
5	IS: 456, IS: 3370 Code [Part IV], SP 16 – for RC Structures. IS: 800 Code, IS Steel table – for Steel Structures.

Reference Books:	
1	Reinforced Concrete Design, S N Sinha, McGraw Hill publication.
2	Structural Design and Drawing, Krishnamurthy [Concrete structures], New Delhi, McGraw Hill publication.
3	K. S Sai.Ram, Design of Steel structures, Pearson Publishers.
4	Dr. Ramachandra and Virendra Gehlot, Design of Steel Structures 1 & 2, SCEINTIFIC [INDIA] Publishers.
5	Dr. Anand S Arya and Dr. J L Ajmani, Design of steel structures, Printed by N C Jain, Roorkee Press, Roorkee.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓	✓					
CO2		✓			✓					✓		
CO3			✓		✓	✓	✓			✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ESTIMATION AND VALUATION	
Course Code: **18CV72**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To inculcate the knowledge of measuring the quantity and checking the executed quantity in civil engineering works.
2	To develop the knowledge of calculating the rate of items of work using civil engineering methods.
3	To understand the specification of all the civil engineering works to be executed as per the standards and design.
4	To gain knowledge of land appreciation and depreciation value.

UNIT – I	
ESTIMATION: Study of various drawings with estimates, important terms, units of measurement, abstract Methods of taking out quantities and cost – Center line method, Preparation of detailed and abstract estimates for the following Civil Engineering works – Buildings – RCC framed structures with flat, sloped RCC roofs with all Building components.	**11 Hrs**
UNIT – II	
ESTIMATION (Continued.,) Long and short wall method for RCC framed building structures with all building components, Different type of estimates, approximate methods of estimating buildings, cost of materials. Estimation of wooden joineries such as doors, windows & ventilators. Steel truss (Fink and Howe truss), manhole and septic tanks, RCC Culverts.	**11 Hrs**
UNIT – III	
SPECIFICATIONS: Definition of specifications, objective of writing specifications, essentials in specifications, general and detail specifications of common item of works in buildings **RATE ANALYSIS:** Definition and purpose. Working out quantities and rates for the following standard items of works – earth work in different types of soils, cement concrete of different mixes, bricks and stone masonry, flooring, plastering.	**10 Hrs**
UNIT – IV	
RATE ANALYSIS (Continued.,) RCC works, centering and form work for different RCC items, wood and steel works for doors, windows and ventilators. **MEASUREMENT OF EARTHWORK FOR ROADS:** Methods for computation of earthwork – cross sections – mid section formula or average end area or mean sectional area, trapezoidal & prismoidal formula with and without cross slopes.	**10 Hrs**
UNIT – V (Blended Learning)	
CONTRACTS: Types of contract – essentials of contract agreement – legal aspects, penal provisions on breach of contract. Definition of the terms – Tender, earnest money deposit, security deposit, tender forms, documents and types. Acceptance of contract documents. Termination of contract, completion certificate, quality control, right of contractor, refund of deposit. Administrative approval – Technical sanction. Nominal muster roll, measurement books – procedure for recording and checking measurements – preparation of bills.	**10 Hrs**

PRINCIPLE OF REAL ESTATE AND PROPERTY MANAGEMENT: Introduction, principles, analytical methods and tools useful for making investment and finance decisions regarding commercial real estate assets, RERA. **TECHNIQUES OF REAL ESTATE VALUATION:** Market analysis, legal and political analysis, and highest and best use analysis; in-depth exposure to the three approaches to valuation; market comparison, income, and cost; the role of valuation in real estate investment; government regulation of appraisers.	

Course Outcomes: The students will be able to	
1	Define quantities of construction items by reading Engineering / construction drawings and specifications followed in executing projects.
2	Apply the rates for the Civil Engineering works and also for individual items.
3	Develop programme specifications, administrative methods, tendering and valuation process and other financial related issues.

Text Books:	
1	Estimating & Costing, B. N. Dutta, Chand Publisher, 2016
2	Quantity Surveying- P. L. Basin S. Chand: New Delhi.
3	Estimating & Specification - S. C. Rangawala, Charotar publishing house, Anand.2009
4	Estimating & Costing- G. S. Birde, Dhanpath Rai and sons: New Delhi.2014

Reference Books:	
1	Estimating, costing, specification and Valuation in Civil Engg., N. Chakraborti, N. Chakraborti, Published by author, Kolkata, 20th Edition, 2007
2	Estimating, Costing and Accounts - D.D. Kohli and R.C. Kohli S. Chand: New Delhi.
3	Contracts and Estimates, B. S. Patil, University Press, 2006.
4	Schedule of Rates book (KPWD/CPWD)

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓						✓	✓			✓
CO2	✓					✓			✓			✓
CO3						✓	✓	✓	✓			✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: PAVEMENT MATERIALS AND CONSTRUCTION	
Course Code: **18CV731**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To explain the different materials which are used in pavement construction by imparting knowledge about the engineering properties required.
2	To discuss various types of bituminous mix designs as per the guidelines (MORTH) and different highway construction equipment with their suitability and adaptability in various field scenarios.
3	To understand various construction practice and quality control aspects of embankment, flexible and rigid pavement as per the required specifications (MORTH).
4	To illustrate the improvisation in various layers of pavement to increase the structural strength by the use of non- basic materials (DLC, polythene sheets).

UNIT-I	
AGGREGATES: Origin, classification, requirements, properties and tests on road aggregates, concepts of size and gradation – design gradation, maximum aggregate size, aggregate blending by different methods to meet specification. **BITUMEN AND TAR:** Origin, preparation, properties and chemical constitution of bituminous road binders, requirements.	**7 Hrs**
UNIT-II	
BITUMINOUS EMULSIONS AND CUTBACKS: Preparation, characteristics, uses and tests. Adhesion of Bituminous Binders to Road Aggregates: Adhesion failure, mechanism of stripping, tests and methods of improving adhesion. **BITUMINOUS MIXES:** Mechanical properties, dense and open textured mixes, flexibility and brittleness, (no Hveem Stabilometer & Hubbar – Field Tests) bituminous mix, design methods using Rothfuch's Method only and specification, Marshal mixed design criteria- voids in mineral aggregates, voids in total mix, density, flow, stability, percentage voids filled with bitumen.	**8 Hrs**
UNIT-III (Blended Learning)	
EQUIPMENT IN HIGHWAY CONSTRUCTION: Various types of equipment for excavation, grading and compaction – their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction	**8 Hrs**
UNIT-IV	
SUBGRADE- Flexible pavements: Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests. **FLEXIBLE PAVEMENTS:** Specifications of materials, construction method and field control checks for various types of flexible pavement layers.	**8 Hrs**
UNIT-V	
SUBGRADE- Rigid pavements: Earthwork grading and construction of embankments and cuts for roads. Preparation of	**8 Hrs**

subgrade, quality control tests. **RIGID PAVEMENTS:** Specifications of materials, construction method and field control checks for various types of rigid pavement layers.	

Course Outcomes: The students will be able to	
1	Classify the various road construction materials with their physical and engineering properties required for design of road facility.
2	Explain the various equipments used for excavation and grading with their working principles in highway construction.
3	Illustrate the various criteria and specifications related to earthwork and construction of flexible and rigid pavements.

Text Books:	
1	Highway Engineering – S K Khanna and C E G Justo, Nem Chand Bros, 10th edition, Roorkee.
2	Construction Equipment and its Management- Sharma, S.C: Khanna Publishers, 6th edition, New Delhi
3	Hot Mix Asphalt Materials, Mixture Design and Construction- Freddy L. Roberts, Kandhal, P.S: University of Texas Austin, Texas. NAPA Education Foundation Lanham, Maryland.

References Books:	
1	RRL, DSIR, 'Bituminous Materials in Road Construction', HMSO Publication.
2	RRL, DSIR, 'Soil Mechanics for Road Engineers', HMSO Publication.
3	Relevant IRC codes and MoRT & H specifications.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓							✓			
2	✓				✓			✓		✓		
3	✓		✓		✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: PHOTOGRAMMETRY AND REMOTE SENSING	
Course Code: **18CV732**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To obtain information about physical objects through process of recording, measuring and interpreting the photographs of the area.
2	To deals with the photo interpretation, recognizing and identifying the objects and judging their significance through careful systematic analysis.
3	To acquire the knowledge of Remote sensing and its applications.

UNIT – I	
PHOTOGRAMMETRY: Introduction, basic definitions, terrestrial photogrammetry, photo theodolite, horizontal and vertical angles from terrestrial photographs, horizontal position of a point from photographic measurements, elevation of points by photographic measurements, determination of focal length	**7 Hrs**
UNIT – II	
AERIAL PHOTOGRAMMETRY: Advantages, vertical, tilted and oblique photographs, geometry of vertical photographs, scale of vertical photograph over flat and variable terrain, ground coordinates, computation of length of a line, computation of flying height, relief displacement, overlaps, flight planning, computation of required number of photographs for a given area, ground control in photogrammetry. Basics of stereoscopy, stereoscopes, uses, parallax. Basic elements in photographic interpretation. Introduction to digital photogrammetry.	**8 Hrs**
UNIT – III	
REMOTE SENSING: Introduction, Ideal remote sensing system, basic principles of electromagnetic remote sensing, electromagnetic energy, electromagnetic spectrum, interaction with earth's atmosphere, interaction with earth- surface materials, spectral reflectance of earth surface materials. **REMOTE SENSING PLATFORMS AND SENSORS:** Introduction, platforms- IRS, Land sat, SPOT, Cartosat, IKONOS, Envisat etc. Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal).	**8 Hrs**
UNIT – IV	
DATA MODELS: Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Relational Database, Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion.	**8 Hrs**
UNIT – V (Blended Learning)	
APPLICATIONS OF REMOTE SENSING: applications in land use land cover analysis, change detection, water resources, urban planning, environmental and geological applications	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain topographic mapping of large area and also the preparation of special purpose map for various engineering projects such as highways, railway, Dams, Harbors.
2	Apply the Remote sensing technology in various fields of Civil Engineering.

3	Apply the knowledge of remote sensing in design of urban planning and water resource projects.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:

1	Principles of GIS - Peter A Burrough Reachael A Mc. Donnel - (Oxford).
2	The GIS Book - George B. Korte, P.E. - 5th Edn, Thomson Learning.
3	Remote sensing and image interpretation - Lillesand - (John Wiley and Sons).

Reference Books:

1	Geographical Information system: Bemhard Sen-Wiley publications.
2	GIS and Computer cartography - Christopher Jones - (Longman).

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							
CO2	✓					✓						
CO3		✓			✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ENVIRONMENTAL IMPACT ASSESSMENT	
Course Code: **18CV733**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To foresee the potential environmental problems that would arise out of a proposed development.
2	To examine and select the suitable methodology for the various project options and predict significant environmental impact.
3	To identify the appropriate abatement and mitigating measures for the implementation of projects.

Unit-I	
INTRODUCTION TO EIA: Development Activity and Ecological Factors, EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**08 Hrs**
Unit-II	
METHODOLOGIES OF EIA: Frame work of Impact Assessment. Developmental Projects - Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	**07 Hrs**
Unit-III	
ENVIRONMENTAL ATTRIBUTES: Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA. (Explanations with flow charts and examples)	**08 Hrs**
Unit-IV (Blended Learning)	
PUBLIC PARTICIPATION PROGRAM: Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity - Environmental Parameter Activity Relationships-Matrices.	**08 Hrs**
Unit-V	
EIA FOR PROJECTS: ✓ EIA for Water resource developmental projects. ✓ Highway projects. ✓ Nuclear-Power plant projects. ✓ Mining project (Coal, Iron ore). ✓ Thermal Power Plant. ✓ Infrastructure Construction Activities.	**08 Hrs**

Text Books:	
1	Methodologies for Environment Impact Assessment - Anjaneyalu. Y, B S publications.
2	Environment Impact Assessment – N.S. Raman, A.R Gajbhiye and S.R. Khandeshwar, dreamtech press.
3	Environment Impact Assessment – R.R. Barthwal, New Age International Publishers.

Reference Books:	
1	Environmental Impact Analysis-Jain R.K.-Van Nostrand Reinhold Co.
2	Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
3	Environment Impact Assessment - Larry W. Canter - McGraw Hill

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Course Outcomes: The students will be able to	
1	Explain systematic identification and evaluation of the potential impacts of proposed projects on components of the total environment.
2	Apply and identify the measures to be adopted to avoid environmental impact and reinforce a commitment in an organized and systematic approach by involving agencies and public participation.
3	Develop environmental protection mechanism for the proposed projects to protect and restore good environment with sustainable development.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓					✓	✓					
2		✓				✓				✓		
3	✓						✓		✓		✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: DESIGN OF BRIDGES	
Course Code: **18CV734** Credits: **03**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To know different terminologies related to Bridge design and construction, codes used for design.
2	To study the philosophy of bridge design and detailing.
3	To understand the design of members under various type of loads and connection details.

UNIT - I	
BRIDGE PRELIMINARIES: Classification of bridges and standard loads, Bridge-definition, components of bridges, various classification, types of bridges, forces to be considered for the design, IRC standards. **HYDRAULIC DESIGN:** Methods of finding design discharge, natural, artificial and linear water ways, afflux, economic span. **SUBSTRUCTURES AND FOUNDATIONS:** Types of abutments, piers and wing walls, forces to be considered for the design, Types of foundations and forces to be considered for the design, depth of scour.	**08 Hrs**
UNIT – II	
DESIGN AND DETALING OF RC SLAB CULVERT: IRC Class-AA loading & Class-AA loading. Design of pipe culvert. Empirical design of bank connections. Slab culvert & pipe culvert for given site particulars.	**08 Hrs**
UNIT – III	
DESIGN AND DETAILING OF RC T BEAM BRIDGE: Cross beams by Piegaud's and Courbon's method for Class-AA loading, empirical design of substructures and foundations.	**08 Hrs**
UNIT – IV	
DESIGN OF COMPOSITE BRIDGE: Design of composite bridge for EUDL, Shear connectors-design requirements for shear connectors. Composite bridge.	**08 Hrs**
UNIT-V (Blended Learning)	
Typical Design and detailing of approach slab, Hand rails, slab culverts and girder bridges as per BIS standards	**07 Hrs**

Course Outcomes: The students will be able to	
1	Explain the different types of bridges, uses and component structures.
2	Analyse the different types of Bridges.
3	Design of different types of brides with detailing of drawing using AutoCAD.

Text Books:	
1	Essentials of Bridge Engineering, Johnson Victor, Oxford IBH Publications, New Delhi.
2	Design of Bridges, Krishna Raju N, Oxford IBH Publications, New Delhi.
3	Bridge Engineering by Rangawala S C and Rangawala K S, Charotar Publishing House, Anand

4	Relevant IRC and BIS codes.

Reference Books:	
1	Design of Bridge Structures, Jagadish T. R & Jayaram M. A, Prentice Hall of India, New Delhi.
2	Concrete Bridge practices by Raina V.K., Tata Mc Graw Hill, New Delhi.
3	Bridge Engineering by Ponnuswamy, Tata McGraw Hill, New Delhi.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓								✓		
CO3			✓	✓						✓	✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: STRUCTURAL DYNAMICS	
Course Code: **18CV735**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To learn principles of structural dynamics and to evaluate the dynamic characteristics of the structure.
2	To analyse structures under time varying loads to find stresses, strains, displacements for all points of the structure.
3	To understand the response of a structures for dynamic loading.

UNIT – I	
Introduction to structural dynamics, Brief history of vibration and Earthquakes, Major earthquakes, Earthquakes zones, some basic definitions, Vibration of single degree of freedom system, undamped, damped, free vibrations, logarithmic decrement. Forced vibrations of single degree freedom systems, response of undamped and damped systems subjected to harmonic loading, rotation unbalance, reciprocating unbalance.	**8 Hrs**
UNIT – II	
Duhamel's integral, response due to general system of loading, dynamic load factor, response spectrum, response of SDOF subjected to harmonic base excitation, vibration isolation. Free vibration of multi degree of freedom systems, natural frequencies, normal modes, orthogonality property of normal modes, eigenvalues	**8 Hrs**
UNIT – III	
Shear buildings modelled as multi degree of freedom systems, free vibrations, natural frequencies. Forced vibration motion of shear buildings, modal super position method, response of shear buildings to base motion, harmonic forced excitation.	**8 Hrs**
UNIT – IV	
Damped motion of shear buildings, equations for damped shear buildings, uncoupled damped equations, conditions for damping uncoupling.	**8 Hrs**
UNIT – V (Blended Learning)	
Dynamic analysis of beams stiffness matrices, lumped mass and consistent mass formulation equations of motion.	**7 Hrs**

Course Outcomes: The students will be able to	
1	Apply the knowledge of mathematics and mechanics for solving problems on structural dynamics.
2	Develop the equation of motion of undamped and under damped single degree of freedom systems subjected to free and forced vibration.
3	Analyse multi-storied frames and draw mode shapes of vibrations
4	Explain the concepts of seismology and working principles of vibration measuring instruments.

Text Books:	
1	Structural dynamics: Vibrations and systems, 1st edition, madhujit mukophadyay, publisher: ANE Books ISBN: 9788180520907, 8180520900, 2008.
2	Structural dynamics: Theory and computation, Mario Paz, 2nd edition, CBS publisher, 2004.
3	Dynamics of structure. R.W.clough and J.Penzien, 2nd revised edition, McGraw-Hill education 1993.

Reference Books:	
1	Theory of Vibration with applications, William Thomson, 4th edition, CRC Press, 1996

2	Structural Dynamics- Anil Chopra: PHI Publishers.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓							
CO2	✓	✓										
CO3		✓	✓									
CO4	✓	✓	✓		✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: CONSTRUCTION PROJECT MANAGEMENT	
Course Code: **18CV736**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the various management techniques for successful completion of construction projects.
2	To study the effect of management for project organization, design of construction process, labour, material and equipment utilization and cost estimation.
3	To study the cost estimation of a project.

UNIT – I	
THE OWNERS' PERSPECTIVE: Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers.	**7 Hrs**
UNIT – II (Blended Learning)	
ORGANIZING FOR PROJECT MANAGEMENT: Project Management – modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants - Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team.	**8 Hrs**
UNIT – III	
DESIGN AND CONSTRUCTION PROCESS: Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment.	**8 Hrs**
UNIT – IV	
LABOUR, MATERIAL AND EQUIPMENT UTILIZATION: Historical Perspective - Labour Productivity - Factors Affecting Job-Site Productivity - Labour Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management. - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks.	**8 Hrs**
UNIT – V	
COST ESTIMATION: Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Develop a project plan based on requirements and prepare schedule of a project by understanding the activities and their sequence.
2	Estimate the quantities and cost of a structure.
3	Explain labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety.

4	Establish as an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2	Choudhury S, Project Management, McGraw-Hill Publishing Company, New Delhi, 1988.

Reference Books:	
1	Dr. U.K. Shrivastava "Construction Planning and Management", Galgotia publications Pvt. Ltd. New Delhi.
2	P C Tripathi and P N Reddy, "Principles of Management", Tata McGraw-Hill Education

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓		✓							✓	
CO2	✓				✓				✓			✓
CO3		✓			✓						✓	✓
CO4	✓							✓		✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: REINFORCED EARTH STRUCTURES	
Course Code: **18CV737**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the importance of soil and its properties in Civil Engineering applications.
2	To demonstrate the index properties and engineering properties of different soils and Soil Structure.
3	To interpret the various factors influencing the soil behaviour.
4	To summarize the significance of soils and its behaviour in various applications of Civil engineering.

UNIT – I	
BASICS OF REINFORCED EARTH CONSTRUCTION: Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil. **GEOSYNTHETICS AND THEIR FUNCTIONS:** Historical developments, Recent developments, manufacturing process-woven & non-woven, Raw materials – polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Elastomers, Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geo-synthetics – Geo-textiles, Geo-grids, Geo-membranes, Geo-composites, Geo-nets, Geo-foam, Geo-mats, Geo-meshes, Geo-webs etc.	**8 Hrs**
UNIT – II	
PROPERTIES AND TESTS ON MATERIALS: Properties – Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties. **DESIGN OF REINFORCED EARTH RETAINING WALLS:** Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, typical design problems.	**8 Hrs**
UNIT – III	
DESIGN OF REINFORCED EARTH FOUNDATIONS AND EMBANKMENTS: **FOUNDATIONS:** Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, bearing capacity improvement in soft soils, General guidelines. **EMBANKMENTS:** Concept of Reinforced Embankments, Internal and external stability, Selection of materials, typical design problems.	**8 Hrs**
UNIT – IV	
SOIL NAILING TECHNIQUES: Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken. **GEO-SYNTHETICS FOR ROADS AND SLOPES:** **ROADS:** Applications to Temporary and Permanent roads, Role of Geo-synthetic in enhancing properties of road, control of mud pumping, Enhancing properties of subgrade, Design requirements. **SLOPES:** Causes for slope failure, Improvement of slope stability with Geo-synthetic, Drainage requirements, Construction technique.	**8 Hrs**

UNIT – V (Blended Learning)	
GEOSYNTHETICS – FILTER, DRAIN AND LANDFILLS: **FILTER AND DRAIN:** Conventional granular filter design criteria, Geo-synthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geo-synthetic permeability, anti-clogging, survivability and durability. **LANDFILLS:** Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps	**7 Hrs**

Course Outcomes: The students will be able to	
1	Interpret the type of soil in the field or in the laboratory
2	Predict the Suitability of soil for a particular project based on its Engineering properties
3	Calculate the rate and amount of settlement of foundation and compaction behaviour of soils
4	Evaluate the index and engineering properties and application to Civil engineering problems

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C, Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering - Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Design with Geo-synthetics - Koerner. R.M. – Prince Hall Publication, 2005.
2	An introduction to Soil Reinforcement and Geosynthetics – Shivakumar Babu G. L., Universities Press, Hyderabad, 2006
3	Engineering with Geo-synthetics - Venkattappa Rao, G., & Suryanarayana Raju., G. V.S. – Tata Mc Graw Hill publishing Company Limited., New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓				✓						
CO3		✓	✓									
CO4		✓	✓									

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: WATER RESOURCES ENGINEERING	
Course Code: **18CV741**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study various aspects of water resources, Surface and groundwater, design of hydraulic structures like dams, spillways and Canal systems.
2	To understand the concept of open wells, tube well and the site suitability for hydraulic structures.
3	To know the water quality aspects, water management and water supply, Surface and ground water flow modelling.

UNIT – I	
INTRODUCTION: Introduction, The world's fresh water resources, water use in the world, water management sectors, the water management community, the future of water resources. **HYDROLOGIC PROCESS:** Introduction to hydrology, hydrologic cycle, atmospheric and ocean circulation. **PRECIPITATION:** Formation and types, rainfall variability, disposal of rainfall on a watershed, design storms.	**7 Hrs**
UNIT – II (Blended Learning)	
SURFACE RUNOFF: Drainage basins, hydrologic losses and rainfall excess, rainfall-runoff analysis using unit hydrograph approach, SCS rainfall-runoff relation. **WATER USE DATA:** Classification of uses, water for energy. Water for agriculture: irrigation trends and needs, irrigation infrastructures, irrigation system selection and performance, water requirement for irrigation, impacts of irrigation Drought management: options, severity, economic aspects of water storage. **ANALYSIS OF SURFACE WATER SUPPLY:** Surface water reservoir systems, Storage-firm yield analysis for water supply reservoir simulation.	**8 Hrs**
UNIT – III	
FLOOD CONTROL: Introduction, flood plain management, flood plain definition, hydrologic and hydraulic analysis of floods, storm water management. **FLOOD CONTROL ALTERNATIVES:** Structural and non-structural measures. Flood damage and net benefit estimation: damage relationships, expected damages, risk based analysis. Operation of reservoir systems for flood control.	**8 Hrs**
UNIT – IV	
STORM WATER CONTROL: Storm water management, storm system: information needs and design criteria. Rational method design. Hydraulic analysis of design, storm sewer appurtenances. Storm detention: effects of urbanization, types of surface detention, subsurface disposal of storm water. **STORM WATER CONTROL STREET AND HIGHWAY DRAINAGE AND CULVERTS:** Drainage of street and highway pavements: design considerations, flow in gutters, pavement	**8 Hrs**

drainage inlets, inlet locations, median, and embankment and bridge culvert design. Hydraulic design of culverts: culvert hydraulics, culver design.	
UNIT – V	
DESIGN OF SPILLWAYS FOR FLOOD CONTROL, STORAGE AND CONVEYANCE SYSTEM: Hydrologic considerations, Dams: types, hazard classification, spillway capacity, criteria, safety of existing dams. **SPILLWAYS:** Functions, overflow and free overfall spillways, ogee spillways, baffled chute spillways, culvert spillways. Gates and valves: spillway crest gates, gates for outlet works, valves for outlet works.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the problems related to water resources engineering.
2	Analyse water supply aspects to rural and urban schemes and in designing of hydraulic structures.
3	Design hydraulic structures to control the flood and storm waters.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books	
1	Water resources engineering: Ralph A Wurbs, Wesley P. James, PHI Learning pvt. Ltd. New Delhi (2009 Ed.)
2	Water resources engineering: Chin D.A., Prentice Hall (2009 Ed.).
3	Water resources engineering: Larry W. Mays, John Wiley & sons (2005).

Reference Books	
1	Water resources engineering, Sathya Narayana Murthy Challa, New Age International Publishers, New Delhi, (2002 Ed.).
2	Elements of water resources engineering, Duggal K.N., Soni J.P., New age international publishers, New Delhi.
3	Water resources engineering, David Chin, Pearson Educaion, NJ, (2006 Ed.).
4	Water resources engineering, lecture notes, IIT Kharagpur.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓			✓	✓						
CO3	✓	✓	✓		✓	✓					✓	✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ADVANCED FOUNDATION DESIGN	
Course Code: **18CV742**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs – L:T:P:S:3:0:0:0	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To gain knowledge on advanced topics of foundation design and analyses.
2	To understand the shallow and deep foundation analyses.
3	To develop the choice of foundation design parameters.
4	To learn the cause and effect of dynamic loads on foundation.

UNIT – I	
PROPORTIONING OF SHALLOW FOUNDATION: Proportion of shallow foundation for equal settlement, Computation of design loads, design of combined footings (rectangular and trapezoidal), strap footings and wall footings, Types of rafts, bearing capacity and settlements of raft foundation, Rigid methods, Flexible methods, coefficient of subgrade reaction, Problems.	**8 Hrs**
UNIT – II	
PILE FOUNDATIONS: Types of piles, Load Transfer mechanism, Static formulae, Dynamic formulae, Pile load Test, SPT and SCPT. Pile groups in clay: Efficiency, Bearing capacity and settlement, Negative skin friction, Problems. Underreamer piles.	**8 Hrs**
UNIT – III (Blended learning)	
FOUNDATIONS ON EXPANSIVE SOILS: Parameters of expansive soils, classification, causes of moisture changes in soils, effect of swelling on buildings, preventive measures for expansive soils, modification of expansive soil, Design of foundation in swelling soils.	**8 Hrs**
UNIT – IV	
DRILLED PIER AND CAISSONS: Construction of drilled pier, Construction of open caisson, Pneumatic caisson and floating caisson, Problems. **WELL FOUNDATIONS:** Different shapes of wells, Grip length, Forces acting on the well foundation, Terzaghi's analysis, Individual components of well, Sinking of wells, Measures for rectification of tilts and shifts, Problems.	**8 Hrs**
UNIT – V	
MACHINE FOUNDATIONS: Introduction, Types of machine foundations, Basic definitions, Degree of freedom of block foundation, General criteria for design of machine foundations, Free vibration, Forced Vibration, Vibration analysis of machine foundation, Determination of natural frequency, Design criteria of foundations of reciprocating machines, Reinforcement and construction details, Weight of foundation, Vibration Isolation and control. Problems.	**7 Hrs**

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit.

• The students will have to answer five full questions, selecting one full question from each unit.

Course Outcomes: The students will be able to	
1	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.
2	Design the load carrying capacity and settlement of single and group of piles.
3	Analyse and design of well foundation, drilled piers and caissons.
4	Analyse and design of machine foundations.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C (2010), Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering - Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Bowles J E, Foundation analysis and design, McGraw- Hill Publications.
2	Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering, Tata McGraw Hill Publications.
3	T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley & Sons.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓				✓						
CO3		✓	✓									
CO4		✓	✓									

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: PAVEMENT DESIGN	
Course Code: **18CV743**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the process of collecting data required for pavement design and factors affecting on it and maintenance of the pavement.
2	To illustrate the design concepts of flexible pavement by various methods (CBR, IRC 37-2001, Mc loads, Kansas and also the same of rigid pavement by IRC 58-2002.
3	To understand the various causes leading to failure of pavements and remedies for the same.
4	To develop skills to perform functional and structural evaluation of pavement by suitable methods.

UNIT-I	
INTRODUCTION: Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement – Design strategies of variables – Functions of sub-grade, sub base – Base course – surface course – comparison between Rigid and flexible pavement. **FUNDAMENTALS OF DESIGN OF PAVEMENTS:** Design life – Traffic factors – climatic factors – Road geometry – Subgrade strength and drainage, Stresses and deflections, Boussinesq's theory – principle, Assumptions – Limitations and problems on above – Bermister's theory – Two layered analysis – Assumptions – problems on above.	**8 Hrs**
UNIT-II (Blended Learning)	
DESIGN FACTORS: Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EWL concept. **FLEXIBLE PAVEMENT DESIGN:** Assumptions – McLeod Method – Kansas method – Tri-axial method – CBR method – IRC Method (old) – CSA Method using IRC 37-2001, problems on above.	**8 Hrs**
UNIT-III	
STRESSES IN RIGID PAVEMENT: Principle – Factors – wheel load and its repetition – properties of sub grade – properties of concrete. External conditions – joints – Reinforcement – Analysis of stresses – Assumptions – Westergaard's Analysis – Modified Westergaard's equations – Critical stresses – Wheel load stresses, Warping stress – Frictional stress – combined stresses (using chart / equations) – problems on above. **DESIGN OF RIGID PAVEMENT:** Design of C.C. Pavement by IRC: 58 – 2002 for dual and Tandem axle load – Reinforcement in slabs – Requirements of joints – Types of joints – Expansion joint – contraction joint – warping joint – construction joint – longitudinal joint, Design of joints, Design of Dowel bars, Design of Tie bars – problems of the above.	**8 Hrs**
UNIT-IV	
FLEXIBLE PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial/maintenance measures in flexible pavements – Functional Evaluation by visual inspection and unevenness measurement by using different technics – Structural Evaluation by Benkelman Beam Deflection Method, Falling weight deflectometer, GPR Method. Design factors for Runway Pavements – Design methods for Airfield pavements and problems on above.	**8 Hrs**

UNIT-V	
RIGID PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial/maintenance measures in rigid pavements – Functional Evaluation by visual inspection and unevenness measurements. Design factors for Runway Pavements – Design methods for Airfield pavements.	**7 Hrs**

Course Outcomes: The students will be able to	
1	Explain the fundamentals and desirable characteristics of flexible pavement design as per standard IRC codes.
2	Illustrate the various stress components & design of rigid pavements as per standard IRC codes.
3	Explain the factual knowledge of failures, its causes and maintenance by structural and functional evaluation of flexible and rigid pavements.

Text Books:	
1	Highway Engineering – S K Khanna and C E G Justo, Nem Chand Bros, 10th edition, Roorkee.
2	Principle and practice of Highway Engineering - L R KADIYALI & N B LAL: Khanna publications, 2017 edition, New Delhi
3	Pavement Analysis & Design - Yang H. Huang- II edition, university of Kentucky, 2004.
4	Relevant IRC codes – IRC – 37 – 2001 & IRC – 58 -2002

Reference Books:	
1	Principles of Pavement Design- Yoder and Witzack - 2nd edition, John Wileys and Sons
2	Pavement Design and Materials by A.T. Papagiannaakis and E. A. Masad, 1st edition, John Wileys and Sons (2007).

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓	✓	✓					✓			
2	✓	✓		✓								
3	✓	✓		✓	✓				✓			

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	
Course Code: **18CV744**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To Study the principle of Engineering Seismology and seismic zoning map of India.
2	To study the behaviour of buildings subjected to earthquake forces and the performance of Structures during past earthquakes.
3	The study of Seismic design philosophy, Determination of design lateral forces.

UNIT-I	
Earthquake ground Motion, Engineering Seismology, Theory of plate tectonics, seismic waves, Magnitude and intensity of earthquakes, local site effects and seismic zoning map of India. Seismic Design Parameters: Types of Earthquakes, earthquake ground motion characteristics, response spectra and design spectrum.	**8 Hrs**
UNIT-II	
Structural modelling, Code based seismic design methods. Response control concepts, seismic evaluation and retrofitting methods. Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity and plan configuration problems, Seismic resistant building architecture – lateral load resistant systems, building characteristics.	**8 Hrs**
UNIT-III (Blended Learning)	
Seismic design philosophy, Determination of design lateral forces - Equivalent lateral force procedure, dynamic analysis procedure.	**8 Hrs**
UNIT-IV	
Step by step procedure for seismic analysis of RC buildings (maximum of 4 storeys, without infills) - Equivalent static lateral force method, response spectrum methods.	**7 Hrs**
UNIT-V	
Earthquake resistant analysis and design of RC buildings – Preliminary data, loading data, load combinations, analysis and design of subframes. (Maximum of 4 storeys, without infills). Earthquake resistant design of masonry buildings - elastic properties of structural masonry, lateral load analysis, Design of two storied masonry buildings.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the dynamic loading system and how it is subjected and distributed for the safe working condition buildings, Bridges, Monumental structures, Assemblies and health centers.
2	Apply the seismic design philosophy and determination of lateral forces.
3	Explain Earthquake resistant analysis and design of RC and masonry buildings.

Text Books:	
1	Earthquake resistant design of structures - Pankaj Agarwal, Manish Shrikande - PHI India.
2	Earthquake Resistant Design of Structures - S.K. Duggal - Oxford University Press, 2007.

Reference Books:	
1	Earthquake Resistant Design- Anil Chopra
2	Earth Quake Engineering Damage Assessment and Structural design- S.F. Borg - (John Wiley and

	Sons. 1983).

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓	✓	✓								
2	✓	✓	✓		✓							
3	✓	✓			✓			✓		✓	✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: SOLID WASTE MANAGEMENT	
Course Code: **18CV745**	Evaluation Procedure:
Credits: 03	CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To impart the knowledge of present methods of the municipal waste management system and to analyze the drawbacks.
2	To understand various waste management statutory rules.
3	To identify the adverse effects of improper waste management on the environment.
4	To analyze different elements of solid waste disposal and management, design and develop recycling options.

UNIT – I	
INTRODUCTION: Land Pollution – Definition, causes and effects, control of land pollution, scope and importance of solid waste management, properties of solid waste, functional elements of solid waste management, energy content - numericals. **SOURCES:** Classification and characteristics – municipal, commercial & industrial. Methods of quantification.	**07 Hrs**
UNIT – II	
COLLECTION AND TRANSPORTATION: Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, transfer means and methods, Factors affecting the location of transfer station, route optimization techniques and problems. **TREATMENT / PROCESSING TECHNIQUES:** Components separation, volume reduction, size reduction, chemical reduction and biological and thermal processing problems.	**08 Hrs**
UNIT – III	
INCINERATION: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolysis, design criteria for incineration. **COMPOSTING:** Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting, Gasification.	**08 Hrs**
UNIT – IV	
SANITARY LANDFILL: Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, requirements of fabrics in sanitary landfills, sanitary land fill lining with design aspects. Different types of Liners, transportation and migration of Leachate.	**08 Hrs**
UNIT – V (Blended Learning)	
DISPOSAL METHODS: Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal. E-waste and its disposal methods. **RECYCLE AND REUSE:**	**08 Hrs**

Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse. Energy production, By-Product recovery.	

Course Outcomes: The students will be able to	
1	Understand the existing municipal management system and identify their drawbacks.
2	Identify the adverse effects of improper waste management on the environment
3	Evaluate the flow of Municipal and waste as per the rules laid by Ministry of Environment & Forest
4	Design recycling and disposal options for municipal and plastic waste

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Integrated Solid Waste Management, Tchobanoglous, M/c Graw Hill.
2	Solid Waste Management in developing countries, Bhide and Sunderashan.
3	Environmental Engineering – Vol II.: S.K. Garg.

Reference Books:	
1	Environmental Engineering: Peavy and Tchobanoglous.
2	Biomedical waste handling rules – 2000.
3	Solid Waste Engineering by Vesilind. Pa Worrell & Reinhart. D. – 2009, Cengage Learning India Private Limited, New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓			✓					
CO2	✓	✓			✓		✓					
CO3		✓			✓	✓	✓					✓
CO4			✓		✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: QUALITY MANAGEMENT SYSTEM IN CIVIL ENGINEERING	
Course Code: **18CV746**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the various management techniques for successful completion of construction projects.
2	To study the effect of management for project organization, design of construction process, labour, material and equipment utilization, and cost estimation.
3	To study the cost estimation of project.

UNIT – I	
QUALITY MANAGEMENT SYSTEM – QMS: Introduction– Evolution of Quality Management System, Element of Quality, Quality Management System, Concept of Process and Network of Process, ISO 9000-Family, Applying, benefits and Importance, Total Quality Management, Comparison of ISO 9000 **IMPLEMENTING ISO 9001-2000 QUALITY MANAGEMENT SYSTEM:** ISO 9000 – Quality Management Principles, ISO 9000 Documents Content of ISO 9001 : 2000, Quality Management System Requirements, General Requirements, Documentation Requirements, Management Responsibilities, Resource Management, Product Realization, Measurement, analysis and Improvement Monitoring and Measurement, Non-conforming Product.	**8 Hrs**
UNIT – II	
PREPARING A ISO 9001-2000 QUALITY MANAGEMENT SYSTEM FOR CIVIL ENGINEERING: Quality Manual, Introduction, Scope of the Quality Manual, Applicability, Responsibility, Quality Management System, General Requirements, Management Responsibilities, Management Commitment, Planning Responsibility, Authority and Communication, Management Review, Resource Management, Provision of Resources, Human Resources Product Realization, Purchasing, Monitoring and Measurement.	**8 Hrs**
UNIT – III	
QUALITY MANAGEMENT SYSTEM PROCEDURES: Introduction, procedure for management review, Format for writing procedures, procedure for preparing Quality plans/ work instructions, Contract review, Document and data control, Document numbering system, Change request, procedure for purchasing, procedure for control of customer supplied product.	**8 Hrs**
UNIT – IV (Blended Learning)	
WORK INSTRUCTIONS: Introduction – Document and Data Control, Material Procurement, Material Handling, Tendering and Estimating, Planning, Design, Training, Plant and Equipment, Quality Assurance and Control, Patching and Transportation of Concrete. **METHOD STATEMENT:** Introduction, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair works, Concrete Demolition works, Road Works, Fencing works etc.	**7 Hrs**
UNIT – V	
JOB DESCRIPTION: Introduction, Job Description of Managing Director, Project Manager, Site Manager, Site	**8 Hrs**

Engineer, QA/QC Engineer, Foreman, Typist/Clerk, Design Engineer, Planning Engineer. **QUALITY CONTROL PLAN/INSPECTION AND TEST PLANS (ITPS):** Introduction-Preparation of Project Quality Plans, Inspection and Test plant. **QUALITY RECORD/FORMATS:** Preparation of Standard Formats: Revision Control form, Document Distribution List, Document Master List, Non-Conformance Report, Store Issue/Receipt Voucher, Local Purchase Order, Material Stock Card, Audit Notification, Quality Audit Report, Corrective Action Report, Calibration Record, Calibration Master Sheet, Work Instruction, Job Description, Contract/Tender Review Form, Accident Report Form, Quality Awareness Training Record.	

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Quality Management System in Civil Engineering – D.S. Rajendra Prasad – ISO 9001-2000, Sapna Book House, Bangalore.
2	Productivity and Quality Improvement – John L. Hardesky – McGraw Hill Book Company.
3	Quality Management – Kanishka Bedi – (Oxford university press).
4	Total Quality Management for Engineers – Mohamed Zairi – Aditya Books Private Limited.

Reference Books:	
1	ISO 9000 Concepts, Methods, Implementation- Bagchi – Wheeler Publishing.
2	IS: 456-2000: Indian Standard Specifications for Plain and Reinforced Concrete Code of Practice: 4th Revision, Bureau of Indian Standards.
3	IS: 383-1990: Indian Standard Specifications for Coarse and Fine Aggregates from Natural Sources for Concrete: Bureau of Indian Standards.
4	Data Book for Civil Engineers Field Practice – Elwyn E. Seelye – John Wiley & Sons, Inc.

Course Outcomes: The students will be able to	
1	Explain the quality management, conveyance and treatment.
2	Analyze the concept of Quality control plan / inspection and testing plans for various Civil Engineering works.
3	Apply the basic principles of ISO 9001-2000.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓	✓									
CO3	✓	✓						✓			✓	✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: HYDRAULICS AND IRRIGATION STRUCTURES	
Course Code: **18CV747**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the essentiality of water required for various purposes.
2	To plan and design of reservoirs.
3	To plan and construction of various hydraulic structures.

UNIT – I	
RESERVOIR PLANNING: Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, safe yield, problems, Reservoir sedimentation, life of a reservoir, economic height of a dam, Environmental effects of reservoirs.	**8 Hrs**
UNIT – II	
GRAVITY DAMS: Introduction, forces on a gravity dam, stress analysis in gravity dam, Problems, combination of forces for design. Elementary & practical profiles of a gravity dam, Arch dams, galleries in gravity dams.	**7 Hrs**
UNIT – III (Blended Learning)	
EARTH DAMS: Introduction, types of Earth dams, construction methods, Design criteria for Earth dams, causes of failure of earth dams, section of dam, control of seepage through earth dams, Safety measures.	**7 Hrs**
UNIT – IV	
SPILLWAYS: Introduction, essentials of a spillway, spillway components, factors affecting type & design of spillways. Ogee spillway. Energy dissipation below spillways.	**7 Hrs**
UNIT – V	
DRAWING NOT TO SCALE (To draw only sketch for the given design details without projected views on the working sheet) ✓ Surplus weir with stepped apron. ✓ Tank Plug sluice without tower head. ✓ Tank Plug sluice with tower head. ✓ Canal regulator. ✓ Earthen Bunds.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Understand various aspects of Reservoir planning,
2	Data required for design, procedure of planning, designing the structures and preparing required drawings to execute the work.
3	Understand the design and construction of earthen dams.

Text Books:	
1	Text book of irrigation engineering & Hydraulic Structures- R.K. Sharma, Oxford & IBH publishing Co., New Delhi (2002)
2	Irrigation & Water resources engineering- G.L. Asawa, New Age International Publishers, New

	Delhi (2005)
3	Irrigation, Water Resources & Water power engineering- Modi. P.N., Standard Book House, New Delhi
4	Design of minor irrigation and Canal structures- C. Sathya Narayana Murthy, Wiley eastern limited, New Delhi (1990)

Reference Books:	
1	Irrigation engineering & Hydraulic structures- Garg. S.K., Khanna publishers, New Delhi
2	Hydraulic Structures & Irrigation Design Drawing - Dr. N. Balasubramanya, Tata McGraw-Hill Education Pvt. Ltd., New Delhi
3	Irrigation and Water Power Engineering- Madan Mohan Das & Mimi Das Saikia, PHI Learning Pvt. Ltd., New Delhi (2009)
4	A Text Book of Irrigation Engineering – Raghunath
5	Ground water engineering – Freez and Cherry

Question Paper Pattern:

- ✓ **Four** questions are to be set from Units 1, 2, 3 & 4 of which **Two** full questions are to be answered for 40 marks.
- ✓ **Two** questions are to be set from Unit 5 (excluding Earthen Bunds) of which **One** full question is to be answered for 45 marks (drawings to be drawn for the given Data on the Drawing sheet).
- ✓ **One** Question is to be set from Earthen Bunds which is compulsory for 15 marks (To draw sketches for the given details on the drawing sheet).

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓	✓					✓
CO2		✓					✓					✓
CO3	✓	✓		✓	✓		✓					

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ECOLOGY AND ENVIRONMENTAL IMPACT ASSESSMENT	
Course Code: **18CV751**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To foresee the potential environmental problems that would arise out of a proposed development.
2	To examine and select the suitable methodology for the various project options and predict significant environmental impact.
3	To identify the appropriate abatement and mitigating measures for the implementation of projects.

UNIT – I	
INTRODUCTION TO EIA: Ecological Factors and Development Activity and, EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**8 Hrs**
UNIT – II	
METHODOLOGIES OF EIA: Frame work of Impact Assessment. Developmental Projects- Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	**8 Hrs**
UNIT – III	
ENVIRONMENTAL ATTRIBUTES: Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.	**7 Hrs**
UNIT – IV (Blended Learning)	
PUBLIC PARTICIPATION PROGRAM : Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships - Matrices.	**8 Hrs**
UNIT – V	
EIA FOR PROJECTS: EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain systematic identification and evaluation of the potential impacts of proposed projects on components of the total environment.
2	Apply and identify the measures to be adopted to avoid environmental impact and reinforce a commitment in an organized and systematic approach by involving agencies and public participation.
3	Develop environmental protection mechanism for the proposed projects to protect and restore good environment with sustainable development.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks.

- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Methodologies for Environment Impact Assessment - Anjaneyalu. Y, B S publications.
2	Environment Impact Assessment – N.S. Raman, A.R Gajbhiye and S.R. Khandeshwar, dreamtech press.
3	Environment Impact Assessment – R.R. Barthwal, New Age International Publishers.

Reference Books:	
1	Environmental Impact Analysis-Jain R.K.-Van Nostr and Reinhold Co.
2	Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
3	Environment Impact Assessment - Larry W. Canter - McGraw Hill

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓					✓	✓					
2		✓				✓				✓		
3	✓						✓		✓		✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: URBAN TRANSPORT PLANNING	
Course Code: **18CV752**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand and apply basic concepts and methods of urban transportation planning.
2	To explain the various methods of designing, conducting and administering surveys to provide the data required for transportation planning.
3	To understand the process of developing an organized mathematical modelling approach to solve select urban transportation planning problem.
4	To illustrate the various types of models used for travel forecasting, prediction of future travel patterns.

UNIT-I	
INTRODUCTION: Scope of Urban transport planning, Inter dependency of land use and traffic, System Approach to urban planning. **STAGES IN URBAN TRANSPORT PLANNING:** Trip generation, Trip production, Trip distribution, Modal split, Trip assignment.	**8 Hrs**
UNIT-II	
URBAN TRANSPORT SURVEY: Definition of study area, Zoning, Types of Surveys, Inventory of transportation facilities, Expansion of data from sample.	**7 Hrs**
UNIT-III	
TRIP GENERATION: Trip purpose, Factors governing trip generation and attraction, Category analysis, Problems. **TRIP DISTRIBUTION:** Methods, Growth factors methods, Synthetic methods, Fractor and Furness method and problems.	**8 Hrs**
UNIT-IV	
MODAL SPLIT: Factors affecting, characteristics of split, Model split in urban transport planning, problems. **TRIP ASSIGNMENT:** Assignment Techniques, Traffic fore casting, Land use transport models, Lowry Model, Garin Lowry model Applications in India.	**8 Hrs**
UNIT-V (Blended learning)	
URBAN TRANSPORT PLANNING FOR SMALL AND MEDIUM CITIES: Introduction, Difficulties in transport planning, Recent Case Studies.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the importance of urban transport planning and its relation between various surveys involved in urban transport for smooth flow of traffic.
2	Apply the fundamental principles of mathematical models for the trip generation and its assignment techniques for modal split and trip distribution methods.
3	Explain the basic elements and its related case studies with respect to urban transport planning for small and medium cities.

Text Books:	
1	Traffic Engineering and Transport Planning- L.R. Kadiyali - Khanna Publishers, New Delhi.
2	Principles of urban transport system planning - B.G. Hutchinson - Scripta Book Co., Washington D.C. & McGraw Hill Book Co.
3	Introduction to transportation engineering- Jotin Kristey and Kentlal - PHI, New Delhi.

Reference Books:	
1	Urban Transport planning- Black John - Croom Helm ltd, London.
2	Urban and Regional models in geography and planning- Hutchison B G – John Wiley and sons London.
3	Entropy in urban and regional modeling- Wilson A G - Pion ltd, London.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓	✓				✓						
2	✓	✓		✓								
3	✓					✓						

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: PHOTO GEOLOGY AND REMOTE SENSING	
Course Code: **18CV753**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To obtain information about physical objects through process of recording, measuring and interpreting the photographs of the area.
2	To deals with the photo interpretation, recognizing and identifying the objects and judging their significance through careful systematic analysis.
3	To acquire the knowledge of Remote sensing and its applications.

UNIT – I	
PHOTOGRAMMETRY: Introduction, basic definitions, terrestrial photogrammetry, photo theodolite, horizontal and vertical angles from terrestrial photographs, horizontal position of a point from photographic measurements, elevation of points by photographic measurements, determination of focal length	**7 Hrs**
UNIT – II	
AERIAL PHOTOGRAMMETRY: Advantages, vertical, tilted and oblique photographs, geometry of vertical photographs, scale of vertical photograph over flat and variable terrain, ground coordinates, computation of length of a line, computation of flying height, relief displacement, overlaps, flight planning, computation of required number of photographs for a given area, ground control in photogrammetry. Basics of stereoscopy, stereoscopes, uses, parallax. Basic elements in photographic interpretation. Introduction to digital photogrammetry	**8 Hrs**
UNIT – III	
REMOTE SENSING: Introduction, Ideal remote sensing system, basic principles of electromagnetic remote sensing, electromagnetic energy, electromagnetic spectrum, interaction with earth's atmosphere, interaction with earth- surface materials, spectral reflectance of earth surface materials **REMOTE SENSING PLATFORMS AND SENSORS:** Introduction, platforms- IRS, Land sat, SPOT, Cartosat, IKONOS, Envisat etc. Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal)	**8 Hrs**
UNIT – IV	
DATA MODELS: Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Relational Database, Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion.	**8 Hrs**
UNIT – V (Blended Learning)	
APPLICATIONS OF REMOTE SENSING: Applications in land use land cover analysis, change detection, water resources, urban planning, environmental and geological applications	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain topographic mapping of large area and also the preparation of special purpose map for various engineering projects such as highways, railway, Dams, Harbors.
2	Apply the Remote sensing technology in various fields of Civil Engineering.

3	Apply the knowledge of remote sensing in design of urban planning and water resource projects.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:

1	Principles of GIS - Peter A Burrough Reachael A Mc. Donnel - (Oxford).
2	The GIS Book - George B. Korte, P.E. - 5th Edn, Thomson Learning.
3	Remote sensing and image interpretation - Lillesand - (John Wiley and Sons).

Reference Books:

1	Geographical Information system: Bemhard Sen-Wiley publications.
2	GIS and Computer cartography - Christopher Jones - (Longman).

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							
CO2	✓					✓						
CO3		✓			✓							

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ENVIRONMENTAL ENGINEERING LABORATORY	
Course Code: **18CVL76**	Evaluation Procedure: CIE + Record + SEE = 20 + 30 + 50 = 100
Credits: **1**	
Teaching Hours: 26 Hrs (L:T:P:S:0:0:2:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To familiarize and understand the standard methods of analysing various parameters in water quality, wastewater, air pollutants and bacteriological pollution.
2	To utilize the results to design efficient treatment units / control measures to protect degree of the pollution in water and wastewater.

Sl. No.	**Experiments**	**No. of Hrs**
1	Determination of Alkalinity, Acidity and pH in water sample.	**2 Hrs**
2	Determination of total Hardness, permanent and temporary Hardness. Calcium and Magnesium in water sample.	**4 Hrs**
3	Determination of chlorides in water sample.	**2 Hrs**
4	Determination of percentage of available chlorine in bleaching powder, Residual Chlorine and Chlorine demand.	**4 Hrs**
5	Jar Test for Optimum dosage of Alum turbidity determination.	**2 Hrs**
6	Determination of Dissolved oxygen of water and wastewater sample.	**2 Hrs**
7	Determination of BOD of wastewater sample.	**2 Hrs**
8	Determination of Solids in Sewage: Total solids, suspended solids, Dissolved solids, volatile, fixed solids, Settleable solids.	**4 Hrs**
9	Determination of MPN in water sample.	**2 Hrs**
10	Determination of COD in wastewater sample.	**2 Hrs**

Question paper pattern:
Any one or two of the above experiments has to be conducted in the examination by the student.

Text Book:	
1	Environmental Engineering Laboratory by Sreenivasaiah and Kotaiah

Reference Books:	
1	Manual of water & wastewater Analysis - NEERI Publications.
2	Standards methods for examination of water & Waste water (1995).
3	American publications - Association, water pollution Control Federation.
4	American water works Association, Washington DC.
5	IS Standards: 2490-1974, 3360-1974.
6	Chemistry for Environment Engineering, by Sayer and McCarthy.

Course Outcomes: The students will be able to	
1	Demonstrate the pollutants and its behaviour present in water, wastewater and industrial effluent.
2	Interpret the physical, chemical and biological characteristics of water and wastewater samples.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓	✓			✓				
CO2	✓	✓		✓				✓		✓		✓

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ADVANCED CIVIL ENGINEERING LABORATORY	
Course Code: **18CVL77**	Evaluation Procedure: CIE + Record + SEE = 20 + 30 + 50 = 100
Credits: **1**	
Teaching Hours: 26 Hrs (L:T:P:S:0:0:2:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To investigate the performance of structural elements.
2	To evaluate the different testing methods and equipments.

Sl. No.	**Experiments**	**No. of Hrs**
1	Tests on self-compacting concrete.	**4 Hrs**
2	Tests on Permeability of concrete.	**4 Hrs**
3	Testing of RC beams for deflection, shear and flexure.	**4 Hrs**
4	Test on Carbonated concrete.	**2 Hrs**
5	To study the different characteristics of Pre-stressed concrete beams.	**4 Hrs**
6	NDT tests on RC structures using Rebound hammer, Ultrasonic pulse velocity meter and Profometer.	**2 Hrs**
7	To study compressibility characteristics of soil.	**4 Hrs**
8	Marshal stability test on bituminous concrete.	**2 Hrs**

Question paper pattern:
Any one or two of the above experiments has to be conducted in the examination by the student.

Text Book:	
1	Properties of Concrete- Neville, A.M. - ELBS Edition, Longman Ltd., London
2	Concrete Technology- M.S. Shetty

Reference Books:	
1	Concrete Technology - A.R. Santha Kumar, - Oxford University Press.
2	Concrete - P.K. Mehta, P J M Monteiro,- Prentice Hall, New Jersey (Special Student Edition by Indian Concrete Institute Chennai)
3	Concrete Manual - Gambhir M.L.- Dhanpat Rai & Sons, New Delhi
4	Soil Mechanics & Foundation Engineering, Punmia BC (2010), Laxmi Publications Co., New Delhi.
5	Highway Engineering – Khanna S K & Justo, Nemchand & Bros, 10th edition, Roorkee.

Course Outcomes: The students will be able to	
1	Achieve knowledge of design and development of experimenting skills.
2	Analysis and interpretation of test results.
3	Summarize the testing methods.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓	✓							
CO2	✓	✓								✓		✓
CO3		✓			✓					✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: VI	
Course Title: MINI PROJECT	
Course Code: **18CVM68**	Evaluation Procedure:
Credits: **02**	Project presentation + Report + SEE= 20 + 30 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:0:0:4:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To define and develop a systematic procedure to carry out projects in various fields of Civil Engineering.
2	To develop innovative ideas to carry out the work in various field of Civil Engineering projects.

Syllabus Contents	**No. of Hours**
Design and Analysis of Multi-storey Frames. Design of Shallow and Pile foundation. Projects on highway topics. Study of the properties of various engineering materials and their applications Civil Engineering problems. Study of water and waste water qualities and their applications. Solid waste Management solutions. Projects on interdisciplinary in nature and societal issues are allowed.	13 (T) + 39 (P)

Note:

- A Mini-Project work involving investigation, develop and design of the above mentioned projects in various fields of Civil Engineering can be carried out as 4 Hours per week.
- The student should be submit the Mini-Project report at the end of the semester.

Course Outcomes: The students will be able to	
1	Define and develop practical knowledge in the field of Civil Engineering projects.
2	Identify, prepare and develop ability to carry out a project in the field of Civil Engineering.
3	Develop the skills to prepare and presentation skills to exhibit the project works to the society.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓	✓			✓					✓

Semester: VII	
Course Title: PROJECT PHASE - I	
Course Code: 18CVP78	**CIE + SEE = 50 + 50 = 100 Marks**
Credits: 02	
Hours: 26 Hrs. (L:T:P:S:0:0:26:0)	**SEE Duration: 3 Hrs**

Course Learning Objectives:	
1	To improve the professional competency and research aptitude by touching the specific areas which otherwise not covered by theory or laboratory classes.
2	The project work aims to develop the work practice in students to apply theoretical and practical tools / techniques to solve real life problems related to industry/field and current research.

The project work can be analysis and design projects of innovative nature or experimental investigation or numerical simulations or a combination of these.

Appropriate software developments with sufficient literature contributions can also be taken up. Each student batch will be allotted with a faculty as guide.

In specific cases student may consult with an external guide with the prior consents of internal guide and head of the department.

In this semester, students are expected to finalize appropriate topic of research, complete the required literature survey and about 25% of the objectives of their intended research.

Reading Materials	
1	Journal Publication.
2	Conference / Seminar Proceedings.
3	Handbooks / Research Digests / Codebooks.

Course Outcomes: The students will be able to	
1	Identify and chose appropriate topic of relevance.
2	Critically evaluate literature in chosen area of research & Establish Scope of work.
3	Define Research Problem Statement.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO5, PO11, PO12
CO2	PO1, PO2, PO4, PO5, PO6, PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11, PO12

Sub Title : Main-Project		
Sub Code: 18CVP 84	**No of Credits : 12 = 0:0:12 (L:T:P)**	**No of contact hours/week : 12**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 = 100**	**Total Hours : 52**

Course Objectives:

1. Training the students to undergo Research exposure and to gain knowledge in the field of Structural / Construction Technology / Geotechnical / Environmental / Water resources and Highway engineering,
2. The students are exposed to innovative ideas to carry out the project work in the related area of project.

Syllabus Contents

- ✓ Analysis of Structure for earthquake ground motion, Time history analysis, Pushover analysis, Wind load analysis.
- ✓ Structural behaviour of RC Structural elements, Health monitoring, Repair and Rehabilitation of Structural members.
- ✓ Study on the behaviour of Steel Structural Elements.
- ✓ Study on Special Concrete, Strength and durability properties of Concrete with mineral admixtures.
- ✓ Study of engineering properties of different types of soil and their application. Soil Stabilization techniques, Soil Structure interaction and liquefaction of soil.
- ✓ Traffic Volume and design of automatic signal system, Pavement design, Study on Mono Rail and Metro Rail.
- ✓ Water sheds management, Water sheds management using ARC GIS, De-siltation of tank, Rain water harvesting and Ground water recharge,
- ✓ Impact of Urbanization on ground water using Remote Sensing and GIS, River bank filtration study.
- ✓ Application of data mining techniques in the field of air pollution.
- ✓ Characterization of industrial effluents, Health risk analysis due to air pollution, Study on impact of various developmental activities on climate change, Solid waste management.

An extensive Research / training involving investigation / design / management of the above mentioned projects is to be conducted for 4 hours per week. The student shall submit the project (Phase - I in VII Sem BE and Phase - II in VIII Sem. BE) report consisting of Research work.

Course Outcomes:

CO1: The students gain the knowledge in the analysis of Structure due to natural disaster, Health monitoring, repair and rehabilitation of structure and development of new materials in the construction Industry,

CO2: The students gain the knowledge in the soil structure interaction.

CO3: The students gain the knowledge in the field of water resources management and ground water recharge

CO4: The students gain the knowledge in the field of Traffic engineering and pavement design.

CO5: The students gain the knowledge in the field of environmental engineering and solid waste management.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO5,PO11,PO12
CO2	PO1, PO2,PO4, PO5, PO6,PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11,PO12
CO4	PO1, PO2, PO5, PO10, PO11,PO12
CO5	PO1, PO2, PO5, PO10, PO11,PO12

Course Title : TECHNICAL SEMINAR		
Sub Code: 18CVS 85	**No of Credits : 2 = 0:0:2 (L:T:P)**	**No of contact hours/week : 02**
Exam Duration : 3 hours	**CIE = 50**	

Course Objectives:

1. Training the students to present a seminar on the current topics in the field of Structural / Construction Technology / Geotechnical / Environmental / Water resources and Highway engineering,
2. The students are exposed to innovative ideas to present a seminar in the related area of research.

Syllabus Contents:

Area of seminar topics:

- ✓ Structural engineering
- ✓ Concrete technology
- ✓ Construction technology
- ✓ Transportation engineering
- ✓ Water resource engineering
- ✓ Geotechnical engineering
- ✓ Environmental engineering
- ✓ Bridge engineering
- ✓ Irrigation engineering
- ✓ Earthquake engineering

Course Outcomes:

CO1: The students gain the knowledge in the analysis of Structure due to natural disaster, Health monitoring, repair and rehabilitation of structure and development of new materials in the construction Industry,

CO2: The students gain the knowledge in the soil structure interaction.

CO3: The students gain the knowledge in the field of water resources management and ground water recharge

CO4: The students gain the knowledge in the field of Traffic engineering and pavement design.

CO5: The students gain the knowledge in the field of environmental engineering and solid waste management.

COs	**Mapping with POs**
CO1	PO1, PO2, PO3, PO5, PO11, PO12
CO2	PO1, PO2, PO4, PO5, PO6, PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11, PO12
CO4	PO1, PO2, PO5, PO10, PO11, PO12
CO5	PO1, PO2, PO5, PO10, PO11, PO12

Semester: VII	
Course Title: INTERNSHIP	
Course Code: **18CVI83**	CIE + SEE Marks
Credits:08	= 50 + 50
Hours: 39 Hrs (L:T:P:S:0:0:16:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	Ability to expose to a particular job and a profession or industry.
2	Explore career alternatives prior to graduation.
3	Develop business skills in communication, technology and team work.

Syllabus Contents
The students are informed to select a suitable company to carry out Internship in their respective field of specialization. The student shall make a midterm presentation of the activities undertaken during the internship course to the panel comprising Internship Guide, a senior faculty from the department and Head of the Department. The Department shall facilitate and monitor the student internship program.

Note:

All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters.

A SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester.

Internship is considered as a head of passing and is considered for the award of degree.

Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

Course Outcomes: The students will be able to	
1	Develop work culture in groups.
2	Identify and demonstrate work habits for success in real field.
3	Develop network of the various contacts to exhibit work efficiency through presentations, reports, group discussions to the public.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO5, PO11, PO12
CO2	PO1, PO2, PO4, PO5, PO6, PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11, PO12

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I SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	MA11	Engineering Mathematics - I	Hu	4	--	--	03	50	50	100	4
2	PH12	Engineering Physics	BS	4	--	--	03	50	50	100	4
3	CV13	Elements of Civil Engineering & Engineering Mechanics	CV	4	--	--	03	50	50	100	4
4	MEL14	Computer Aided Engineering Drawing	CV	--	--	3	03	50	50	100	4
5	EE15	Basic Electrical Engineering	CV	4	--	--	03	50	50	100	4
6	MEL16	Workshop Practice Lab	CV	--	--	3	03	50	50	100	1.5
7	PHL17	Engineering Physics Lab	CV	--	--	3	03	50	50	100	1.5
8	HS02	Constitution of India & Professional Ethics	CV	2	--	--	03	50	50	100	2
9	KA19	Kannada	CV	2	--	--	03	50	50	100	PP/NP
		TOTAL									25

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II SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	MA21	Engineering Mathematics - II	Hu	4	--	--	03	50	50	100	4
2	CH22	Engineering Chemistry	BS	4	--	--	03	50	50	100	4
3	CS23	Computer Concepts & C Programming	CV	4	--	--	03	50	50	100	4
4	ME24	Elements of Mechanical Engineering	CV	4	--	--	03	50	50	100	4
5	EC25	Basic Electronics	CV	4	--	--	03	50	50	100	4
6	CSL26	Computer Concepts & C Programming Lab	CV	3	--	03	03	50	50	100	1.5
7	CHL27	Engineering Chemistry Lab	CV	3	--	03	03	50	50	100	1.5
8	HS01	Environmental Studies	CV	2	--	--	03	50	50	100	2
9	EN29	English	CV	2	--	--	03	50	50	100	PP/NP
			TOTAL								25

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III SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	MA31	Engineering Mathematics - III	BS	4	--	--	3	50	50	100	4
2	CV31	Building Materials & Construction	CV	3	--	--	3	50	50	100	3
3	CV32	Strength of Materials	CV	4	--	--	3	50	50	100	4
4	CV33	Surveying - I	CV	3	--	--	3	50	50	100	3
5	CV34	Fluid Mechanics	CV	4	--	--	3	50	50	100	4
6	CV35	Applied Engineering Geology	CV	--	--	3	3	50	50	100	1.5
7	CVL36	Civil Engineering Material Testing Lab	CV	--	--	3	3	50	50	100	1.5
8	CVL37	Surveying Practice – I	CV	--	--	3	3	50	50	100	1.5
9	EN39	Soft Skills	CV	2	--	--	3	50	--	50	PP/NP
		TOTAL									**24**

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IV SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	MA41	Engineering Mathematics - IV	BS	4	--	--	3	50	50	100	4
2	CV41	Concrete Technology	CV	3	--	--	3	50	50	100	3
3	CV42	Structural Analysis - I	CV	4	--	--	3	50	50	100	4
4	CV43	Surveying - II	CV	3	--	--	3	50	50	100	3
5	CV44	Hydraulics & Hydraulic Machines	CV	4	--	--	3	50	50	100	4
6	CV45	Water Supply Engineering	CV	3	--	3	3	50	50	100	3
7	CV46	Building Planning & Drawing	CV	1	--	3	3	50	50	100	2
8	CVL47	Surveying Practice - II	CV	--	--	3	3	50	50	100	1.5
9	CVL48	Applied Engineering Geology		--	--	3	3	50	50	100	1.5
10	EN49	Employability Skills	CV	2	--	--	3	50	--	50	PP/NP
			TOTAL								26

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V SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	CV51	Wastewater Treatment & Disposal	BS	4	--	--	3	50	50	100	4
2	CV52	Design of RCC Structural Elements	CV	4	--	--	3	50	50	100	4
3	CV53	Structural Analysis - II	CV	4	--	--	3	50	50	100	4
4	CV54	Geotechnical Engineering - I	CV	3	--	--	3	50	50	100	3
5	CV55	Hydrology & Irrigation Engineering	CV	3	--	--	3	50	50	100	3
6	CV56	Transportation Engineering - I	CV	3	--	3	3	50	50	100	3
7	CVL57	Hydraulics & Hydraulic Machinery Lab	CV	--	--	3	3	50	50	100	1.5
8	CVL58	Computer Aided Design Lab	CV	--	--	3	3	50	50	100	1.5
10	19HS51	Aptitude & Verbal Ability Skills	CV	2	--	--	3	50	--	50	PP/NP
		TOTAL									**23**

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V SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	CV51	Wastewater Treatment & Disposal	BS	4	--	--	3	50	50	100	4
2	CV52	Design of RCC Structural Elements	CV	4	--	--	3	50	50	100	4
3	CV53	Structural Analysis - II	CV	4	--	--	3	50	50	100	4
4	CV54	Geotechnical Engineering - I	CV	3	--	--	3	50	50	100	3
5	CV55	Hydrology & Irrigation Engineering	CV	3	--	--	3	50	50	100	3
6	CV56	Transportation Engineering - I	CV	3	--	3	3	50	50	100	3
7	CVL57	Hydraulics & Hydraulic Machinery Lab	CV	--	--	3	3	50	50	100	1.5
8	CVL58	Computer Aided Design Lab	CV	--	--	3	3	50	50	100	1.5
10	19HS51	Aptitude & Verbal Ability Skills	CV	2	--	--	3	50	--	50	PP/NP
		TOTAL									**23**

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VI SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	HS03	Management and Entrepreneurship	BS	4	--	--	3	50	50	100	4
2	CV61	Design & Computer Aided Drawing of RCC Structures	CV	1	--	--	3	50	50	100	2
3	CV62	Transportation Engineering - II	CV	3	--	--	3	50	50	100	3
4	CV63	Geotechnical Engineering - II	CV	3	--	--	3	50	50	100	3
5	CV64	Hydraulic Structures & Irrigation Design Drawing	CV	2	--	--	3	50	50	100	3
6	CV65	Advanced Concrete Technology	CV	3	--	--	3	50	50	100	3
7	CV66X	Professional Elective - I	CV	3	--	--	3	50	50	100	3
8	CVL67	Geotechnical Engineering Laboratory	CV	--	--	3	3	50	50	100	1.5
9	CVL68	Extensive Survey Project	CV	--	--	3	3	50	50	100	1.5
10	CVP69	Mini Project Work	CV	--	--	3	3	50	50	100	2
11	19HS61	Analytical & Reasoning Skills	HS	2	--	--	3	50	--	50	PP/NP
		TOTAL									**26**

Professional Elective - I

Subject Code	Title of the Subject	Subject Code	Title of the Subject
CV661	Theory of Elasticity	CV665	Ground Water Hydrology

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CV662	Alternate Building materials & Technologies	CV666	Solid Waste Management
CV663	Ground Improvement Techniques	CV667	Traffic Engineering
CV664	Advanced Surveying	CV668	Repair & Rehabilitation of Structures

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VII SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	CV71	Design of Steel Structures	BS	4	--	--	3	50	50	100	4
2	CV72	Estimation and Valuation	CV	2	2	--	3	50	50	100	3
3	CV73	Design of Prestressed Concrete Structures	CV	3	--	--	3	50	50	100	3
4	CV74X	Professional Elective - II	CV	3	--	--	3	50	50	100	3
5	CV75X	Professional Elective - III	CV	3	--	--	3	50	50	100	3
6	CVL76	Environmental Engineering Lab	CV	--	--	3	3	50	50	100	1.5
7	CVL77	Concrete and Highway Materials Lab	CV	--	--	3	3	50	50	100	1.5
8	CVEXX	Interdepartmental Elective - I	CV	4	--	--	3	50	50	100	4
9	CVP78	Project work Phase - I	CV								PP / NP
			TOTAL								23

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Professional Elective				Interdepartmental Elective	
Professional Elective - II		Professional Elective - III		Interdepartmental Elective - I	
Subject Code	Title of the Subject	Subject Code	Title of the Subject	Subject Code	Title of the Subject
CV741	Matrix Method of Structural Analysis	CV751	Numerical methods in Civil Engineering	CVE01	Integrated Solid Waste Management
CV742	Advanced Design of RC Structures	CV752	Rock Mechanics	CVE02	Air Pollution and Control methods
CV743	Design of Masonry Structures	CV753	Pavement Materials and Construction		
CV744	Earth and Earth Retaining Structures	CV754	Photogrammetry and Remote Sensing		
CV745	Highway Geometric Design	CV755	Air Pollution and Control		
CV746	Open Channel Hydraulics	CV756	Design and Drawing of Bridges.		
CV747	Rural Water Supply and Sanitation Engineering	CV757	Structural Dynamics		
		CV758	Construction Project Management		

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VIII SEMESTER

Sl. No	Course and Course code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	HS04	Intellectual Property Rights	HSS	2	--	--	3	50	50	100	2
2	CV81	Design and Computer Aided Drawing of Steel Structures	CV	–	1	3	3	50	50	100	2
3	CV82X	Professional Elective - IV	CV	3	--	--	3	50	50	100	3
4	CV83X	Professional Elective - V	CV	3	--	--	3	50	50	100	3
5	CVEXX	Interdepartmental Elective - II	CV	4	--	--	3	50	50	100	4
6	CVP84	Project work Phase - II	CV	--	--	3	3	50	50	100	12
7	CVS85	Seminar	CV	--	4	–	3	50	50	100	2
			TOTAL								28

Professional Elective		Interdepartmental Elective
Professional Elective - IV	Professional Elective - V	Interdepartmental Elective - II

Subject Code	Title of the Subject	Subject Code	Title of the Subject	Subject Code	Title of the Subject
CV821	Advanced Pre-stressed Concrete Structures	CV831	Finite Element Analysis	CVE03	Ecology and Environmental Impact Assessment
CV822	Advanced Foundation Design	CV832	Reinforced Earth Structures	CVE04	Remote Sensing and Geographic Information System
CV823	Pavement Design	CV833	Urban Transport Planning		
CV824	Earthquake Resistant Design of Structures	CV834	Advanced Design of Steel Structures		
CV825	Industrial WasteWater Treatment	CV835	Water Resources Engineering		
CV826	Quality Management System in Civil Engineering	CV836	Environmental Impact Assessment		
CV827	Remote Sensing and Geographic Information System	CV837	Infrastructure Development		

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Department of Civil Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. S.Vijaya

Department of Civil engineering

Professor and Head
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MARY BHAGYA JYOTHI.T, Asst Professor

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Dr. Ambedkar Institute of Technology, Bengaluru
(an autonomous Institute, affiliated to VTU, belgaum)
Department of Civil Engineering
Syllabus for I /II semester 2017-18

Sub Title : Elements of Civil Engineering and Engineering Mechanics		
Sub Code : CV13/23	No of Credits:3, : 3:0:0	No of lecture hours/week : 03 Self Study hour / week : 01
Exam Duration : 3 hours	CIE+ Assignment +SEE 45 + 5 + 50 = 100	Total Number of contact hours : 39+13=52

Course Objectives:

1. It offers basic knowledge of various branches of civil engineering (being the oldest branch of engineering) and the related engineering structures, the infrastructures such as buildings, roads, highways, dams and bridges.
2. It provides knowledge of geometry, logic and adoption of mathematical concepts and techniques.
3. It helps for an engineer in planning, designing and construction of various types of structures and machines.
4. It deals with the calculation of load functions viz. forces and moments etc and it creates the awareness about the impacts of infrastructure development.

Unit. No	Syllabus	No of Hours Of Teaching
1	**STATICS** 1.1.Introduction to Engineering Mechanics: Basic idealization-particle, continuum and rigid body; Force and its characteristics, types of forces, classification of force system; Principle of physical independence of forces, principle of superposition of forces, principle of transmissibility of forces; Newton laws of motion, introduction to SI units. 1.2.Analysis of force system: Coplanar Concurrent force system: Composition of forces-Definition of resultant and equilibrant; Composition of coplanar concurrent force system, Parallelogram law of forces, principle of resolved parts; Numerical problems. 1.3. Moment of a force; numerical problems; couple, moment of a couple, characteristics of a couple, equivalent force –couple system; Numerical problems. 1.4. Coplanar Non-concurrent force system: Composition of coplanar non concurrent force system, Varignon's principle of moments; Numerical problems.	11 Hours
2	2.1. Equilibrium of forces: Equilibrium of concurrent and non-concurrent forces: Equilibrium of forces; Condition of static equilibrium for different force systems, Lami's theorem; Numerical problems. 2.2. Support reaction: Type of supports, beams and loads, statically determinate beams; Numerical problems on statically determinate beams for different types loads and support conditions. 2.3. Friction: Definition, types of friction, Laws of friction, limiting friction,	11 Hours

	angle of friction, angle of repose, cone of friction; Impending motion on horizontal and inclined planes; Numerical problems on single and two blocks on inclined planes. Numerical problems on ladder and wedge friction.	
3	3.1. Centroid and centre of gravity: Introduction to the concept, definition of centroid and centre of gravity, centroid of basic geometrical figures, computing centroid for engineering composite sections-T, L, I, C and Z sections and their built up sections; Numerical problems. 3.2. Moment of Inertia: Introduction, definitions, Polar moment of Inertia moment of inertia of basic planar figures, computing moment of inertia for engineering Composite sections-T, L, I, C and Z sections and their built up sections; radius of gyration, parallel axis theorem and perpendicular axis theorem; Numerical problems	**08** Hours
4	4.1. **Dynamics:** **4.1.1. Kinematics of Rectilinear Motion:** Introduction, Basic definition-motion, displacement, velocity, acceleration, derivation – differential equations of motion, uniformly accelerated motion, motion under variable acceleration, **Super elevation and banking** - numerical problems. **4.1.2. Projectiles:** Introduction, important terms definitions, trajectory equation derivation, inclined projections on level ground - Numerical problems. **4.1.3**. Kinetics of rigid bodies – Numerical problems, Introduction - Newton's laws of motion, De-alemberts principle	**09** Hours
5	**Self study:** **Module- I:** Introduction to Civil engineering: Scope of different fields of civil engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering. **Module-II.** Infrastructure: Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country. **Module-III.** **Roads:** Types of roads, components and their function. **Bridges and Dams: D**ifferent types with simple sketches.	-------

Course Outcomes:

CO1.The students will be able to understand the basics of Civil Engineering, concepts of Engineering Mechanics, forces and force system.

CO2. The students will be capable to determine the resultant of a given co-planar force system.

CO3. The students will gain the knowledge to calculate the geometrical properties (CG, MI & Radius of gyration) of regular, irregular and composite section which are used in the construction industry.

CO4. The students will acquire the knowledge in the field of Kinetics, Kinematics and Projectiles to solve the problems related to rectilinear and curvilinear motion.

Text Books:

1. Engineering Mechanics by Timoshenko-young and J V Rao, Mc Graw –Hill Book Company, New Delhi.
2. Elements of Civil Engineering (IV Edition) by S S Bhavikatti, Vikas Publishing House Pvt. Ltd. New Delhi.
3. Elements of Civil Engineering and Engineering Mechanics, by M N Shesha Prakash and G V Mogaveer, PHI learning (2009).

Reference Books.

1. Engineering Mechanics by B Bhattacharya, Oxford University, 2008.
2. Engineering Mechanics by K L Kumar, Tata-Mc Graw Hill Publishing company, New Delhi.
3. Engineering Mechanics by M V S Rao and D R Durgaiah, University press (2005).

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Question paper pattern:

Note (1): Question paper shall consist of seven questions of which First question consists of objective types (20 questions of One Mark each) covering the entire syllabus except unit 5. Questions shall not be set from Unit 5.

Note (2):

(a) Answer five full questions.
(b) Answer question No.1 (Objective type), question No. 6 (unit 3) and question No. 7 (unit 4) compulsory.
(c) Answer any one question from 2 and 3 (unit-1).
(d) Answer any one question from 4 and 5 (unit-2).

Cos	Mapping with POs
CO1	PO1, PO2, PO10, PO12.
CO2	PO1, PO2, PO3, PO6, PO11, PO12.
CO3	PO1, PO2, PO3, PO7, PO12.
CO4	PO1, PO6, PO7, PO11, PO12.

Sub Title : Environmental Studies		
Sub Code: HS01	**No of Credits** : 2, **2:0:0**	**No of lecture hours/week : 02**
Exam Duration : 2 hours	**Exam Marks : 25 + 25 = 50**	**Total Number of contact hours : 26**

Objectives:

1. To create awareness among the students about impacts of developmental and human activities on natural resources, remedial measures and life support systems viz. land, water, air etc
2. It makes how to conserve natural resources for sustainable development.
3. To understand the importance of environmental protection and sustainable development.

Unit. No	Syllabus	No of Hours	
		Teaching	Tutorial
1	**Introduction**: Concept of environmental studies. Definition of environment, component of the environment and structure of the atmosphere. Study of different ecosystems. **Human Activities And Its Effect On Environment:** Agriculture, Industry, Mining, Transportation, & Urbanization.	06 hours	-------
2	**Natural Resources:** Forest Resources, Water Resources, Mineral Resources, Food Resources and Land Resources **ENERGY:** Definition of energy and energy resources, different types of energy-conventional and non-conventional energies.	07 hours	-------
3	**Environmental Pollution And Effects:** Air pollution, Water pollution "water born and water induced disease", Soil pollution and Noise pollution. **Current Environmental Issues Of Importance:** Population Growth, Climate Change and Global warming, Acid Rain, Ozone layer depletion	08hours	-------
4	**ENVIRONMENTAL PROTECTION:** Episodes (Los Angeles smog, Minamota disease in Japan 1945, Bhopal (india) gas tragedy 1984) Legislation to control and protect the environment, education at different level about environmental awareness. **Environmental Impact Assessment And Sustainable Development. Rainwater Harvesting:** Definition and methods.	05 hours	-------

Text Books

1. Ranjit Daniels R.J. and Jagdish Kirshnaswamy, (2009), "Environmental Studies", Wiley India Private Ltd., New Delhi
2. Benny Joseph (2005), "Environmental Studies", Tata McGraw - Hill Publishing Company Limited
3. Rajagopalan R. (2005), "Environmental Studies – From Crisis to Cure", Oxford Univesity Press

References

1. Raman Sivakumar, (2005), "Principles of Environmental Science and Engineering", Second Edition, Thomson Learning, Singapore
2. Meenakshi P. (2006), "Elements of Environmental Science and Engineering", Prentice Hall of India Private Limited, New Delhi
3. Prakash S.M. (2007), "Environmental Studies", Elite Publishers, Mangalore
4. Erach Bharucha (2005), "Text Book of Environmental Studies", for UGC, Universities Press
5. Tyler Miller Jr. G. (2004), "Environmental Science – Working with the Earth", Tenth Edition, Thomson Brooks/Cole
6. Tyler Miller Jr. G. (2006), "Environmental Science – Working with the Earth", Eleventh Edition, Thomson Brooks/Cole

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Course Outcomes:

CO1. The students will be introduced and refreshed about the ecology and ecosystem in general and understand the effect of human activities on environment.

CO2. The students will be able to analyze the importance of natural resources and its protection.

CO3. The students will understand the value of environment protection by studying past episode.

CO4. The students will acquire the skill to adopt the suitable method for sustainable development through environmental impact assessment and rainwater harvesting.

Cos	Mapping with POs
CO1	PO1, PO2 PO3, PO4, PO6, PO7. PO10, PO11,
CO2	PO1, , PO3, PO6, PO7, PO8,
CO3	PO1, PO2, PO3, PO5, PO8, PO9, PO10, PO11, PO12
CO4	PO1, PO2, PO3, , PO5, PO8, PO9, PO10, PO11, PO12

Dr. Ambedkar Institute of Technology, Bengaluru
(an autonomous institute, affiliated to VTU, Belgaum)
Department of Civil Engineering.
Syllabus for III and IV Sem. BE 2017-18

Sub Title : Building Materials And Construction		
Sub Code: CV31	**No of Credits** :3 = **3:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours : 39

Objectives:

1. To understand engineering properties of various materials used in civil engineering construction and their applications.
2. It is required to understand the techniques and requirements involved in designing the components of buildings and method of construction.
3. To gain the knowledge in the field of civil engineering and to achieve economy in the construction.

Unit. No	Syllabus content	No of Hours
1	**Introduction to building materials:** Common building stones, quarrying of stones, Tests on stones, properties and uses, ingredients of good brick earth, manufacturing of Bricks, classification and qualities of bricks. Materials of plastering. Paints, Constituents of paints & types. Timber, classification, seasoning of timber. Defects in timber, preservation of timber, uses & their properties. **FOUNDATION** Function and requirements of a good foundation, Types of foundations, Preliminary investigation of soil, Safe Bearing Capacity of Soil, Introduction to spread, combined, strap, mat and pile foundations, Design of shallow foundations.	9
2	**MASONRY** Classification of Masonry, Definition of terms used in Masonry, Classification of stone masonry, Joints in stone masonry, Introduction to load bearing and partition walls. Bonds in Brick work - English Bond, Flemish Bond, and Reinforced Brick Masonry. **ARCHES, LINTEL AND BALCONY** Elements of an arch, Classification of arches, Stability of arch, Definition and classification of Lintels, Definition and functions of Chejja, Canopy & Balcony.	9
3	**DOORS AND WINDOWS** Doors and windows, Definition of technical terms, Types of Doors, Types of windows, commercially available windows and doors. **ROOFS AND FLOORS** Types of Roofs & Roofing materials, Flat roof (RCC), Types of pitched roofs, Wooden Truss, Steel trusses, Types of flooring, Factors affecting selection of flooring materials.	7
4	**STAIRS AND FORM WORK** Definition of technical terms, Requirements of good stair, Types of Stairs, Geometrical design of RCC Dog legged and open well stairs (Plan and sectional elevation).	8

	Introduction to formwork and scaffolding, Formwork details for RCC Column, Beams and Floors, Shoring and under pinning. **PLASTERING , PAINTING AND DAMP PROOFING** Purpose of plastering, Methods of plastering, Purpose of Painting, Application of Paints to new and old surfaces. Damp Proofing - Causes of Dampness, Effects of Dampness, Methods of Damp Proofing.	
5	**GREEN BUILDING:** Introduction to green building, fundamentals of building science, Green Design, Green Construction Methods, Energy Auditing, Green Products and Miscellaneous Topics, Life-Cycle Assessment and Green Products	**6**

TEXT BOOKS

1. **A Text Book Building Materials**, by P.G. Varghese, Prentice-Hall of India Pvt. Ltd., Publication.
2. **Engineering Materials,** Rangawala P.C. Charter Publishing House, Anand, India.
3. **Engineering Materials,** Sushil Kumar, Standard Publication and Distributors, New Delhi.
4. **Concrete technology – Theory and practice**, M..S. Shetty, S. Chand and Co, New Delhi, 2002.

REFERENCE BOOKS / Web links:

1. **Advances in Building Materials and Construction** by Mohan Rai and M.P. Jain Singh – publication by CBRI, Roorkee.
2. **Concrete Technology,** Neville A.M and Brooks J.J — ELBS Edition. London
3. **Concrete Technology –** Gambhir M.L –Dhanpat Rai and Sons, New Delhi.

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Note : Question paper shall contain seven questions; two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:

CO1. The students will understand the use of various construction materials.
CO2. Students will understand the different tests to be conducted to ascertain the properties and suitability of engineering materials required for construction,
CO3. The knowledge gained in various construction techniques will leads to implementation of economic and cost effective construction methods.

Cos	Mapping with POs
CO1	PO1, PO2,PO4,PO6, PO7, PO8, PO9,PO10,PO11,PO12
CO2	PO1, PO2, PO3, Po4, PO7, PO8, PO9, PO10, PO11,PO12

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CO3	PO1, PO2, PO3, Po4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

Sub Title : Strength Of Materials		
Sub Code: CV32	**No of Credits =4, : 4:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours : **52**

Objectives:

1. The main object of the study will be focused on the determination of mechanical properties of the material, stress strain behavior, temperature stresses and proportional limits of materials under various loading condition,
2. To analyze the statically determinate structures/shafts and to calculate the bending stresses, shear stresses in beams.
3. To analyze the statically determinate structures and to calculate the deflection of beams.
4. To study the behaviour of thick and thin cylinders under different types of loading.

Unit. No	Syllabus content	No of Hours
1	Simple Stress and Strain: Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress – Strain Diagram for structural steel and non ferrous materials, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Elongation member due to self– weight.	10
2	Simple Stress and Strain(continued): Composite section, Volumetric strain, expression for volumetric strain, Elastic constants relationship among elastic constants, Thermal stresses (including thermal stresses in compound bars).	8
3	**Bending moment and shear force in beams** Introduction, Types of beams loadings and supports, Shearing force in beam, Bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering point loads, UDL, UVL and Couple. **Bending stress, shear stress in beams** Introduction – Bending stress in beam, Assumptions in simple bending theory, Pure bending derivation of Bernoulli's equation, Modulus of rupture, section modulus, Flexural rigidity, Expression for shear stress in beam, Shear stress diagram for rectangular, symmetrical 'I' and 'T' section (Flitched beams not included). Determination of Shear centre and its importance.	12
4	**Deflection of beams** Introduction – Definitions of slope, deflection, Elastic curve-derivation of differential equation of flexture, Sign convention,Slope and deflection for standard loading classes using Macaulay's method for prismatic beams and overhanging beams subjected to point loads, UDL and Couple. **Torsion of circular shafts ,** Introduction – Pure torsion-torsion equation of circular shafts, Strength and stiffness,	12

	Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections. Thin and thick cylinders including derivations and numerical problems.	
5	**Compound stresses** Introduction, Stress components on inclined planes, General two-dimensional stress system, Principal planes and stresses, Mohr's circle of stresses. **Elastic stability of columns** Introduction – Short and long columns, Euler's theory on columns, Effective length slenderness ration, radius of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems.	**10**

TEXT BOOKS:

1. **Strength of Materials,** Subramanyam, Oxford University Press, Edition 2008
2. **Strength of Materials**, Basavarajaiah and Mahadevappa Universities Press (2009).

REFERENCE BOOKS / Web links:

1. **Strength of Materials**, Singer Harper and Row Publications.
2. **Elements of Strength of Materials**, Timoshenko and Young Affliated East-West Press.
3. **Mechanics of Materials,** James M. Gere (5^{th} Edition), Thomson Learning.
4. **Strength of Materials , R. K Bansal, Lakshmi Publications (P) Ltd.,**
5. **Strength of Materials, S. Ramamrutham, Dhanpath Rai, Publishing Co.**
6. **Strength of materials, Hibbeler**

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Note : Question paper shall contain seven questions; two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:

CO1: The subject knowledge is spread across all branches of engineering profession.
CO2: At the end of this course, the student will have knowledge about behavior of members subjected to various types of forces and their applications concerned to civil engineering problems.
CO3: Exposure to this subject makes students able to face the challenges in the analysis and design of structural components.
CO4: The students will have the knowledge of material behavior under different types of loading and combination of loadings.

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO4, PO5, PO6. PO7, PO8,PO10, PO12
CO2	PO1, PO2, PO3, PO4, PO5, PO7, PO8,PO10, PO11, PO12
CO3	PO1, PO2, PO3, PO4, PO5, PO6. PO7, PO8,PO10, PO11

CO4	PO1, PO2, PO3, PO4, PO5, PO6. PO7, PO8,PO10, PO11, PO12

Sub Title : Surveying - I		
Sub Code: CV33	**No of Credits : 3= 3:0:0 (L:T:P)**	**No of lecture hours/week : 02+02**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **: 52**

Objectives:

1. The main objective of the subject is to transfer the objects on the ground to the sheet for the planning and analysis.
2. To give exposure to all instruments used for linear; angular, horizontal and vertical measurements.
3. The Objective of Surveying is to prepare topographical maps, earth work estimation, aligning of transport systems, calculation of capacity water storage systems, etc.

Unit. No.	Syllabus content	No. of Hours
1	**Introduction:** Definition of Surveying, Classification of Surveys, Uses of Surveying Units of Measurements, Map & Classification, Survey of India topographical Maps and their numbering., Basic principles of surveying, Errors, Classification, Precision and accuracy. **Measurement of horizontal distances.** Chain and types, Tape and types, EDM devices, Ranging of lines, Direct and Indirect, Measurement of distances over sloping grounds– Numerical problems.	**08**
2	**Compass Surveying** Meridians and bearings, Principle, working and use of - Prismatic compass, Surveyor's compass, Magnetic bearing, true bearings, WCB and Reduced bearing. Dip and Declination, Accessories required for compass surveying, Traverse - closed and open traverse, Local attraction, determination and corrections, Dependent and independent co-ordinates, Checks for closed traverse and determination of closing error and its direction, Bowditch's graphical method of adjustment of closed traverse, Bowditch's rule and transit rule, Omitted measurements (Only Length and corresponding bearing of one line).	**9**
3	**Introduction to Leveling** Principles and basic definitions, Fundamental axes and part of a dumpy level, Types of adjustments and objectives, Temporary adjustments of a dumpy level, Sensitiveness of bubble tube, Curvature and refraction correction, Type of leveling, Simple leveling, Reciprocal leveling, Profile leveling, Cross sectioning, Fly leveling, Booking of levels, Rise and fall method and Height of instrument method, comparison Arithmetic checks, Fly back leveling, Errors and precautions. Introduction of Topo sheets and its uses.	**8**
4	**Plane Table Surveying** Plane table and accessories, Advantages and limitations of plane table survey, Orientation and methods of orientation, Methods of plotting – Radiation, Intersection, Traversing, Resection method, Two point and three point problems, Solution to two point problem by graphical method, Solution to three point problem Bessel's	**6**

	graphical method, Errors in plane table survey.	
5	**Contouring , Planimeter, pantograph and total station:** Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours Numerical problems on determining intervisibility, Grade contours and uses. Description and uses and application of Planimeter, Pantograph **Total Station:** introduction, angle measurement, distance measurement, co ordinate measurement, data processing	**8**

TEXT BOOKS:

1. **'Surveying'** Vol–1 – B.C. Punmia , Laxmi Publications, New Delhi.
2. **Surveying and Levelling** – R Subramanian. Oxford University Press (2007)
3. **Text Book of Surveying** – C. Venkataramiah. Universities Press.(2009 Reprint)

RFERENCE BOOKS / Web links:

1. **Fundamentals of Surveying -** Milton O. Schimidt – Wong, Thomson Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India.
3. **Surveying** Vol. I, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.
4. **Surveying** Vol 1 and 2, Kanitkar,
5. Surveying , Arora

6 Survey of India Publication on maps.

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Note: Question paper shall contain seven questions; two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:

CO1: At the end of the course the students will possesses the knowledge about Chain, Compass, Plane table, Leveling, Theodolite and Engineering surveying.

CO2: The success of any Engineering project is based upon the collection of existing data, accurate and complete survey work.

CO3: In surveying the measurements such as sections and elevations are drawn to convenient scale on papers by selecting the suitable scale.

CO4: At the end of the course the student will possesses knowledge about Tachometric surveying and Survey adjustments,

Cos	Mapping with Pos
CO1	PO2, PO3, PO4, PO5, PO6, PO7. PO8, PO9, PO10, PO11,PO12
CO2	PO3, PO4, PO5, PO6, PO7, PO8

CO3	PO1,PO2, PO3, PO4, PO5, PO6, PO7. PO8, PO9, PO10, PO11,

Sub Title : Fluid Mechanics		
Sub Code: CV34	**No of Credits** :4 = **4:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **: 52**

Objectives:

1. The students are introduced to the definition and properties of fluid.
2. To study the Principles of statics, kinematics and kinetics of fluid flow.
3. To study the different devices used for measurement of velocity and discharge of fluid flow.
4. To study the dimension analysis.

Unit. No	**Syllabus content**	**No of Hours**
1	**BASIC PROPERTIES OF FLUIDS** Introduction, Definition of Fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension,& Capillarity. Newton's law of viscosity (theory & problems).Capillary rise in a vertical tube and between two plane surfaces (theory & problems). **PRESSURE AND ITS MEASUREMENT** Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure. Vapour pressure. Measurement of pressure using a simple, differential & inclined manometers (theory & problems).	**12**
2	**HYDROSTATIC PRESSURE ON SURFACES** Basic definitions, equations for hydrostatic force and depth of centre of pressure for Vertical and inclined submerged laminae (plane and curved) – Problems. **KINEMATICS OF FLOW** Introduction, methods of describing fluid motion, definitions of types of fluid flow, streamlines, path line, stream tube. Three dimensional continuity equations in Cartesian Coordinates (derivation and problems). General Continuity equation (problems). Velocity potential, Stream function, Equi-potential line, Stream line- problems, Stream function.	**12**
3	**DYNAMICS OF FLUID FLOW** Introduction, Energy possessed by a fluid body. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Problems on applications of Bernoulli's equation (with and without losses). Application of Bernouli's equation (Venturimeter, Orificemeter, Pitot Tube and Pitot static tube) - problems	**10**
4	**FLOW THROUGH PIPES** Introduction, losses in pipe flow,. Darcy-Weisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe-problems. Minor losses in pipe flow, equation for head loss due to sudden expansion and contraction- problems. Water hammer in pipes,- problems.	**09**
5	**DEPTH AND VELOCITY MEASUREMENTS, NOTCHES AND WEIRS**	**09**

	Introduction, Measurement of depth, point & hook gauges, self recording gauges. Staff gauge, Weight gauge, float gauge. Measurement of velocity- single and double gauges, pitot tube, Current meter. **DISCHARGE MEASUREMENTS** Introduction, Triangular notch, Rectangular notch, Cipolletti notch, Rotometer, Ogee weir and Broad crested weir, Small orifices, mouth pieces – Problems.	

TEXT BOOKS:

1. A Text Book of Fluid mechanics & Hydraulic Machines'- R.K.Rajput, S.Chand & Co, New Delhi, 2006 Edition.
2. 'Principles of Fluid Mechanics and Fluid Machines'- N.Narayana Pillai, Universities Press(India), Hyderabad,2009 Edition..
3. ' Text Book Of Fluid Mechanics & Hydraulic Machines'- R.K.Bansal, Laxmi Publications, New Delhi, 2008 Edition.
4. Hydraulics and Hydraulic Machines- Dr. P. N. Modi and Seth, McGraw Hill Publications.

REFERENCE BOOKS / Web links:

1. Fundamentals of Fluid Mechanics – Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, Wiley India, New Delhi, 2009 Edition.
2. 'Introduction To Fluid Mechanics' – Edward j. Shaughnessy,jr; Ira m. Katz:; James p Schaffer, Oxford University Press, New Delhi, 2005 Edition.
3. Fluid Mechanics' – Streeter, Wylie, Bedford New Delhi, 2008(Ed)
4. Fluid Mechanics and Turbomachines'- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition
5. A Text book of Fluid mechanics and Hydraulic machines – Chandramouli and others
6. Fluid Mechanics, K L Kumar,

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http://books.google.co.in

Note : Question paper shall contain seven questions; two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:

CO1. The students will acquire the knowledge about various properties of fluid and measurement of fluid pressures and its applications.
CO2. Various forces which are acting on the plane surfaces submerged in liquid and to study the various losses of fluid flowing through pipes.
CO3. The students will determine the behavior of fluid in static and dynamic condition.
CO4. The students will acquire the knowledge of measurement of velocity and discharge by using different devices

Cos	Mapping with POs
CO1	PO1,PO2, PO3, PO4, PO6, PO7. PO8, PO9, PO10,PO12
CO2	PO1,PO2, PO3, PO5,PO8, PO9, PO10, PO11,PO12

CO3	PO1,PO2, PO3, PO5, PO6, PO7. PO8, PO9, PO11,PO12
CO4	PO2, PO3, PO5, PO6, PO8, PO9, PO10, PO11,PO12

Sub Title : Applied Engineering Geology		
Sub Code: CV35	**No of Credits : 3 = 3:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **:39**

Objectives:

1. To introduce the basics of engineering Geology and its applications in various fields of civil engineering construction,
2. To study the various processes involved in the formation of rocks and minerals and
3. To understand the behaviour of rock structure upon construction of civil engineering structures.

Unit. No	**Syllabus content**	**No of Hours**
1	**INTRODUCTION**: Geology and its application in the field of civil engineering. Earth: Its internal structure and composition. **MINERALOGY:** Definition of mineral, ore, tenor. Mode of formation, classification, identification and Description of Rock forming and Ores, minerals based on physical and special properties and mention their uses: Rock forming minerals: Felspars group:- Orthoclase, Plagioclase, microcline. Olivines:- olivine. Amphiboles:- Hornblende, Micas:- Biotite and muscovite, Secondary Silicates:- Talc, serpentine , asbestos, Quartz and its varieties, Carbonates : Calcite, Magnesite and Dolemite, Suphate Group:- Gypsum **ore minerals :** Hematite, Magnetite, Chromite, Pyralusite, bauxite , limonite, pyrite, chalcopyrite.	**08**
2	**PETROLOGY**: Definition of rock, classification rocks, Igneous rocks: Origin, classification (chemical and textural); Identification and description of Granite, Syenite, Dolerite, Gabbro, Dunite, Pegmatite, Porphiries; Basalt and Pumice. Sedimentary rocks: Origin, classification, primary structures and description of Sandstones, Conglomerate, Breccia, Shale, Limestones and Laterite. Metamorphic rocks: Kinds of metamorphism, description of Gneiss, Quartzite, Marble, Slate, Phyllite, Charnokite and Schists. Rocks as fundamental units and building materials and their engineering applications: As building stones, road metals and stones for decoration, pavement, cladding, roofing, flooring, concreting and foundation engineering.	**06**
3	**STRUCTURAL GEOLOGY AND ROCK MECHANICS**: Basic Principles of structural Geology, Materials of structural geology, rock deformations. Study of Dip, strike. Study of the causes, nomenclature, classifications, mechanics and significance of the folds, fractures / Joints and faults and unconformities in different rocks and their effects on civil engineering structures.	**07**
4	**HYDROGEOLOGY AND GEO ENVIRONMENT GEODYNAMICS:** Epigene and Hypgene geological agents; rock weathering and its types; Geological action of rivers with different drainage patterns. Study of Coastal landforms:-	**12**

	continental shelf, continental rise, continental slope, abyssal plain, mid-oceanic ridges, trenches, Tsunamis. Earthquakes: causes, classification of earthquakes, seismic waves, seismograph, epicenter, Seismic Zones of World and India and Seismic resisting structures. Land-slides; causes, effects and remedial measures. **HYDROGEOLOGY:** Hydrological cycle; distribution of ground water in the earth crust; properties of water bearing geological formation: water table, Aquifers and their types: Porosity, Permeability, Transmissibility and storage Coefficient. Springs and Artisian wells, Artificial recharging of Ground water, Sea water intrusion and remedies. Ground water exploration-Electrical Resistivity method and Seismic method. Remote sensing Techniques.	
5	**ENGINEERING GEOLOGY AND GEOLOGICAL SITE INVESTIGATION TECHNIQUES :** Geological and Geotechnical considerations in selecting a suitable site for the construction of civil engineering projects like Dams and Reservoirs, Tunnels, Bridges and Highways	**6**

Text books:

1. Text book of Geology by P.K. Mukerjee, World Press Pvt. Ltd. Kolkatta
2. Text of Engineering and General Geology by Parbin Singh, Published by S. K. Kataria and Sons, New Delhi.
3. A text book of Engineering Geology by Chenna Kesavulu, Mac Millan India Ltd
4. Dimitri P Krynine, William R Judd, "Principles of Engineering Geology and Geotechnics"CBS publishers & Distributors-2003

References books / Web links:

1. Foundations of Engineering Geology, by Tony Waltham (3rd Ed.) Universities Press.
2. Structural Geology (3rd Ed.)by M. P. Billings, Published by Prentice Hall of India Pvt. Ltd. New Delhi
3. Rock Mechanics for Engineers by Dr B.P.Verma, Khanna Publishers, New Delhi.
4. Engineering Geology for Civil Engineering by D. Venkata Reddy, Oxford and IBH Publishing Company, New Delhi.
5. Ground water geology by Todd D.K. John Wiley and Sons, New York.
6. Remote sensing Geology by Ravi P Gupta, Springer Verilag, New York.
7. Physical Geology by Arthur Holmes, Thomson Nelson and Sons, London.
8. Environmental Geology by K. S. Valdiya, Tata Mc Graw Hills.
9. Ground water assessment, development and management by K.R.Karanth, Tata Mc Graw Hills

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Note::
Question Paper pattern : Question shall contain 7 Questions, two of them have internal choice. Students have to answer five full questions.

Course Outcomes:

CO1**.** The students will acquire geological knowledge applied in various infrastructure developments.

CO2. The knowledge gained will help them to understand the mineral resources at National and International Level.

CO3. Thus plays a key role in the overall development and sustainable development.

CO4: Assess the various structural features and geological tools in ground water exploration, Natural resource estimation and solving civil engineering problems

CO5: Apply and asses use of building materials in construction and asses their properties

Cos	Mapping with POs
CO1	PO1,PO2, PO4, PO6, PO7. PO12
CO2	PO2, PO4, PO8, PO9, PO10, PO11,PO12
CO3	PO1, PO3, PO4, PO8, PO9, PO11,PO12
CO4	PO2, PO3, PO4, PO12
CO5	PO4, PO5, PO11,PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: CIVIL ENGINEERING MATERIAL TESTING LAB		
Sub Code: CVL36	**No of Credits :1.5 = (0:0:3) (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Record + SEE = 20 +30 + 50 = 100	Total No. of Contact Hours **:42**

Objectives:

1. The experimental work involved in the laboratory will expose the student to understand the fundamental modes of loading of the structures.
2. The measurements of loads, displacements and strains are useful to study the engineering properties of the materials.
3. To estimate the mechanical properties of materials under static and dynamic loading.

Unit. No	**Syllabus content**	**No of Hours**
1	1. Tension test on Mild steel and HYSD bars. 2. Compression test of Mild Steel, Cast iron and Wood. 3. Torsion test on Mild Steel circular sections	**9**
2	4. Bending Test on Wood Under two point loading 5. Shear Test on Mild steel 6. Impact test on Mild Steel (Charpy & Izod) **7.** Test on Springs	**9**
3	8. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's 9. Test on Bricks and Tiles	**6**
4	***10.*** Tests on Fine aggregates – Moisture content, Clay Content, Specific gravity, Bulk density, Sieve analysis and Bulking of sand	**9**
5	11. Tests on Coarse aggregates – Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis **12.** Demonstration of Strain gauges and Strain indicators	**3**

NOTE: All tests shall be carried out as per relevant BIS Codes

REFERENCE BOOKS / Web links:

1. **Testing of Engineering Materials**, Davis, Troxell and Hawk, International Student Edition – McGraw Hill Book Co. New Delhi.
2. **Mechanical Testing of Materials",** Fenner, George Newnes Ltd. London.
3. **"Experimental Strength of Materials"**, Holes K A, English Universities Press Ltd. London.
4. **"Testing of Metallic Materials"**, Suryanarayana A K, Prentice Hall of India Pvt. Ltd. New Delhi.
5. **Relevant IS Codes**
6. **"Material Testing Laboratory Manual"**, Kukreja C B- Kishore K. Ravi Chawla Standard Publishers & Distributors 1996.

7. **Concrete Manual,** M.L.Gambhir –Dhanpat Rai & Sons- New Delhi.

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Scheme of Examination:
Group Experiments: Tension, Compression Torsion and Bending Tests
Individual Experiments: Remaining tests
Note:
Two questions are to be set – one from group experiments and the other as individual experiment.

Course Outcomes:

CO1: The students will be able to understand the characteristic strength and stiffness properties of various engineering material.
CO2: Failure fracture of different materials can be identified under different loading conditions.
CO3: It helps in selecting the material for various constructions.

Cos	Mapping with POs
CO1	PO4, PO5, PO6, PO12
CO2	PO4, PO5, PO6, PO8, PO12
CO3	PO2, PO4, PO6

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: SURVEYING PRACTICE-I		
Sub Code: CVL37	**No of Credits : 1.5 (0:0:3) (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Record + SEE = 20 +30 + 50 = 100	Total No. of Contact Hours **:42**

Objectives: .

1. The students are exposed to use different survey equipments for linear and angular measurements.
2. It helps in determining the elevation, area enclosed and alignment of civil engineering structures.
3. To calculate distance between inaccessible objects, etc.

Unit. No	**Syllabus content**	**No of Hours**
1	Exercise – 1 a) To measure distance between two points using direct ranging b) To set out perpendiculars at various points on given line using cross staff, optical square and tape and Building Traversing. Exercise – 2 Setting out of rectangle, hexagon using tape/chain and other accessories	**6**
2	Exercise – 3 Measurement of bearing of the sides of a closed traverse & adjustment of closing error by Bowdich method and Transit method Exercise – 4 To set out rectangles, pentagon, hexagon, using tape /chain and compass. Exercise – 5 To determine the distance between two inaccessible points using chain/tape & compass.	**9**
3	Exercise – 6 To locate points using radiation and intersection method of plane tabling Exercise – 7 To solve 3-point problem in plane tabling using Bessel's graphical solution	**9**
4	Exercise –8 To determine difference in elevation between two points using fly leveling technique & to conduct fly back leveling. Booking of levels using both HI and Rise & Fall methods. Exercise – 9 To determine difference in elevation between two points using reciprocal leveling and to determine the collimation error Exercise – 10 To conduct profile leveling for water supply /sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a given formation level. Exercise – 11	**9**

	Interpolation of contours by block leveling	
5	Exercise – 12 Measurement of angles and distances using total station To determine difference in elevation between two points using Total Station **Demonstration** Minor instruments – Clinometers, Ceylon ghat tracer, Hand level, Box sextant, Planimeter and Pantagraph.	**9**

Scheme of Examination:
Any one of the above exercise is to be conducted in the examination by the student.

TEXT BOOKS:

1. **'Surveying'** Vol.–1, B.C. Punmia, Laxmi Publications, New Delhi.
2. **"Plane Surveying'** Vol-1-A.M. Chandra , New age International ® Ltd.
3. **'Plane Surveying'** – ALAK , S. Chand and Company Ltd., New Delhi.

REFERENCE BOOKS / Web links: :

1. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India.
2. **Fundamentals of Surveying** - Milton O. Schimidt – Wong, Thomson Learning.
3. **Surveying** Vol. I, S.K. Duggal

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Course Outcomes:
CO1. At the end of the course the students will possess knowledge about Chain, Compass, Plane table, Leveling, Theodolite and Engineering surveying.
CO2. The success of any Engineering project is based upon the accurate and complete survey work.
CO3. In Surveying the measurements such as sections and elevations are drawn to convenient reduced size on papers by selecting the suitable scale.
CO4. At the end of the course the student will possesses knowledge about Tachometric surveying and Survey adjustments,

Cos	Mapping with POs
CO1	PO1,PO4, PO5, PO6, PO12
CO2	PO1,PO4, PO5, PO6, PO8, PO12
CO3	PO2, PO4, PO6
CO4	PO1,PO3

Dr. Ambedkar Institute of Technology, Benaluru -

IV Sem. BE (Civil) (2017-18)

Sub Title: Concrete Technology		
Sub Code: CV41	**No of Credits :3 = 3:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **:39**

Objectives:

1. To study the properties of concrete making materials like Cement, sand, coarse aggregate and water.
2. To study the properties of concrete in fresh and hardened state are useful in estimating the strength and durability of concrete.
3. To acquire the knowledge of concrete mix design by various methods.

Unit. No	**Syllabus content**	**No of Hours**
1	**CEMENT**: Chemical composition, hydration of cement, Types of cement, manufacture of OPC by wet and dry, process (flow charts only) Testing of cement - Field testing, Fineness by sieve test and Blaine's air permeability test, Normal consistency, setting time, soundness, Compression strength of cement and grades of cement, Quality of mixing water. **AGGREGATES** - grading, analysis, Specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – Importance of size, shape and texture. Grading of aggregates - Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. Properties of M sand and filtered sand.	**8**
2	**WORKABILITY OF CONCRETE**- factors affecting workability, Measurement of workability - slump, flow tests, Compaction factor and Vee-Bee consisto-meter tests, Segregation and bleeding, Process of manufactures of concrete : Batching, Mixing, Transporting, Placing, Compaction, Curing. **Properties of Hardened Concrete**: Factors affecting strength, W/C ratio, A/c ratio, Gel space ratio, Maturity concepts, Tests on hardened concrete.	**8**
3	**ELASTICITY -** Relation between modulus of elasticity and Strength, factors affecting modulus of elasticity, Poisson Ratio, Shrinkage - plastic shrinkage and drying shrinkage, Factors affecting shrinkage, Creep - Measurement of creep, factors affecting creep, effect of creep,	**8**
4	**DURABILITY -** definition, significance, permeability, Sulphate attack, Chloride attack, carbonation, freezing and thawing, Factors contributing to cracks in concrete - plastic shrinkage, settlement cracks, construction joints, Thermal expansion, transition zone, structural design deficiencies,	**8**
5	**CONCEPT OF CONCRETE MIX DESIGN**: variables in proportioning, exposure conditions, Procedure of mix design as per IS 10262-2009, Numerical examples of Mix Design.	**7**

TEXT BOOKS:

1. "Concrete Technology" -Theory and Practice, M.S.Shetty, S.Chand and Company, New Delhi, 2002.
2. Concrete Technology- Gambhir Dhanpat Rai & Sons, New Delhi.
3. Concrete Technology-– A.R.Santakumar. Oxford University Press (2007)'

REFERENCES / Web links:

1. "Properties of Concrete"Neville, A.M. : , ELBS, London
2. "Concrete Manual" - Gambhir Dhanpat Rai & Sons, New Delhi
3. "Concrete Mix Design" - N.Krishna Raju, Sehgal - publishers.
4. "Recommended guidelines for concrete mix design" - IS:10262,BIS Publication

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Note 1. Question paper shall contain seven questions, two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:

CO1. At the end of the course the student will posses knowledge about of concrete making materials, preparation of good concrete and assessment of qualities of various ingredients of concrete.

CO2. The student will understand the production of concrete, importance of curing and properties of concrete in fresh and hardened state.

CO3. The students will acquire the knowledge about elasticity, durability and other properties of concrete.

CO4. The students are able to design the concrete of different grades as per IS specifications used in the construction industry

Cos	Mapping with POs
CO1	PO3, PO4, PO6, PO7, PO8, PO10
CO2	PO1,PO2, PO3, PO4, PO5, PO6, PO7. PO8, PO9, PO10
CO3	PO1,PO2, PO3, PO4,PO5, PO6, PO7. PO8, PO9, PO10,PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: STRUCTURAL ANALYSIS –I		
Sub Code: CV42	**No of Credits :4=4:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **:52**

Objectives: The main purpose of studying STRUCTURAL ANALYSIS – I

1. To know the arrangement of structural elements to support the external loads and to find the response of a structure to a given loading,
2. To analyze the forces in the various members of perfect Trusses.
3. To determine the deformation of beams, Frames and Truss joints
4. To analyze the indeterminate beams and acquire the knowledge of drawing BMD and SFD.
5. To evaluate the forces in statically determinate and indeterminate arches and cables.

Unit. No	Syllabus content	No of Hours
1	**STRUCTURAL SYSTEMS** Forms of structures, Conditions of equilibrium, Degree of freedom, Linear and Non linear behaviour, One, two, three dimensional structural systems, Determinate and indeterminate structures [Static and Kinematics]. **ANALYSIS OF TRUSSES:** Method of joints and Method of sections.	**9**
2	**DEFLECTION OF BEAMS -** :Moment area method. **DEFLECTION OF BEAMS -** Conjugate beam method **STRAIN ENERGY** Strain energy and complimentary strain energy, Strain energy due to axial load, bending and shear, Theorem of minimum potential energy, Law of conservation of energy, Principle of virtual work. The first and second theorem of Castigliano, problems on beams, frames, Betti's law, Clarke-Maxwell's theorem of reciprocal deflection. Deflection of beams (Propped cantilever and Fixed beams)	**14**
3	**STRAIN ENERGY continued** Deflection of truss joints using unit load method **ANALYSIS OF BEAMS** **Consistent deformation method** – Propped cantilever and fixed beams only **Clapeyron's theorem of three moments** – continuous beams and fixed beams	**13**
4	**ARCHES AND CABLES** Three hinged circular and parabolic arches with supports at same levels and different levels, Determination of thrust, shear and bending moment, Analysis of cables under point loads and UDL, length of cables (Supports at same levels and at different levels).	**8**
5	**ANALYSIS OF INDETERMINATE ARCHES** Two hinged parabolic arch, Two hinged Circular Arch	**8**

Note: Question paper shall contain seven questions, two of them have internal choice. Students have to answer FIVE full questions.

TEXT BOOKS:

1. **Theory of Structures**, Pandit and Guptha, Vol. – I, Tata McGraw Hill, New Delhi.
2. **Basic Structural Analysis** Reddy C. S., Tata McGraw Hill, New Delhi.
3. **Strength of Materials and theory of structures** Vol I & II, B.C. Punmia and R.K. Jain Laxmi Publication New Delhi

REFERENCE BOOKS / Web links:

1. **Elementary Structural Analysis**, Norris and Wilbur, International Student Edition. McGraw Hill Book Co: New York
2. **Structural Analysis**, 4th SI Edition by Amit Prasanth & Aslam Kassimali, Thomson Learning.
3. **Analysis of Structures**, Thandava Murthy, Oxford University Press, Edition 2005
4. **Structural Analysis,** Hibbeler.

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Course Outcomes:

CO1. The students will be able to understand the different form of structures, determination of static and kinematic indeterminacy and the defection of statically determinate beams and determination of forces in the various members of a truss..

CO2. The students will acquire the knowledge to determine the deflection of bent beams and plane frames.

CO3. The students will be able to analyze the three hinged arches, two hinge arches and suspension cable bridges

CO4. The students will be able to analyze statically indeterminate beams which is useful for the structural designer to choose the right type of section consistent with economy and safety of the structure.

Cos	Mapping with POs
CO1	PO1, PO4, PO6, PO8, PO10
CO2	PO2, PO4, PO8
CO3	PO3, PO4, PO8, PO9, PO11,
CO4	PO3, PO4, PO5, PO7, PO8, PO9. PO11, PO12,

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: SURVEYING -II		
Sub Code: CV43	**No of Credits :3 = 3:0:0 (L:T:P)**	**No of lecture hours/week : 02+02**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **:39**

Objective:

1. To establish the boundaries of land and control points of the suitable area.
2. To collect the data for designing any Engineering Projects such as a Road, Railway, Water supply or Sanitary scheme, canal etc.,
3. To require to study the features of the Earth's surface in which the project is to be conducted and prepare a map of that area.

Unit. No	**Syllabus content**	**No of Hours**
1	**THEODOLITE SURVEY** Theodolite and types, Fundamental axes and parts of a transit theodolite, Uses of theodolite, Temporary adjustments of a transit theodolite, Measurement of horizontal angles – Method of repetitions and reiterations, Measurements of vertical angles, Prolonging a straight line by a theodolite in adjustment and theodolite not in adjustment .	**09**
2	**TRIGONOMETRIC LEVELING** Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method Distance and difference in elevation between two inaccessible objects by double plane method. **TACHEOMETRY:** Basic principle Types of tacheometric surveyTacheometric equation for horizontal line of sight and inclined line of sight in fixed hair method, Anallactic lens in external focusing telescopes, Reducing the constants in internal focusing telescope, Moving hair method and tangential method, Subtance bar, Beaman stadia arc.	**09**
3	**CURVE SETTING (Simple curves and Compound curves)** Curves – Necessity – Types, Simple curves Elements Designation of curves, Setting out simple curves by linear methods, Setting out curves by Rankines deflection angle method. Compound curves Elements Design of compound curves Setting out of compound curves	**09**
4	**CURVE SETTING (Reverse curves)** Reverse curve between two parallel straights (Equal radius and unequal radius).	**06**
5	**CURVE SETTING (Transition and Vertical curves)** :Transition curves Characteristics Length of Transition curve Setting out cubic Parabola and Bernoulli's Lemniscates, Vertical curves (Basic terms) – Types – Simple numerical problems. **AREAS AND VOLUMES:** Calculation of area from cross staff surveying, Calculation of area of a closed traverse by coordinates method. Computations of volumes by trapezoidal and prismoidal rule. **Total Station: I**ntroduction, use of Total Station (Leveling) and data processing. Salient features of Total Station, Advantages of Total Station over conventional instruments, Application of Total Station.	**06**

TEXT BOOKS:

1.'**Surveying'** Vol 2 and Vol 3 - B. C. Punmia, Laxmi Publications

2.**'Plane Surveying'** A. M. Chandra – New age international (P) Ltd
3.**'Higher Surveying'** A.M. Chandra New age international (P) Ltd

REFERENCE BOOKS / Web links:

1. **Fundamentals of Surveying** - Milton O. Schimidt – Wong, Thomson Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arther Bannister et al., Pearson Education, India
4. **Plane Surveying – Alakdey**

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Note: Question paper shall contain seven questions; two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:
Outcome:
CO1. The success of any Engineering project is based upon the accurate and complete survey work.
CO2. Engineer must be thoroughly familiar with the Principles and practice of surveying.
CO3. In Surveying the measurements such as sections and elevations are drawn to convenient reduced size on papers by selecting the suitable scale.

Cos	Mapping with POs
CO1	PO1,PO2, PO3, PO4,PO5, PO6, PO7. PO8, PO9, PO10 PO12
CO2	PO1,PO2, PO3, PO4,PO5, PO6, PO7. PO8, PO10,PO11, PO12
CO3	PO2, PO3, PO4,PO5, PO6, PO7. PO8, PO9, PO12

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Sub Title: HYDRAULICS & HYDRAULIC MACHINES		
Sub Code: CV44	**No of Credits :4 = 4:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **:52**

Objectives:

1. To understand the components involved in open channels to minimize the losses and maximize discharge at different stages of flows.
2. To increase the efficiency of the system identifying the unknown variables which are acting on the flow system. Using dimensional analysis it helps to obtain the desired solution for the complicated problems,
3. To increase the water energy, design and planning and understanding the basic principles of the practical application.

Unit. No	**Syllabus content**	**No of Hours**
1	**UNIFORM FLOW IN OPEN CHANNELS:** Introduction, Geometric properties of Rectangular, Triangular, Trapezoidal and Circular channels. Chezy's equation, Manning's equation-problems. Most economical open channels-Rectangular, Triangular, Trapezoidal and Circular channels- problems. **NON-UNIFORM FLOW IN OPEN CHANNELS:** Introduction, Specific energy, Specific energy diagram, Critical depth, Conditions for Critical flow- Theory & problems. Hydraulic jump in a Horizontal Rectangular Channel- Theory and problems. Dynamic equation for Non-Uniform flow in an Open channel, Classification of Surface profiles- simple Problems.	**13**
2	**DIMENSIONAL ANALYSIS AND MODEL STUDIES:** Introduction, Systems of units, Dimensions of quantities, Dimensional Homogeneity of an equation. Analysis-Raleigh's method, Buckingham's Π theorem- problems. Model Studies, Similitude, Non-dimensional numbers: Froude models-Undistorted and Distorted models. Reynold's models- Problems.	**10**
3	**IMPACT OF JET ON VANES:** Introduction, Impulse- Momentum equation. Direct impact of a jet on a stationary flat plate, Oblique impact of a jet on a stationary flat plate, Direct impact on a moving plate, Direct impact of a jet on a series of a jet on a series of flat vanes on a wheel. Conditions for maximum hydraulic efficiency. Impact of a jet on hinged Flat plate- problems. **IMPACT OF JET ON CURVED VANES:** Introduction, Force exerted by a jet on a fixed curved vane, moving curved vane. Introduction to concept of velocity triangles, Impact of jet on a series of curved vanes-problems. .	**12**
4	**TURBINES:** General layout of Hydro electric power plant and thermal power plant, Surge tank, Introduction to Turbines, Classification of Turbines. **Pelton wheel**-components, working, Maximum power, efficiency, working proportions- problems. **KAPLAN TURBINES:** Introduction, Components, Working principle, Discharge of the Turbines, Number of Blades-Problems. Draft Tube, Importance of Draft tube.	**9**

5	**CENTRIFUGAL PUMPS:** Introduction, Classification, Priming. Heads and Efficiencies. Equation for work done, minimum starting speed. Multistage Centrifugal Pumps (Pumps in Series and parallel). Characteristic Curves for a Single stage Centrifugal Pumps- problems. Lay-out of Thermal Power plant.	**8**

TEXT BOOKS:

1. Text Book Of Fluid Mechanics & Hydraulic Machines'- R.K.Bansal, Laxmi Publications, New Delhi, 2008 Edition.
2. Hydraulics and Hydraulic Machines- Dr. P. N. Modi and Seth, McGraw Hill Publications.

REFERENCE BOOKS / Web links:

1. Fundamentals of Fluid Mechanics – Bruce R. Munson, Donald F.Young, Theodore H. Okiishi, Wiley India, New Delhi, 2009 Edition.
2. Introduction To Fluid Mechanics' – Edward j. Shaughnessy,jr; Ira m. Katz:; James p Schaffer, Oxford University Press, New
3. Delhi, 2005 Edition.
4. Fluid Mechanics – Streeter, Wylie, Bedford New Delhi, 2008(Ed)
5. Fluid Mechanics and Turbomachines'- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition
6. A TextBook of Fluid mechanics & Hydraulic Machines'- R.K.Rajput, S.Chand & Co, New Delhi, 2006 Edition.
7. Principles of Fluid Mechanics and Fluid Machines'- N.Narayana Pillai, Universities Press(India), Hyderabad,2009 Edition.

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Note: Question paper shall contain seven questions, two of them have internal choice. Students have to answer FIVE full questions.

Course Outcomes:

CO1: After undergoing this course, the student will be able to plan and design the hydraulic structures economically.

CO2: Learning the basic principles of hydraulics for practical application.

CO3: The students understand the methodology adopted for generating hydroelectric power using turbines.

Cos	Mapping with POs
CO1	PO2, PO3,PO4, PO5, PO6, PO7, PO8, PO9, PO11, PO12
CO2	PO1, PO2, Po4, PO6, PO7, PO8, PO9, PO10, PO11, PO12
CO3	PO1, PO2, PO3, Po4, PO5, PO6,PO8, PO9, PO10, PO11, PO12

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Sub Title : WATER SUPPLY ENGINEERING		
Sub Code: CV45	**No of Credits** : 03 = 3:0:0 **(L:T:P)**	**No of lecture hours/week : 03**
Exam Duration hours : 03	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **: 39**

Objectives:

1. To create the importance of the need and necessity of water for every living beings.
2. To create the necessity of water demand to meet the various needs without which no human activities can exist.
3. To bring awareness about the quality of water about its Potability, Wholesomeness and Palatability.

Unit No.	**Syllabus content**	No. Of Hours
1.	**Unit - 1** **INTRODUCTION:** Water for various beneficial uses and quality requirement. Need for protected water supply. **DEMAND OF WATER**: Types of water demands-domestic demand in detail, institutional and commercial, public uses, fire demand. Per capita consumption –factors affecting per capita demand, population forecasting, different methods with merits &demerits- variations in demand of water. Fire demand – estimation by Kuichling's formula, Freeman formula & national board of fire underwriters formula, peak factors, design periods & factors governing the design periods.	08
2.	**Unit - 2** **SOURCES**: Surface and subsurface sources – suitability with regard to quality and quantity.**COLLECTION AND CONVEYANCE OF WATER:** Intake structures – different types of intakes; factor of selection and location of intakes. Pumps-Necessity, types – power of pumps; factors for the selection of a pump. Pipes – Design of the economical diameter for the rising main; Nomograms – use.**DISTRIBUTION SYSTEMS:** System of supply, service reservoirs and their capacity determination, methods of layout of distribution systems	08
3.	**Unit - 3** **QUALITY OF WATER:** Objectives of water quality management. wholesomeness & palatability, water borne diseases. Water quality parameters – Physical, chemical and Microbiological. Sampling of water for examination. Water quality analysis (IS: 3025 and IS: 1622) using analytical and instrumental techniques (in brief). Drinking water standards BIS & WHO guidelines. Health significance of Fluoride, Nitrates and heavy metals like Mercury, Cadmium, Arsenic etc. and toxic / trace organics (in brief).	07
4.	**Unit - 4** **WATER TREATMENT:** Objectives – Treatment flow-chart. Aeration- Principles, types of Aerators. **SEDIMENTATION:** Theory, settling tanks, types, design. Coagulant aided sedimentation, jar test, chemical feeding, flash mixing, and clari-flocculator. **FILTRATION:** Mechanism – theory of filtration, types of filters, slow sand, rapid	09

	sand and pressure filters including construction, operation, cleaning and their design – excluding under drainage system – back washing of filters. Operational problems in filters.	
5.	**Unit – 5** **DISINFECTION:** Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. **SOFTENING –** definition, methods of removal of hardness by lime soda process and zeolite process RO & Membrane technique. **MISCELLANEOUS TREATMENT:** Removal of color, odor, taste, use of copper sulfate, adsorption technique, fluoridation and de-fluoridation.	07

TEXT BOOKS:

1. Water supply Engineering –S.K.Garg, Khanna Publishers
2. Environmental Engineering I –B C Punima and Ashok Jain
3. Manual on Water supply and treatment –CPHEEO, Minstry of Urban Development, New Delhi

REFERENCES / Web links:

1. Hammer, M.J., (1986), **Water and Wastewater Technology** – SI Version, 2nd Edition, John Wiley and Sons.
2. Karia, G.L., and Christian, R.A., (2006), **Wastewater Treatment– Concepts and Design Approach,** Prentice Hall of India Pvt. Ltd., New Delhi.
3. Metcalf and Eddy, (2003), **Wastewater Engineering, Treatment and Reuse,** 4th Edition, Tata McGraw Hill Edition, Tata McGraw Hill Publishing Co. Ltd.
4. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986), **Environmental Engineering** – McGraw Hill Book Co.
5. Raju, B.S.N., (1995), **Water Supply and Wastewater Engineering, T**ata McGraw Hill Pvt. Ltd., New Delhi.
6. Sincero, A.P., and Sincero, G.A., (1999), **Environmental Engineering – A Design Approach**– Prentice Hall of India Pvt. Ltd., New Delhi.

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Note: Questions to be set one each from Unit 2, 3, & 5 and Two each from Unit 1 and Unit 4. Students should answer Five full questions.

Course Outcomes:

CO1. Students will understand the importance of water demand, quantity and quality aspects of water for our daily routine to lead a happy and healthy life.
CO2. Students will be able understand and solve the problem in transport and distribution of water to consumers including material selection with related design and test process for quality.
CO3. Civil Engineering students also develop the knowledge of designing water supply scheme, individual treatment units and also quality protection process.

Cos	Mapping with POs
Co1	Po,1Po2
Co2	Po1,Po2,Po3,Po4,Po5,Po7,Po9,Po11,Po12
Co3	Po1,Po2,Po3,Po4,Po5,Po6,Po7,Po8,Po9,Po10,Po11,Po12

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Sub Title: **BUILDING PLANNING AND DRAWING**		
Sub Code: CV46	**No of Credits :2:0:0 (L:T:P)**	**No of lecture hours/week : 01+03 (T+P=13+39)**
Exam Duration : 4 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	Total No. of Contact Hours **:52**

Objectives:

1. The students will gain the knowledge to draw buildings plans, sections and elevations.
2. The drawing tools are practiced manually to draw Residential, Educational, Health and Industrial buildings.
3. The concept of a reduced scale, units and dimensions are taught.

Unit. No	Syllabus content	No of Hours	
		Teaching	Drawing
1	Introduction to building drawings and accessories. To prepare geometrical drawing of component of buildings i) Stepped wall footing and isolated RCC column footing, ii) Fully paneled and flush doors, iii) Half paneled and half-glazed window, iv) RCC dog legged and open well stairs.	2	6
2	Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio.	2	6
3	Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings i) Two bed room building ii) Two storeyed building (Groung and First floor) and (iii) Pitched roof.	5	15
4	Development of line diagram only for fallowing building i) Primary health centre, ii) Primary school building, iii) College canteen iv) Office building-Subdivision/Divisional office for engineers.	2	6
5	For a given single line diagram, preparation of water supply, sanitary and electrical layouts.	2	6

REFERENCE BOOKS / Web links:

1 **"Building Drawing"**, Shah M.H and Kale C.M, Tata Mc Graw Hill Publishing co. Ltd., New Delhi.
2 **"Building Construction",** Gurucharan Singh, Standard Publishers &distributors,New Delhi.
3 **Building Drawing",** Gurucharan Singh, Standard Publishers &distributors,New Delhi.
3 **National Building Code**, BIS, New Delhi.

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SCHEME OF EXAMINATION

Section-I Compulsory question from chapter No 3 for 60 Marks

Plan……25
Elevation……15 } 60

Section……...15
Schedule of opening……..05

Section-II Four questions from chapters 1, 2, 4 and 5 should be set, out of which two have to be answered (20 x 2 = 40 Marks).

Note: No theory question shall be asked from any chapter.

Outcomes:

1. The structural Planning will help the graduates to handle the field problems.
2. The positioning of various components of the building both in plan and elevation are well understood before going for prototype.
3. The exposure to this subjects make students capable of planning and designing of various buildings independently.
4. Also they can be better employable.

Cos	Mapping with POs
CO1	PO1,PO2, PO3,PO4, PO5, PO6, PO7, PO8, PO9, PO11, PO12
CO2	PO2, PO3, Po4, PO5, PO6, PO7, PO8, PO9, PO11, PO12
CO3	PO1, PO3, Po4, PO5, PO6, PO7,PO8, PO9, PO10, PO11, PO12

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Sub Title: **SURVEYING PRACTICE-II**		
Sub Code: CVL47	**No of Credits :1.5:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**Exam Marks : 50**	**Total Hours :42**

Objectives:

1. Surveying is the art of determining and establishing large measurements of the required accuracy in an economical way.
2. Surveying is the first step in all but the smallest Engineering or Architectural Projects and is often the last step before the finished construction is accepted by the owner.

Unit. No	Syllabus	No of Hours
1	**Exercise – 1** Measurement of horizontal angles with method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite. **Exercise – 2** To determine the elevation of an object using single plane method when base is accessible and inaccessible. **Exercise – 3** To determine the distance and difference in elevation between two inaccessible points using double plane method.	**9**
2	**Exercise – 4(a)** To determine the tachemetric constants using horizontal and inclined line of sight. **Exercise – 4(b)** To Determine the gradients between the two points by Tacheo metric method. **Exercise – 5** To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.	**9**
3	**Exercise – 6** To set out simple curves using Rankine's deflection angles method. **Exercise – 7** To set out compound curve with angular methods with suing theodolite only.	**9**
4	**Exercise – 8** To set out the center line of a simple rectangular room using offset from base line **Exercise – 9** To set out center lines of columns of a building using two base lines at right angles	**9**
5	**Exercise – 10** Exposure to use of total station: traversing, longitudinal section, block leveling, usage of relevant software's for preparation of contour drawings.	**6**

TEXT BOOKS:

1. '**Surveying'** Vol 2 and Vol 3 - B. C. Punmia, Laxmi Publications
2**. 'Plane Surveying'** A. M. Chandra – New age international (P) Ltd
3**. 'Higher Surveying'** A.M. Chandra New age international (P) Ltd

REFERENCE BOOKS / Web links:

1. **Fundamentals of Surveying** - Milton O. Schimidt – Wong, Thomson Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arther Bannister et al., Pearson Education, India

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Scheme of Examination:
Any one of the above exercise is to be conducted in the examination by the student.

Course Outcomes:
CO1 The students will be able to take-up field problems in surveying.
CO2. An engineer must be thoroughly familiar with the Principles and practice of surveying.
CO3. In Surveying the measurements such as sections and elevations are drawn to convenient reduced size on papers by selecting the suitable scale.

Cos	Mapping with POs
CO1	PO1, PO3, PO6, PO8
CO2	PO1, PO5, PO6, PO9
CO3	PO1, PO5, PO6, PO12

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Sub Title: APPLIED ENGINEERING GEOLOGY LABORATORY		
Sub Code: CVL48	**No of Credits :1.5:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**Exam Marks : 50**	Total No. of Contact Hours **:42**

Objectives:

1. To introduce the basics of engineering Geology and its practical applications in various fields of civil engineering construction.
2. To study of the engineering properties of rocks and minerals and the behaviour of their structure.

Unit. No	Syllabus content	No of Hours
1	Describe and identify the minerals based on their physical, special properties, chemical composition and uses. Study of important rock forming minerals, ores and other important industrial minerals. (As per the III semester theory syllabus)	9
2	Describe and identify the rocks as per the theory syllabus by giving their physical properties and engineering uses.	9
3	Study of Geological maps and their sections: interpreting them in terms of selecting the sites for various civil engineering structures.	9
4	Study of Geological problems : i) Dip and strike (surface method) problems: To find out the dip and strike of the geological formation to select suitable site for civil engineering structures ii) Borehole problems (sub surface dip and strike): three point level ground methods iii) Thickness of strata (out crops) problems: both on level ground and on sloppy ground :-To determine the true thickness, vertical thickness and the width of the out crops on different topographical terrain. –	9
5	Study of Topo -sheets, River basin and Drainage	6

Text books:

1 Text book of Geology by P.K. Mukerjee, World Press Pvt. Ltd. Kolkatta
2 Text of Engineering and General Geology by Parbin Singh, Published by S. K. Kataria and Sons, New Delhi.
3 A text book of Engineering Geology by Chenna Kesavulu, Mac Millan India Ltd

References books / Web links::

1 Foundations of Engineering Geology,by Tony Waltham (3rd Ed.) Universities Press.
2 Structural Geology (3rd Ed.)by M. P. Billings, Published by Prentice Hall of India Pvt. Ltd. New Delhi
3 Rock Mechanics for Engineers by Dr B.P.Verma, Khanna Publishers, New Delhi.
4 Engineering Geology for Civil Engineering by D. Venkata Reddy, Oxford and IBH Publishing Company, New Delhi.
5 Ground water geology by Todd D.K. John Wiley and Sons, New York.
6 Remote sensing Geology by Ravi P Gupta, Springer Verilag, New York.
7 Physical Geology by Arthur Holmes, Thomson Nelson and Sons, London.
8 Environmental Geology by K. S. Valdiya, Tata Mc Graw Hills.

9 Ground water assessment, development and management by K.R.Karanth, Tata Mc Graw Hills
10. Remote sensing and GIS by M.Anji Reddy

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Scheme of Examination

1. Identification of Minerals (6 Nos.): 5x2 : 10 marks
2. Identification of Rocks (5Nos.): 5x2 : 10 marks
3. Geological Map: 1x 8 : 8 marks
4. Borehole Problems: 1x 5 : 05 marks
5. Dip and Strike Problems: 1x5 : 05 marks
6. Thickness of strata problems: 1x3 : 03 marks
7. Study of given topo sheet 1x4 : 04 Marks
8. Viva- Voce : 05 marks

I.A. Marks should be assessed by conducting a test for 25 Marks and 25 Marks for practical record. (Total Marks: 50)

Course Outcomes:

CO1. The students will acquire geological knowledge applied in various infrastructure developments.
CO2. The knowledge gained will help them to understand the mineral resources at National and International Level.
CO3. Thus plays a key role in the overall development and sustainable development.

Cos	Mapping with POs
CO1	PO2, PO4, PO5
CO2	PO2, PO3, PO5
CO3	PO2, PO3, PO5, PO11, PO12

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V Sem. BE (2017-18)

Sub Title : WASTEWATER TREATMENT AND DISPOSAL		
Sub Code: CV51	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total No. of Contact Hours : 39**

Objectives:

1. To create the knowledge about the importance of proper collection and conveyance of waste water and conveyance of storm water.
2. To create the importance of providing the water carriage system of sewerage at all places for the healthy community.
3. To bring out the knowledge and importance of waste water treatment and disposal.

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1.	**Introduction**: Necessity for sanitation, methods of sewage disposal, types of sewerage systems and their suitability. **Quantity of sewage:** Dry weather flow, factors effecting dry weather flow, Estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration.	07
2.	Sewer Appurtenances: Catch basins, manholes, flushing tanks, oil and grease traps, drainage traps. Materials of sewers: Sewer materials, shapes of sewers, laying of sewer, jointing and testing of sewers, ventilation and cleaning of sewers. (Theory Only)	07
3.	Design of Sewers: Hydraulic formulae for velocity, effects of flow variations on velocity, self cleansing and non scouring velocities, design of hydraulic elements for circular sewers flowing full and for partially full. (No derivations). Wastewater Characterization: Physical Chemical and biological characteristics concepts of aerobic and anaerobic activity CNS cycles, more emphasis on BOD and COD. Their significance and problems on BOD.	07
4.	Disposal of Effluents: By dilution phenomenon, oxygen sag curve, Zones of purifications, Sewage farming, sewage sickness disposal standards on land and surface water. Numerical Problems on Disposal of Effluents, Treatment of Wastewater: Flow diagram of municipal sewage treatment plant. Primary treatment: Screening, grit chambers, skimming tanks, primary sedimentation tanks – Designs criteria and design examples.	09
5.	Secondary Treatment: suspended growth and fixed film bioprocess. Tricking filter-Types, Theory, operation and designs. Activated sludge process- Principles and flow diagram, F/M Ratio, Designs of ASP. Anaerobic Sludge digestion, Sludge digestion tanks, Design of sludge drying beds. Low cost waste treatment method - Septic tanks, oxidation ditch and oxidation pond-Design. Reuse and recycle of waste water. (Theory Only)	09

Text books :

1. Waste water treatment – SK Garg, Khanna Publishers
2. Environmental Engineering –II- BC Punmia and Ashok Jain.
3. G.S.Birde,(1990), Water Supply and Sanitary Engineering, Dhanpat Rai & Sons
4. Manual of waste water treatment – CPHEEO, Ministry of Urban Development, GOI.

REFERENCE BOOKS / Web links:

1. Water and waste water Engineering vol-II- fair, Gayer and Okun, Willey publishers, New York.
2. Waste Water Treatment, Disposal and reuse _ Metcalf and Eddy Inc. Tata Mc Graw Hill Publications(2003 Edition)
3. Hammer.M.J., (1986), Water and Wastewater Technology-SI Version, 2nd Edition, John Wiley and Sons.
4. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G. Environmental Engineering, McGraw Hills, New York 1985.
5. Steel. E.W. & Terence J.M. Ghees, Water Supply and Sewerage, Mc Graw – Hill International Book Co.
6. Environmental Engineering - Howards S. Peavy, Donald R.Rowe, George Techno Bano Glous, McGraw Hill International edition.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. Students will come to know about the importance of Wastewater management for our daily routine to lead a happy and healthy life.

CO2. Students will be able understand and solve the problem in collection, conveyance, disposal of waste water in safe and hygienic method including material selection with related design and test process for concentration of pollutants and treatment efficiency

CO3. Civil Engineering students will finally gain knowledge of designing Waste water treatment system, their individual treatment units and also low cost and economical process for safe and hygienic disposal of wastewater.

Cos	Mapping with POs
Co1	Po1,Po2,Po3,Po5,Po7,Po8,Po10
Co2	Po1,Po3,Po4,Po5,Po6,Po8,Po10,Po11
Co3	Po1,Po2,Po3,Po5,Po7,Po9,Po10,Po11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : DESIGN OF RCC STRUCTURAL ELEMENTS		
Sub Code: CV52	**No of Credits** : 04 = 4:0:0, (L:T:P)	**No of lecture hours/week : 04**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 52**

Objectives:

1. To know different terminologies related to RCC design and construction, codes used for design.
2. To understand the philosophy of RCC design and detailing of reinforcement.
3. The concept of limit state design and the basic material properties of reinforced concrete are studied.
4. It covers the knowledge about the behaviour and design of structural elements and their connections in accordance with latest code of practice IS-456-2000.

Sl. No	**Syllabus Contents**	**No. Of Hours**
1.	**GENERAL FEATURES OF REINFORCED CONCRETE:** Introduction, design loads, materials for reinforced Concrete and Code requirements. Design Philosophy – Working Stress Design concept, Limit State Design principles. Load factor, Characteristic and design loads, Characteristic and design strength. General aspects of Ultimate strength, Stress block parameters for limit state of collapse, Ultimate flexural strength of singly reinforced rectangular sections. Ultimate flexural strength of doubly reinforced rectangular sections. Ultimate flexural strength of flanged sections. Ultimate shear strength of RC sections, Ultimate torsional strength of RC sections, Concepts of development length and anchorage. Analysis examples of singly reinforced, doubly reinforced, flanged sections, shear strength and development length. General Specification for flexure design of beams. Practical requirements, size of beam, cover to reinforcement-spacing of bars. General aspects of serviceability. Deflection limits in IS	12
2.	**DESIGN OF BEAMS**: Design procedures for critical sections for moment and shears. Anchorages of bars, check for development length. Reinforcement requirements, Slenderness limits for beams to ensure lateral stability, .Design examples for simply supported and Cantilever beams for rectangular and flanged sections	12
3.	**DESIGN OF SLABS**: General considerations of design of slabs, rectangular slabs spanning one direction, Rectangular slabs spanning in two directions for various boundary conditions. Design of simply supported, cantilever and continuous slabs as per IS	10
4.	**DESIGN OF COLUMNS AND FOOTINGS:** General aspects, effective length of column, loads on columns, slenderness ratio for columns, minimum eccentricity. Design of short axially loaded columns and column subjected to combined axial load and uni-axial moment and biaxial moment using SP –16 charts. Design of footings**:** Introduction, Proportioning of footing for equal settlement , Design basis for limit state method, Design of isolated rectangular footing for axial load and uni-axial moment. Design of pedestal	09

5.	**DESIGN OF STAIR CASES**: General features, types of stair case, loads on stair cases, effective span as per IS, distribution of loading on stairs. Design of stair cases, with waist slabs. : Calculation of deflection (Theoretical method), Cracking in structural concrete members, Calculation of deflections and crack width.	09

Text Books:

1. **Design of Reinforced Concrete Structure** –By Dr. Krishna Raju and Pranesh, TaTa McGraw Hill Publications
2. **Design of RCC Structural Elements** S. S. Bhavikatti, Vol-I, New Age International Publications, New Delhi.
3. Limit state method of design – A. K. Jain, Namichand and Bros, Roorkey

REFERENCE BOOKS / Web links:

1. **Limit State Design of Reinforced concrete-** by P.C. Varghese, PHI Learning Private Limited 2008-2009
2. **Fundamentals of Reinforced concrete Design-**by M.L. Gambhir, PHI Learning Private Limited 2008-2009.
4. **Reinforced concrete Design-**by Pallai and Menon, TMH Education Private Limited,
5. **Reinforced concrete Design-**by S.N.Shinha, TMH Education Private Limited,
6. **Reinforced concrete Design-**by Karve & Shaha, Structures Publishers Pune.
7. **IS-456-2000 and SP-16, IS-875 (Parts I to IV)**

Note : One Question to be set from each unit and for choice two questions to be set from any two units.

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Course Outcomes:

CO1: The student is exposed to philosophy of latest limit state design of reinforced concrete construction material.
CO2: With the knowledge gained, candidate will be ready to take up the design and construction of reinforced concrete construction.
CO3: Opportunities are available for the expertise in reinforced concrete design and construction.
CO4: Students are exposed to the fundamentals of composite behavior of steel and concrete.

Cos	Pos
CO1	PO2,PO3,PO4,PO6,PO7,PO8,PO9,PO10,PO12

CO2	PO2,PO3,PO4,PO6,PO7,PO8,PO9,PO10,PO11, PO12
CO3	PO1,PO2,PO3,PO4,PO6,PO7,PO8,PO9,PO10,PO11,PO12
CO4	PO1,PO2,PO3,PO4,PO6,PO7,PO8,PO9,PO10,PO11, PO12

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Sub Title: STRUCTURAL ANALYSIS – II		
Sub Code: CV53	**No of Credits** : 04 = 4:0:0, (L:T:P)	**No of lecture hours/week : 04**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 52**

Objectives:

1. The main purpose of studying STRUCTURAL ANALYSIS – II is to know how the structure responds to a given loading and thereby evaluating the stresses and deformations.
2. To analyze the beams under moving loads and to study the concept of influence lines, which are useful in the design.
3. It deals with determination of internal forces in the various members of a structure, External reaction due to worst possible combination of loads by various methods.
4. To study the behaviour of structures under dynamic loading.

Sl. No	**Syllabus Contents**	**No. Of Hours**
1.	**ROLLING LOAD AND INFLUENCE LINES**: Rolling load analysis for simply supported beams for several point loads and udl. Influence line diagram for reaction, SF and BM at a given section	09
2.	**SLOPE DEFLECTION METHOD:** Introduction, Sign convention, Development of slope-deflection equations and Analysis of Beams and Orthogonal Rigid jointed plane frames (Sway & non-sway, members assumed to be axially rigid) with kinematic redundancy less than/equal to three. (Members to be axially rigid). **MOMENT DISTRIBUTION METHOD:** Introduction, Definition of terms-Distribution factor, Carry over factor, Development of method and Analysis of beams and orthogonal rigid jointed plane frames (non-sway, members assumed to be axially rigid) with kinematic redundancy less than/equal to three. (Members to be axially rigid).	13
3.	**MOMENT DISTRIBUTION METHOD-CONTD:** Analysis of beams and frames-sway analysis with kinematic redundancy ≤3. KANIS METHODS: **Introduction, Basic Concept, Analysis of Continuous beams and Analysis of rigid jointed non-sway plane frames.**	12
4.	**STIFFNESS MATRIX METHOD OF ANALYSIS**: Introduction, Development of stiffness matrix for plane truss element and axially rigid plane framed structural elements. And Analysis of plane truss and axially rigid plane frames by stiffness method with kinematic indeterminacy ≤ 3. FLEXIBILITY MATRIX METHOD OF ANALYSIS: Introduction, Development of flexibility matrix for plane truss element and axially rigid plane framed structural elements.	09
5.	**BASIC PRINCIPLES OF DYNAMICS:** Basic principles of Vibrations and causes, periodic and a periodic motion, harmonic and non-harmonic motion. Period and frequency. Free and Forced Vibration, Resonance, Damping and Equations of Single Degree of Freedom System with and without damping.	**09**

REFERENCE BOOKS / Web links:

1. **Basic Structural Analysis**- Reddy C.S. - Second Edition, Tata McGraw Hill Publication Company Ltd.
2. **Theory of Structures Vol. 2** - S.P. Gupta, G.S. Pandit and R. Gupta, Tata McGraw Hill Publication Company Ltd.
3. **Structural Analysis**- by Hebbeler
4. Structural Dynamics-by M. Mukhopadhyay,
5. **Structural Analysis-II** -S. S. Bhavikatti – Vikas Publishers, New Delhi.
6. **Basics of Structural Dynamics and Aseismic Design** By Damodhar Swamy and Kavita PHI Learning Private Limited
7. **Structural Analysis**- D.S. Prakash Rao,, A Unified Approach, University Press
8. **Structural Analysis**, 4th SI Edition by Amit Prasanth & Aslam Kassimali, Thomson Learning.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The students will be able to understand the concept of influence line diagram to calculate the position of rolling loads on the structure to obtain the absolute maximum bending moment.

CO2. The students will acquire the knowledge to analyze the statically indeterminate beams and rigid jointed frames subjected to gravity and sway loads by displacement and force methods

CO3. The students will be able to analyze and draw BMD, SFD for multistory frames.

CO4. The students will be able to analyze the performance of structure for dynamic forces which helps the designer to select the safe and efficient structural elements.

Cos	Mapping with POs
CO1	PO1, PO6, PO8, PO10, PO11
CO2	PO2, PO4, PO8, PO9,
CO3	PO3, PO4, PO5, PO9, PO11,
CO4	PO3, PO5, PO6, PO7, PO9, PO12

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Sub Title : GEOTECHNICAL ENGINEERING – I		
Sub Code: CV54	**No of Credits** : 03 = 2:2:0, (L:T:P)	**No of lecture hours/week : 04**
Exam Duration : 3 hrs	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39+13 = 52**

Objectives

1. To understand the fundamental definitions and terms related to soil mechanics
2. To know the importance of index properties of soil and its determination and used in IS soil classification
3. To study the effect of soil structure and clean mineralogy on soil behavior and importance of Geostatic stress on soil
4. To realize the importance of compaction characteristics of soils and to study the determination and cause of engineering properties of soils-permeability, consolidation and shear strength characteristics of soils

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1.	INTRODUCTION: History of soil mechanics, Definition, origin and formation of soil. Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Water content, Specific Gravity of soil solids and soil mass, Densities and Unit weights - Bulk, Dry, Saturated & Submerged and their inter relationships.	09
2.	INDEX PROPERTIES OF SOIL AND THEIR DETERMINATION: Index Properties of soil- Water content , Specific Gravity, Particle size distribution, Relative Density, Consistency limits and indices, in-situ density, Activity of Clay, Laboratory methods of determination of index properties of soil: Water content (Oven Drying method & Rapid Moisture method), Specific gravity of soil solids (Pycnometer and density bottle method), Particle size distribution (Sieve analysis and Hydrometer analysis only), Liquid Limit- (Casagrande and Cone penetration methods), Plastic limit and shrinkage limit.	12
3.	CLASSIFICATION OF SOILS: Purpose of soil classification, Particle size classification – MIT classification and IS classification, Textural classification. IS classification - Plasticity chart and its importance, Field identification of soils. CLAY MINERALOGY AND SOIL STRUCTURE: Valence bonds, Soil-Water system, Electrical diffuse double layer, adsorbed water, base-exchange capacity, Isomorphous substitution. Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite. FLOW OF WATER THROUGH SOILS: Darcy's law- assumption and validity, coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation, quick sand phenomena, Capillary Phenomena	12
4.	EFFECTIVE STRESS CONCEPT: Effective stress concept-total stress, effective stress and Neutral stress, Concept of pore pressure, Compaction of soil: definition, Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control – compactive effort & method, lift	10

	thickness and number of passes, Proctor's needle, Compacting equipment.	
5.	CONSOLIDATION OF SOIL: Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation theory-assumption and limitations (no derivation), Normally consolidated, under consolidated and over consolidated soils, pre-consolidation pressure and its determination by Casagrande's method. Consolidation characteristics of soil (C_c, a_v, m_v and C_v). Laboratory one dimensional consolidation test, Determination of consolidation characteristics of soils-compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method). SHEAR STREGNTH OF SOIL: Total and effective shear strength parameters, factors affecting shear strength of soils, Sensitivity and Thixotropy of clay. Measurement of shear parameters- Direct shear test, unconfined compression test, Triaxial compression test and vane shear test, Test under different drainage conditions.	09

TEXT BOOKS:

1. **Soil Mechanics and Foundation Engg**.- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.
2. **Principles of Soil Mechanics and Foundation Engineering**- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.
3. **Geotechnical Engineering**; Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India

REFERENCES BOOKS / Web links:

1. **Foundation Analysis and Design**- Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. Co. New York.
2. **Soil Engineering in Theory and Practice**- Alam Singh and Chowdhary G.R. (1994), CBS Publishers and Distributors Ltd., New Delhi.
3. **Basic and Applied Soil Mechanics**- Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., Newe Delhi.
4. **Geotechnical Engineering**- Donold P Coduto Phi Learning Private Limited, New Delhi
5. **Geotechnical Engineering**- Shashi K. Gulathi & Manoj Datta. (2009), " Tata Mc Graw Hill.
6. **Text Book of Geotechnical Engineering**- Iqbal H. Khan (2005),, 2nd Edition, PHI, India.
7. **Numerical Problems, Examples and objective questions in Geotechnical Engineering**- Narasimha Rao A. V. & Venkatrahmaiah C. (2000), Universities Press. Hyderabad.3

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www.nptel.org.in
http://books.google.co.in

Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. To understand the basic terminology with regard to soil mechanics, importance of phase diagrams, index properties of soils, soil classification and soil structure.

CO2. To gain knowledge on determining geostatic stresses, coefficient of permeability and compaction characteristics of soils.

CO3. To understand the concept and importance of Engineering properties of soils such as soil compressibility and shear strength

Cos	Mapping with POs
CO1	PO1,PO2, PO3, PO4,PO5, PO7. PO8, PO9, PO10, PO12
CO2	PO1,PO2, PO3, PO4,PO5, PO6, PO7. PO8, PO10,PO11,
CO3	PO1,PO2, PO3, PO4,PO5,, PO7. PO8, PO9, PO10, PO12
CO4	PO1, PO4, PO6, PO7. PO8, PO9,, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : Hydrology and Irrigation Engineering		
Sub Code: CV55	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. Student is introduced to the subject, Hydrology and Irrigation pattern, since Water is very essential commodity for living beings.
2. The knowledge of Planning and design of all kinds of hydraulic structures are required for storage of surface and ground water recharge.
3. The rainfall pattern and depth of rain fall need to be forecasted in advance for Systematic and effective use of water for domestic and agriculture purpose.

4.

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1.	**Hydrology**: Introduction, Hydrologic cycle (Horton's representation). Water budget equation Precipitation: introduction, forms of precipitation, types of precipitation, measurement of precipitation (Simon's gauge & Syphon gauge only), selection of rain gauge station. Adequacy of rain gauges, methods of computing average rainfall, interpolation of missing data. Hyetograph and mass curve of rainfall, losses from precipitation. Evaporation: Definition, factors affecting, measurement (Class A pan). Estimation using empirical methods (Meyer's and Rohwer's equation), evaporation control. Evapo-transpiration: Definition, factors affecting, measurement, estimation (Blaney criddle method) Infiltration: Definition, factors affecting, measurement (double ring infiltrometer), infiltration indices, Horton's equation of infiltration.	14
2.	**HYDROGRAPHS:** Definition, components of hydrographs, unit hydrograph and its derivation from simple storm hydrograph, base flow separation, Prepositions of unit hydrograph- problems, **ESTIMATION OF FLOOD & FLOOD ROUTING:** Definition of flood, factors affecting flood, methods of estimation (envelope curves, empirical formulae, rational method). Flood routing: Introduction to hydrological routing, relationship of out flow and storage, general storage equation, Muskingum routing method.	07
3.	**Irrigation**: Introduction, need for irrigation, advantages and disadvantages of irrigation, environmental impacts of irrigation, Systems of irrigation: Gravity irrigation, lift irrigation, well irrigation, tube well irrigation, infiltration galleries, sewage irrigation, and supplemental irrigation. **SOIL-WATER-CROP RELATIONSHIP**: Introduction, soil profile, physical properties of soil, soil classification. Indian soils, functions of irrigation soils, maintaining soil fertility, soil-water-plant relationship, soil-moisture. Irrigation relationship, frequency of irrigation	07
4.	**Water requirement of crops:** Introduction, definitions, crop seasons of India, water requirement of a crop, duty, delta, base period. Consumptive use. Irrigation	06

	efficiencies.	
5.	Canals Definition, Types of canals, Alignment of canals, Design of canals by Kenedy's and Lacey's methods- Problems.	05

TEXT BOOKS:

1. Engineering Hydrology – Subramanya. K; Tata McGraw Hill New Delhi-2008 (Ed)
2. Hydrology- Madan Mohan Das, Mim Mohan Das-PHI Learning private Ltd. New Delhi-2009 (Ed)
3. A Text Book Of Hydrology - Jayarami Reddy, Laksmi Publications, New Delhi-2007 (Ed)
4. Irrigation, water Resources and water power Engineering- P.N. Modi- standard book house, New Delhi.
5. Irrigation and Water Power Engineering - Madan Mohan Das & Mimi Das Saikia; PHI Learning pvt. Ltd. New Delhi 2009 (Ed).

REFERENCE BOOKS / Web links:

1. Hydrology & Soil Conservation Engineering - Ghanshyam Das- PHI Learning Private Ltd., New Delhi-2009 (Ed)
2. Hydrology & Water Resources Engineering- Patra K.C. Narosa Book Distributors Pvt. Ltd. New Delhi-2008 (Ed)
3. Hydrology & Water Resources Engineering- R.K. Sharma & Sharma, Oxford and IBH, New Delhi
4. Irrigation Engineering and Hydraulic structures- S. K. Garg- Khanna Publication, New Delhi.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1 The students earn the knowledge of hydrological changes due to the various reasons and learn forecast changes takes place in the atmosphere.

CO2. The Students gain the knowledge to estimate the flood and flood routing, crop yield, duty. Delta of the system.

CO3. The student is able to carry out design and construction of canal, water requirement of crop, methods of irrigation.

Cos	Mapping with POs
Co1	Po2,Po3, Po4,Po5, Po6,Po7,Po8, Po9,Po11, Po12
Co2	Po1, Po2,Po3,Po4,Po5,Po6,Po8 ,Po9,Po10,Po11, Po12
Co3	Po1,Po3,Po5,Po7,Po9,Po10,Po11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : TRANSPORTATION ENGINEERING-I		
Sub Code: CV56	**No of Credits** : 03 = 2:2:0, (L:T:P)	**No of lecture hours/week : 02+02**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 26+26**

OBJECTIVES:

1. The rapid growth in road traffic in terms of number of vehicles as well as increase in magnitude and frequency of loading of commercial vehicles has posed challenging problems to the highway engineering professionals dealing with planning, design, construction, maintenance and management of road network.
2. The road users are concerned with the functional condition of the roads such as smooth and comfortable riding quality and high operating speed to reduce travel time so that they can reach their destinations comfortably and safely.
3. The high engineer has to meet the challenges in the design, construction, operation and maintenance of sustainable road infrastructure in the country using alternate and new materials and also in the selection of appropriate pavement type, duly considering life cycle cost.
4. The increased demand has resulted in development and advances in various areas of the subject, Transportation Engineering-I(Highway engineering)

Sl. No.	**Syllabus Contents**	**No. Of Hours**	
		Teaching	**Tutorial**
1.	**UNIT – 1, PRINCIPLES OF TRANSPORTATION ENGINEERING:** Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute. HIGHWAY DEVELOPMENT AND PLANNING: Road types and classification, road patterns, planning surveys, master plan– saturation system of road planning, phasing road development in India, problems on best alignment among alternate proposals Salient Features of 3rd and 4th twenty year road development plans and Policies, Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCL) Road development plan - vision 2021.	**05 Hours**	05
2.	**UNIT – 2, HIGHWAY ALIGNMENT AND SURVEYS:** Ideal Alignment, Factors affecting the alignment, Engineering surveys-Map study, Reconnaissance, Preliminary and Final location & detailed survey, Reports and drawings for new and re-aligned projects. HIGHWAY ECONOMICS: Highway user benefits, VOC using charts only-Examples, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods-Examples, Highway financing-BOT-BOOT concepts.	**05 Hours**	05
3.	**UNIT – 3, HIGHWAY GEOMETRIC DESIGN:** Importance, Terrain classification, Design speed, Factors affecting geometric design, **Cross sectional elements**-Camber- width of pavement- Shoulders-, Width of formation- Right of way. Typical cross sections. **Sight Distance**-Restrictions to sight distance- Stopping sight distance- Overtaking sight distance-overtaking zones- Examples on SSD and OSD- Sight distance at intersections, **Horizontal alignment**-Radius of Curve- Superelevation –	**06 Hours**	06

	Extra widening-Transition curve and its length, setback distance – Examples, **Vertical alignment**-Gradient-summit and valley curves with examples. **HIGHWAY DRAINAGE:** Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, design of filter materials.		
4.	**UNIT – 4** **PAVEMENT MATERIALS: Subgrade soil -** desirable properties-HRB soil classification-determination of CBR and modulus of subgrade reaction-Examples on CBR and Modulus of subgrade reaction, **Aggregates-** Desirable properties and list of tests, **Bituminous materials**-Explanation on Tar, bitumen, cutback and emulsion-List of tests on bituminous materials.	**04 Hours**	04
5.	**UNIT – 5** **PAVEMENT DESIGN:** Pavement types, component parts of flexible and rigid pavements and their functions, design factors, ESWL and its determination-Examples, **Flexible pavement**- Design of flexible pavements as per IRC;37-2001-Examples, **Rigid pavement**- Westergaard's equations for load and temperature stresses- Examples- Design of slab thickness only as per IRC:58-2002. **PAVEMENT CONSTRUCTION:** Earthwork – cutting-Filling, Preparation of subgrade, Specification and construction of i) Granular Subbase, ii) WBM Base, iii) WMM base, iv) Bituminous Macadam, v) Dense Bituminous Macadam vi) Bituminous Concrete, vii) Dry Lean Concrete sub base and PQC viii) concrete roads	**06 Hours**	06

Text books : TEXT BOOKS:

1. **Highway Engineering** – S K Khanna and C E G Justo, Nem Chand Bros, Roorkee
2. **Highway Engineering** - L R Kadiyali, Khanna Publishers, New Delhi
3. **Transportation Engineering** – K P Subramanium, Scitech Publications, Chennai
4. **Transportation Engineering** – James H Banks, Mc. Graw. Hill Pub. New Delhi
5. **Highway Engineeering** – R. Sreenivasa Kumar, University Press. Pvt.Ltd. Hyderabad

REFERENCE BOOKS / Web links & Relevant IRC Codes

1. **Specifications for Roads and Bridges - MoRT & H, IRC, New Delhi.**
2. **Transportation Engineering –** C. Jotin Khisty, B. Kent Lal, PHI Learning Pvt. Ltd. New Delhi.
3. **Transportation Engineering** – GE01 Railway Publications.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

The students will be able to:

CO1. Understand the importance of transportation, development, classification of roads, calculate the length of roads, alignment of roads and economic studies

CO2. Design the geometry of roads, such as cross section elements, SSD, OSD, horizontal alignment, vertical alignment and design of drainage system.

CO3. Determine the properties of materials, interpret the results, design the pavement and construct the pavement.

CO4. Analyse the different pavements and design using different materials and construct the different road pavement.

CO's	**PO's**
CO1	PO1, PO3, PO7, PO9, PO10, PO12.
CO2	PO1, PO2, PO3, PO6, PO8, PO9, PO11, PO12.
CO3	PO4, PO6, PO8, PO10, PO11, PO12.
CO4	PO1, PO2, PO3, PO5, PO6, PO11, PO12.

Dr. Ambedkar Institute of Technology, Benaluru -

HYDRAULICS AND HYDRAULI C MACHINERY LABORATORY		
Sub Code: CVL57	**No of Credits** : 1.5 = 0::0:3, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 42**

Objectives:

1. The main objective is to study the measurement of flow of fluid in a pipe, notches, and weirs.
2. Calibration of measuring equipments and their applications.
3. To study the performance of pumps and Turbines.

Sl. No.	Syllabus Contents	No. Of Hours
1.	Calibration of collecting tank (gravimetric method) Calibration of pressure gauge (dead weight method)	03
2.	Verification of Bernoulli's equation	03
3.	Calibration of 90^0 V-notch	03
4.	Calibration of Rectangular and Cipolletti notch	03
5.	Calibration of Broad- crested weir	03
6	Calibration of Venturiflume	03
7	Calibration of Venturimeter	03
8	Determination of Darcy's friction factor for a straight pipe	03
9	Determination of Hydraulic coefficients of a vertical orifice	03
10	Determination of vane coefficients for a flat vane & semicircular vane	03
11	Performance characteristics of a single stage centrifugal pump	03
12	Performance characteristics of a Pelton wheel Turbine	03
13	Performance characteristics of a Kaplan turbine	03

Reference / Web links:

Experiments in Fluid Mechanics – Sarbjit Singh- PHI Pvt. Ltd.- New Delhi- 2009-12-30
Hydraulics and Hydraulic Machines Laboratory Manual – Dr. N. Balasubramanya.

Note: The candidate has to conduct one experiment (from Sl. No. 3 to 14) which carries 70% of the total marks and viva-voce for 30% of the total marks.

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Course Outcomes:

CO1 : Student are able to verify the principles studied in theory by conducting the experiments.
CO2 : Students gain the knowledge to calibrate the equipments
CO3 : Students are able to calculate the discharge through pipes and open channel.

Cos	Mapping with POs
CO1	PO1, PO2, PO5, PO6
CO2	PO2, PO4, PO6,
CO3	PO4, PO5, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : COMPUTER AIDED DESIGN LABORATORY		
Sub Code: CVL58	**No of Credits** : 1.5 = 0:0:3, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 42**

Objectives:

1. The drawing tools are practiced using AUTO CAD.
2. Structural analysis using Finite Element software is taught to make modeling and analysis of different structures.
3. The application of MS Excel for solving simple practical problems is illustrated.

Sl. No	Syllabus Contents	No. Of Hours
1	**Unit 1. AUTOCAD** **Basics of AUTOCAD**: **DRAWING TOOLS:** Lines, Circle, Arc, Polyline, Multiline, Polygon, Rectangle, Spline, Ellipse, *Modify tools*: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet, *Using Text*: Single line text, Multiline text, Spelling, Edit text, *Special Features*: View tools, Layers concept, Dimension tools, Hatching, Customising toolbars, Working with multiple drawings	03
1.2	**Use of AUTOCAD in Civil Engineering Drawings**: Following drawings are to be prepared for the data given using AUTOCAD i) Cross section of Foundation - masonry wall, RCC columns (isolated) ii) Different types of staircases iii) Lintel and chajja iv) RCC slabs and beams v) Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan. **Unit 2 : STRUCTURAL ANALYSIS SOFTWARE** Use of commercially available software for the analysis of Plane Trusses Continuous beams 2D Portal frames-single storied and multistoried	18
	Unit 3 : USE OF EXCEL IN CIVIL ENGINEERING PROBLEMS Use of spread sheet for the following civil engineering problems SFD and BMD for Cantilever and simply supported beam subjected to uniformly distributed and uniformly varying load acting throughout the span Design of singly reinforced and doubly reinforced rectangular beams Computation of earthwork Design of horizontal curve by offset method Design of super elevation	12

REFERENCE BOOKS / Web links:

1. **Computer Aided Design Laboratory-** Dr M.N. Shesha Prakash, Dr.G.S. Suresh, Lakshmi Publications
2. **CAD Laboratory**- M.A. Jayaram, D.S. Rajendra Prasad- Sapna Publications
3. **AUTOCAD 2002-** Roberts JT, -BPB publications
4. **AUTOCAD 2004-** Sham Tickoo, A beginner's Guide, Wiley Dreamtech India Pvt Ltd.,
5. **Learning Excel 2002-** Ramesh Bangia, - Khanna Book Publishing Co (P) Ltd.,
6. **Microsoft Excel-** Mathieson SA, Starfire publishers

Note: In the examination the candidate has to answer (drawing) one compulsory question from Unit-1 for 50% of the marks, One Question from either Unit-2 or Unit -3 for 30% of the marks and Viva-Voce for remaining 20% of the marks.

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Course Outcomes:

CO1: The graduates will be ready to draw buildings plans, sections and elevations.

CO2: .The structural modeling and analysis experience will help the graduates handle the field problems.

CO3: They can be better employable by learning CAD.

Cos	Mapping with POs
CO1	PO2, PO5, PO6,, PO8
CO2	PO1, PO2, PO3, PO4, PO7, PO9
CO3	PO3, PO4, PO9, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

VI Semester (2017-18)

Sub Title : MANAGEMENT & ENTREPRENEURSHIP		
Sub Code: HS03	**No of Credits** : 04 = 4:0:0, (L:T:P)	**No of lecture hours/week : 04**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 52**

Sl. No	**Syllabus Contents**	**No. Of Hours**
1.	**MANAGEMENT:** Introduction – Meaning – nature and characteristics of Management, Scope and functional areas of management – Management as a science, art or profession – Management & Administration – Roles of Management, Levels of Management, Development of Management Thought – early management approaches – Modern management approaches	05
2.	**PLANNING:** Nature, importance and purpose of planning process - objectives - Types of plans (Meaning only) - Decision making - Importance of planning - steps in planning & planning premises - Hierarchy of plans. ORGANIZING AND STAFFING: Nature and purpose of organization – principles of organization – Types of organization – Departmentation – Committees – Centralisation Vs Decentralisation of authority and responsibility – Span of control – MBO and MBE (Meaning only) Nature and importance of Staffing – Process of Selection & Recruitment (in brief). DIRECTING & CONTROLLING: Meaning and nature of directing – Leadership styles, Motivation Theories, Communication – Meaning and importance – Coordination, meaning and importance and Techniques of Co-ordination. Meaning and steps in controlling – Essentials of a sound control system – Methods of establishing control (in brief).	18
3.	**ENTREPRENEUR:** Meaning of Entrepreneur, Evolution of Concept, Functions of Entrepreneur, Types of Entrepreneur, Entrepreneur – An emerging class. Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process, Role of Entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.	06
4.	**SMALL SCALE INDUSTRY**: Definition; Characteristics; Need and rationale: Objectives, Scope, role of SSI in Economic Development. Advantages of SSI. Steps to start an SSI – Government policy towards SSI, Different Policies of SSI, Government Support on SSI, during 5 year plans. Impact of Liberalization, Privatisation, Globalization on SSI. Effect of WTO / GATT Supporting Agencies of Government for SSI Meaning. Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition only).	06

5.	**INSTITUTIONAL SUPPORT**: Different Schemes, TECKSOK, KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI, NSIC, SIDBI, KSFC. PREPARATION OF PROJECT, Meaning of Project, Project Identification, Project Selection, Project Report, Need and significance of Project, Contents, formulation, Guidelines by Planning Commission for Project Report, Network Analysis, Errors of Project Report, Project Appraisal, Identification of Business Opportunities. Market Feasibility Study: Technical Feasibility Study, Financial Feasibility Study Social Feasibility Study.	17

TEXT BOOKS

1. **Principles of Management** – P.C. Tripathi, P.N. Reddy, Tata McGraw Hill.
2. **Dynamics of Entrepreneurial Development & Management** – Vasant Desai – Himalaya Publishing House
3. **Entrepreneurship Development** – Small Business Enterprises – Poornima M. Charantimath – Pearson Education – 2006.

REFERENCE BOOKS / Web links:

1. **Management Fundamentals** – Concepts, Application, Skill Development – Robert Lusier – Thomson.
2. **Entrepreneurship Development** – S.S Khanka – S Chand & Co.
3. **Management** – Stephen Robbins – Pearson Education / PHI – 17th Edition, 2003.
4. **Management & Entrepreneurship** by N V R Naidu & T Krishna Rao – I K International Publishing House Pvt. Ltd. 1st edition

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Note: 1. Questions to be set one each from Unit 1, 3, & 4 and Two each from Unit 2 and Unit 5. Students should answer Five full questions.

Course Outcomes:

CO1. They get knowledge how to manage the several issue and how to interact with Entrepreneurships

Cos	Mapping with POs
CO1	PO, PO, PO, PO, PO, PO. PO, PO,
CO2	PO, PO, PO, PO, PO, PO. PO, PO,
CO3	PO, PO, PO, PO, PO, PO. PO, PO,
CO4	PO, PO, PO, PO, PO, PO. PO, PO,

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: DESIGN & COMPUTER AIDED DRAWING OF RC STRUCTURES		
Sub Code: CV61	**No of Credits** : 02 = 2:0:0, (L:T:P)	**No of lecture hours/week :01+ 03**
Exam Duration : 3 hours	**CIE + Drawing +SEE= 20+30+50 = 100**	**Total Hours : 13+39**

Objectives:

1. The main objectives of studying DESIGN & DRAWING OF RC STRUCTURES is the selection of proper material, proper size, proportion and shape of each member and its connecting details.
2. Reinforcement detailing of structural elements with the use of proper grade of steel and concrete.
3. Design of water storage structures and selection of suitable materials such that it is safe and economical.
4. It covers the knowledge about the behaviour and design of structural elements and their connections in accordance with latest code of practice IS-456-2000, IS:875 Part I to V, IS:13920-2000 etc.,

Sl. No.	Syllabus Contents	No. Of Hours Teaching
1.	**PART-A** *(DRAWINGS TO BE PREPARED FOR GIVEN STRUCTURAL DETAILS USING CAD)* **UNIT-1** Layout Drawing: General layout of building showing, position of columns, footings, beams and slabs with standard notations. Detailing of Beam and Slab floor system, continuous beams. **UNIT-2** Detailing of Staircases: Dog legged and Open well. **UNIT-3** Detailing of Column footings: Column and footing (Square and Rectangle).	**05 (T) + 18 (D)**
2.	**PART-B** **UNIT-4** Design and detailing of Rectangular Combined footing slab and beam type. **UNIT-5** Design and detailing of Retaining walls (Cantilever and counter fort type). **UNIT-6** Design and detailing of Circular and Rectangular water tanks resting on ground and free at top(Flexible base and Rigid base), using IS: 3370 (Part IV) only. **UN IT-7** Design and detailing of Simple Portal Frames subjected to gravity loads. (Single bay & Single storey)	**08 (T) + 21 (D)**

NOTE:

(i) Part-A : Drawing shall be done using CAD and practical examination shall be conducted separately.

(ii) Part-B: Design as per IS 456-2000, SP16, IS3370-Part-IV and theory examination shall be conducted separately.

REFERENCE BOOKS / Web links:

1. **Structural Design & Drawing Reinforced Concrete & Steel**- N. Krishnaraju, University Press.
2. **Structural Design and Drawing**- Krishnamurthy -, (Concrete Structures), CBS publishers, New Delhi. Tata Mc-Graw publishers.
3. **Reinforced Concrete Structures** - B.C. Punmia – Laxmi Publishing Co.
4. **Reinforced Concrete Design –** S.N.Sinha, McGrawHill Education,

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SCHEME OF QUESTION PAPER: 1. Three questions each carrying 20 marks is to be set from unit 1 to 3. Student has to answer two questions out of three.
2. Two questions each carrying 60 marks is to be set from Unit 4 to 7. Student has to answer one question out of two.

Course Outcomes:

CO1. The students acquire the knowledge in the preparation of final layout of structure.
CO2. The students will be able to draw the reinforcement detailing for various structural elements in a building
CO3. The student is exposed to the design of retaining walls footings and portal frames
CO4. The students will be able to acquire the design concept of water tanks including reinforcement detailing

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO5, PO6, PO8. PO12
CO2	PO1, PO2, PO4, PO7, PO8, PO9. PO12
CO3	PO3, PO4, PO5, PO8, PO10, PO11
CO4	PO3, PO5, PO6, PO9, PO10, PO11. PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : TRANSPORTATION ENGINEERING II		
Sub Code: CV62	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. The two important modes of land transportation are Railways and Highways. Railways are the significant and potential means of transporting men and materials over long distances.
2. Their introduction has converted barren lands in to green fields and well grown towns and cities. Railways have helped social development of the country by transporting people from one corner of the country to thousands of kilometers to reach another corner.
3. To learn the concept of design, and construction of airport, harbor and tunnel.

Sl. No.	Syllabus Contents	No. Of Hours
1.	**UNIT – 1** **INTRODUCTION to Railways:** Role of railways in transportation, Indian Railways, Selection of Routes, Permanent way and its requirements, Gauges and types, Typical cross sections-single and double line B G track in cutting, embankment and electrified tracks, Coning of wheels and tilting of rails, **Rails**-Functions-requirements—types and sections-length-defects-wear-creep-welding-joints, creep of rails **SLEEPERS AND BALLAST:** Functions, requirements, Types, Track fitting and fasteners-Dog spike, screw spike and Pandrol clip,-Fish plates-bearing plates, Calculation of quantity of materials required for laying a track-Examples, Tractive resistances and hauling capacity with examples.	07
2.	**UNIT – 2** **GEOMETRIC DESIGN:** Necessity, Safe speed on curves, Cant-cant deficiency-negative cant-safe speed based on various criteria,(both for normal and high speed tracks) Transition curve, Gradient and types, grade compensation, Examples on above. **POINTS AND CROSSING:** Components of a turnout, Details of Points and Crossing, Design of turnouts with examples (No derivations) types of switches, crossings, track junctions. Stations and Types, Types of yards, Signaling-Objects and types of signals, station and yard Equipment-Turn table, Fouling mark, buffer stop, level crossing, track defects, and maintenance. Embankment: Blanketing	09
3.	**UNIT – 3** **INTRODUCTION TO AIRPORT ENGINEERING:** Layout of an airport with component parts and functions, Site selection for airport, Aircraft characteristics affecting the design and planning of airport, Airport classification, Runway orientation using wind rose with examples. **RUNWAY-** Basic runway length-Corrections and examples, Runway geometrics, Taxiway-Factors affecting the layout - geometrics of taxiway-Design of exit taxiway with examples, Visual aids**-** Airport marking – lighting-Instrumental Landing System.	09

4.	**UNIT – 4** **TUNNELS:** Advantages and disadvantages, Size and shape of tunnels, Surveying-Transferring centre line, and gradient from surface to inside the tunnel, Examples, Tunnelling in rocks-methods, Tunnelling methods in soils-Needle beam, Liner plate, Tunnel lining, Tunnel ventilation, vertical shafts, Pilot tunneling, mucking and methods, drilling and drilling pattern.	07
5.	**UNIT – 5** **HARBOURS:** Harbour classifications, Layout with components, Natural phenomenon affecting the design of harbours - wind, wave and tide, currents, Breakwater-Types Wharf and Quays, Jetties and Piers, Dry dock and wet docks.	07

TEXT BOOKS

1. **Railway Engineering -** Saxena and Arora, Dhanpat Rai & Sons, New Delhi
2. **Indian Railway Track** – M M Agarwal, Jaico Publications, Bombay
3. **Airport Planning and Design** – Khanna Arora and Jain, Nem Chand Bros, Roorkee
4. **Doks and Tunnel Engineering** – R Srinivasan, Charaotar Publishing House
5. **Docks and Harbour Engineering** –H P Oza and G H Oza Charaotar Publishing House
6. **Surveying** – B C Punmia, Laxmi Publications

REFERENCE BOOK / Web links:

Railway Engineering – Mundrey, McGraw Hill Publications

www.vtu.ac.in
www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note: 1. Questions to be set one each from Unit 1, 4, & 5 and Two each from Unit 2 and Unit 3. Students should answer Five full questions.

Course Outcomes:

The students are capable of:

CO1. Planning, designing the components of railway track, construct and maintain the track to ensure the speed and safety of rolling stock as well as the passengers.

CO2. Planning, designing, and construction of airport facilities.

CO3. Planning, designing the various components of harbor and tunnels for transportation.

CO's	PO's
CO1	PO1, PO3, PO6, PO8, PO10, PO12
CO2	PO1, PO2, PO3, PO7, PO8, PO12
CO3	PO1, PO2, PO3, PO7, PO8, PO12
CO4	PO1, PO2, PO6, PO9, PO10, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : GEOTECHNICAL ENGINEERING – II		
Sub Code: CV63	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Outcome of the subject, Transportation Engineering-II:

1. Students will be exposed to different soil exploration methods and importance of computation of stresses due to different types of loading
2. Analyze the quantity of seepage through hydraulic structures like sheet piles, earth dams and weirs.
3. Determination of lateral earth pressure on retaining structures by different theories and layered backfills.
4. To analyze the stability of slopes by analytical and graphical methods.
5. Prediction of bearing capacity of soil and foundation settlements and proportioning of shallow foundation.

Sl. No.	**Syllabus Contents**	**No. Of Hours**	
		Teaching	**Tutorial**
1.	**UNIT - 1** **SUBSURFACE EXPLORATION:** Importance of exploration program, Methods of exploration: Boring, Seismic refraction method of grophysical exploration, Types of samples - undisturbed, disturbed and representative samples, Samplers, sample disturbance, area ratio, Recovery ratio, clearance, Stabilisation of boreholes - Typical bore log. Number and depth of borings for various civil engineering structures, soil exploration report.	06	
2.	**UNIT - 2** **STRESSES IN SOILS:** Boussinesq's and Westergaard's theories for concentrated, circular and rectangular loads. Comparison of Boussinesq's and westergaard's analysis. Pressure distribution diagrams, Contact pressure, Newmark's chart. **FLOWNETS:** Laplace equation (no derivation) assumptions and limitations only, characteristics and uses of flownets, Methods of drawing flownets for Dams and sheet piles. Estimating quantity of seepage and Exit gradient. Determination of phreatic line in earth dams with and without filter.	07	
3.	**UNIT - 3** **EARTH PRESSURE:** Active and Passive earth pressures, Earth pressure at rest. Rankine's and Coulomb's Earth pressure theories-–assumptions and limitations, Graphical solutions for active earth pressure (cohesionless soil only) – Culmann's and Rebhann's methods, Lateral earth pressure in cohesive and cohesionless soils, Earth pressure distribution.	08	
4.	**UNIT – 4** **STABILITY OF EARTH SLOPES:** Types of slopes, causes and type of failure of slopes. Definition of factor of safety, Stability of infinite slopes, Stability of finite slopes by Method of slices and Friction Circle method, Taylor's stability number, Fellineous method. **FOUNDATION SETTLEMENT:** Importance and Concept of Settlement Analysis, Immediate, Consolidation and Secondary settlements (no	09	

	derivations, but, computation using relevant formula for Normally Consolidated soils), Tolerance. BIS specifications for total and differential settlements of footings and rafts.		
5.	**UNIT – 5** **BEARING CAPACITY:** Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure. Terzaghi's and Brinch Hansen's bearing capacity equations - assumptions and limitations, Bearing capacity of footing subjected to eccentric loading. Effect of ground water table on bearing capacity. Field methods of evaluation of bearing capacity - Plate load test, Standard penetration test and cone penetration test. **PROPORTIONING SHALLOW FOUNDATION** Allowable Bearing Pressure, Factors influencing the selection of depth of foundation, Factors influencing Allowable Bearing Pressure, Factors influencing the choice of foundation,	09	

Course Outcomes:

CO1. To make a proper assessment of soil properties by soil exploration, location of ground water table and analysis of flow through hydraulic structures.

CO2. Computation of stresses due to various types of loadings such as due to concentrated, circular, strip line loads, below ground surface and Slope stability analysis.

CO3. Computation of Earth Pressure on retaining structures, Computation of bearing capacity, computation of settlement of foundations.

TEXT BOOKS

1. **Soil Engineering in Theory and Practice**- Alam Singh and Chowdhary G.R. (1994), CBS Publishers and Distributors Ltd., New Delhi.
2. **Soil Mechanics and Foundation Engg.**- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.

REFERENCES BOOKS / Web links:

1. **Foundation Analysis and Design**- Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. Co. New York.
2. **Soil Mechanics and Foundation Engineering**- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.
3. **Basic and Applied Soil Mechanics**- Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., Newe Delhi.
4. **Geotechnical Engineering**- Venkatrahmaiah C. (2006), 3rd Edition New Age International (P) Ltd., Newe Delhi.
5. **Soil Mechanics**- Craig R.F. (1987), Van Nostrand Reinhold Co. Ltd.
6. **Principles of Geotechnical Engineering**- Braja M. Das (2002), 5th Edition, Thomson Business Information India (P) Ltd., India.
7. Text Book of Geotechnical Engineering- Iqbal H. Khan (2005), 2nd Edition, PHI, India.

Note: 1. Questions to be set one each from Unit 1, 2, & 4are compulsory and Two each from Unit 3 and Unit 5. Students should answer Five full questions.

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO4, PO5, PO6. PO8, PO10, PO11
CO2	PO1, PO2, PO3, PO4, PO5, PO6. PO8, PO10, PO11,PO12
CO3	PO1, PO2, PO3, PO4, PO6, PO7,PO9, PO10
CO4	PO1, PO4, PO5, PO6, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : HYDRAULIC STRUCTURES & IRRIGATION DESIGN - DRAWING		
Sub Code: CV64	**No of Credits** : 03 = 1:1:3, (L:T:P)	**No of lecture hours/week : 01+01+03**
Exam Duration : 3 hours	**CIE + Drawing +SEE= 20+30+50 = 100**	**Total Hours : 13+13+39=65**

Objectives:

1. Water is the most essential commodity required by human beings, animals, plants and Irrigation purpose.
2. This subject teaches planning and designing of Reservoir and earthen bunds.
3. To study the planning and construction of various Hydraulic structures.

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1.	**Unit-1:** **Reservoir Planning** Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, safe yield, problems, Reservoir sedimentation, life of a reservoir, economic height of a dam, Environmental effects of reservoirs.	07
2.	**Unit-2:** **Gravity Dams:** Introduction, forces on a gravity dam, stress analysis in gravity dam, Problems, combination of forces for design. Elementary & practical profiles of a gravity dam, Arch dams, galleries in gravity dams,	06
3.	**Unit-3:** **Earth Dams** Introduction, types of Earth dams, construction methods, Design criteria for Earth dams, causes of failure of earth dams, section of dam, control of seepage through earth dams, Safety measures.	06
4.	**Unit-4:** **Spillways** Introduction, essentials of a spillway, spillway components, factors affecting type & design of spillways. Ogee spillway. Energy dissipation below spillways.	05
5.	**Unit-5** **Drawing (to draw only sketch for the given design details without projected views on the drawing sheet)** 1. Surplus weir with stepped apron 2. Tank Plug sluice without tower head 3. Tank Plug sluice with tower head 4. Canal regulator 5. Earthen Bunds	15(D)

Text Books:

1. Text book of irrigation engineering & Hydraulic Structures- R.K.Sharma, Oxford & IBH publishing Co., New Delhi (2002)
2. Irrigation & Water resources engineering- G.L.Asawa, New Age International Publishers, New Delhi (2005)

3. Irrigation, Water Resources & Water power engineering- Modi . P.N., Standard Book House, New Delhi

4. Design of minor irrigation and Canal structures- C. Sathya Narayana Murthy, Wiley eastern limited, New Delhi

Reference Books :

1. Irrigation engineering & Hydraulic structures- Garg. S.K., khanna publishers, New Delhi

2. Hydraulic Structures & Irrigation Design Drawing - Dr.N. Balasubramanya, Tata McGraw-Hill Education Pvt. Ltd., New Delhi

3. irrigation and Water Power Engineering- Madan Mohan Das & Mimi Das Saikia, PHI Learning Pvt. Ltd., New Delhi (2009)

4. A Text Book of Irrigation Engineering – Raghunath

5. Ground water engineering – Freez and Cherry

6. Irrigation engineering & Hydraulic structures- Garg. S.K., khanna publishers, New Delhi
7. Hydraulic Structures & Irrigation Design Drawing - Dr.N. Balasubramanya, Tata McGraw-Hill Education Pvt. Ltd., New Delhi
8. irrigation and Water Power Engineering- Madan Mohan Das & Mimi Das Saikia, PHI Learning Pvt. Ltd., New Delhi (2009)
9. A Text Book of Irrigation Engineering – Raghunath
10. Ground water engineering – Freez and Cherry

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Question paper pattern:

Four questions are to be set from Units 1, 2, 3 & 4 of which **Two** full questions are to be answered for 40 marks.

Two questions are to be set from Unit 5 (excluding Earthen Bunds) of which **One** full question is to be answered for 45 marks (drawings to be drawn for the given Data on the Drawing sheet). **One** Question is to be set from Earthen Bunds which is compulsory for 15 marks (To draw sketches for the given details on the drawing sheet)

Course Outcomes:

CO1 : Students will understand various aspects of Reservoir planning,
CO2 : The data required for design, procedure of planning, designing the structures and
CO3 : Preparing required drawings to execute the work.
CO4 : . Students are able to understand the design and construction of earthen dams.

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO6, PO7, PO8. PO9, PO12,

CO2	PO1, PO2, PO6, PO7, PO8, PO10. PO12
CO3	PO3, PO4, PO5, PO6, PO9, PO11
CO4	PO4, PO5, PO9, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ADVANCED CONCRETE TECHNOLOGY		
Sub Code: CV65	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To examine and select the best material such as mineral and chemical admixtures for making good concrete from the project options available.
2. To study the material behaviour, costs and benefits of RMC concrete, Self Compacting Concrete, Fibre Reinforced Concrete.
3. To study the concept of mix design and to arrive the mix proportions.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** Importance of Bogue's compounds, Structure of a Hydrated Cement Paste, Volume of hydrated product, porosity of paste and concrete, transition Zone, Elastic Modulus, factors affecting strength and elasticity of concrete, Rheology of concrete in terms of Bingham's parameter. **CHEMICAL ADMIXTURES**- Mechanism of chemical admixture, Plasticizers and super Plasticizers and their effect on concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, new generation superplasticiser. **MINERAL ADMIXTURE-**Fly ash, Silica fume, GCBS, and their effect on concrete property in fresh state and hardened state.	**09**
2	**UNIT - 2** **MIX DESIGN -** Factors affecting mix design, design of concrete mix by BIS method using IS10262 and current American (ACI)/ British (BS) methods. Provisions in revised IS10262-2009.	**9**
3	**UNIT - 3** **Self compacting concrete** concept, materials, tests, properties, application and Typical mix. **Fiber reinforced concrete** - Fibers types and properties, Behavior of FRC in compression, tension including pre-cracking stage and post-cracking stages, behavior in flexure and shear,	7
4	**UNIT - 4** **Ferro cement -** materials, techniques of manufacture, properties and application **Light weight concrete**-materials properties and types. Typical light weight concrete mix High density concrete and high performance concrete-materials, properties and applications, typical mix.	**7**

5	**UNIT - 5** **RMC concrete** - manufacture, transporting, placing, precautions, Methods of concreting- Pumping, under water concreting, shotcrete, High volume fly ash concrete concept, properties, typical mix.	**7**

TEXT / REFERENCE BOOKS / Web links:

1. **Properties of Concrete- Neville, A.M. - ELBS Edition, Longman Ltd., London**
2. **Concrete Technology- M.S. Shetty**
3. **Concrete Technology- A.R. Santhakumar,-Oxford University Press.**
4. **Concrete- P.K. Mehta, P J M Monteiro,- Prentice Hall, New Jersey (Special Student Edition by Indian Concrete Institute Chennai)**
5. **ACI Code for Mix Design**
6. **IS 10262-2004**
7. **Concrete Mix Design- N. Krishna Raju - Sehgal Publishers**
8. **Concrete Manual- Gambhir M.L.- Dhanpat Rai & Sons, New Delhi**
9. **Advanced Concrete Technology Processes- John Newman, Ban Seng Choo, - London.**
10. **Advanced Concrete Technology Constituent materials- John Newman, Ban Seng Choo- London**
11. **Non-Destructive Test and Evaluation of Materials- J.Prasad, C G K Nair,-Mc Graw Hill.**
12. **High Performance Concrete- Prof Aitcin P C- E and FN, London.**
13. **Properties of Fresh Concrete- Power T.C.- E and FN, London**

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http://books.google.co.in

Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The students understand the knowledge of development of strength and durability of various types of concrete and their ingredients.

CO2. . The students can able to design the concrete mixes as per IS Specifications.

CO3. The students will be exposed to identification of different materials proposed for different construction projects and the use of ready mix concrete.

CO4. The students will acquire the knowledge in the design of special concrete and their applications

Cos	Mapping with POs
CO1	PO, PO, PO, PO, PO, PO. PO, PO,
CO2	PO, PO, PO, PO, PO, PO. PO, PO,
CO3	PO, PO, PO, PO, PO, PO. PO, PO,
CO4	PO, PO, PO, PO, PO, PO. PO, PO,

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : THEORY OF ELASTICITY		
Sub Code: CV661	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. To learn the basics of stress strain behaviour, compatibility, equilibrium equation, boundary conditions.
2. The relationship between different elastic constants, strain displacement relationships will be discussed.

Sl. No.	Syllabus Contents	No. Of Hours
1.	**UNIT -1** Introduction to Mathematical theory of elasticity, definition of continuum, stress and strain at a. point, Generalised Hooke's Law, Strain- displacement relations, St. Venant's principle **Differential equations of equilibrium, boundary conditions, compatibility equations, Airy's stress function, problems, Stress polynomials – for Two Dimensional cases only.**	12
2.	**UNIT- 2 Plane stress and plane strain, Principal stresses and strains, measurement of surface strains, strain rosettes, Mohr's circle of stress and strain, analytical method.**	08
3.	**UNIT – 3** Two-dimensional problems in rectangular coordinates, bending of a cantilever beam subjected to end load, effect of shear deformation in beams, Simply supported beam subjected to UDL. Two-dimensional problems in polar coordinates, strain-displacement relations, equations of equilibrium, compatibility equation, stress function.	12
4.	**UNIT – 4** Axi Symmetric stress distribution - Rotating discs, Lame's equation for thick cylinder. Effect of circular hole on stress distribution in plates subjected to tension, compression and shear, stress concentration factor.	10
5.	**UNIT – 5** Torsion: Inverse and Semi-inverse methods, stress function, torsion of circular and elliptical sections.	10

TEXT BOOKS:

1. **"Theory of Elasticity" - International Students**- Timoshenko. S.P. and Goodier. J.N. - Edition, McGraw Hill Book Co. Inc., New Delhi.
2. **Applied Elasticity**- Wang. P.C.

REFERENCE BOOKS / Web links:

1. **Contiuum Mechanics Fundamentals**- Valliappan. C: Oxford and IBH Publishing Co. Ltd., New Delhi.
2. **Advanced Mechanics of Solids**- Srinath. L.S.: Tata McGraw Hill Publications Co. Ltd., New Delhi.
3. **Structural Mechanics with Introduction to Elastity and Plasticity**- Venkataraman and Patel: McGraw Hill Book Inc., New York.
4. **Mechanics of Solids**- Arbind Kumar Singh: Prentice hall of India Pvt. Ltd. New Delhi - 2007.
5. **Applied Elasticity BY T**.G. Sitharam and L. Govinda Raju, Interline Publishing, 2005.

Note: Questions to be set one each from Unit 2, 4, & 5 and Two each from Unit 1 and Unit 3.

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Students should answer Five full questions.

Course Outcomes:

CO1 : The student will be able to understand the stress strain relationship. Strain displacement relationship for different materials used in structural analysis.

CO2: The basic knowledge gained will help to formulate mathematical expressions at element level which can be assembled at structure level.

CO3 : This knowledge will help the finite element of the structure.

Cos	Mapping with POs
CO1	PO1, PO3, PO4, PO6, PO8
CO2	PO2, PO5, PO6, PO9
CO3	PO1, PO3, PO11

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ALTERNATIVE BUILDING MATERIALS AND TECHNOLOGIES		
Sub Code: CV662	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. The students are exposed to alternative materials for construction and technology for construction both in terms of cost and energy.
2. To Study the properties of Lime-pozzolana cements.
3. To study the alternative building materials and stone masonry.

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1.	**UNIT – 1 INTRODUCTION:** Energy in building materials Environmental issues concerned to building materials Global warming and construction industry Environmental friendly and cost effective building technologies. Requirements for building of different climatic regions. Traditional building methods and vernacular architecture	07
2.	**UNIT – 2 ALTERNATIVE BUILDING MATERIALS:** Characteristics of building blocks for walls Stones and Laterite blocks Bricks and hollow clay blocks Concrete blocks Stabilized blocks: Mud Blocks, Steam Cured Blocks, Fal-G Blocks and Stone Masonry Block, M-Sand **LIME-POZZOLANA CEMENTS** Raw materials Manufacturing process Properties and uses Fibre reinforced concretes Matrix materials Fibers : metal and synthetic Properties and applications Fibre reinforced plastics Matrix materials . Fibers : organic and synthetic . Properties and applications . Building materials from agro and industrial wastes . Types of agro wastes . Types of industrial and mine wastes . Properties and applications Field quality control test methods	07

3.	**UNIT – 3 ALTERNATIVE BUILDING TECHNOLOGIES** Alternative for wall construction Types Construction method Masonry mortars Types Preparation Properties Ferrocement and ferroconcrete building components Materials and specifications . Properties . Construction methods . Applications . Alternative roofing systems . Concepts . Filler slabs . Composite beam panel roofs . Masonry vaults and domes	07
4.	**UNIT – 4 STRUCTURAL MASONRY** Compressive strength of masonry elements Factors affecting compressive strength Strength of units, prisms / wallettes and walls Effect of brick work bond on strength Bond strength of masonry : Flexure and shear Elastic properties of masonry materials and masonry IS Code provisions Design of masonry compression elements Concepts in lateral load resistance	09
5.	**UNIT – 5 COST EFFECTIVE BUILDING DESIGN** Cost concepts in buildings Cost saving techniques in planning, design and construction Cost Analysis : Case studies using alternatives **EQUIPMENT FOR PRODUCTION OF ALTERNATIVE MATERIALS** Machines for manufacture of concrete Equipments for production of stabilized blocks Moulds and methods of production of precast elements	09

Course Outcomes:

CO1. Basic understanding of the subject will motivate people to re-use the recycled aggregates in concrete.

CO2. It helps the sustainable construction

CO3. Locally available materials, energy efficient materials and technology can be adopted.

Cos	Mapping with POs

TEXT BOOKS:

1. **Alternative building methodologies for engineers and architects, lecture notes edited**: K.S. Jagadish and B.V. Venkatarama Reddy, Indian Institute of cience, Bangalore.
2. **Structural Masonry** by Arnold W. Hendry.

REFERENCE BOOKS / Web links & Relevant IS Codes.

1. **Alternative building materials and technologies.**
2. **Proceedings of workshop on Alternative building material and technology,** 19th to 20th December 2003 @ BVB College of Engineering. & Tech., Hubli.
3. **Proceedings of National Workshop on Alternative building Methods, 16-18 Jan 2002 at IISc, Bangalore.**

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Note: 1. Questions to be set one each from Unit 1, 3, & 5 and Two each from Unit 2 and Unit 4. Students should answer Five full questions.

CO1	PO3, PO4, PO6, PO8,PO9
CO2	PO1,PO2, PO5, PO6, PO9
CO3	PO1, PO3, PO11

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : GROUND IMPROVEMENT TECHNIQUES		
Sub Code: CV663	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. Teach students about Ground Water hydrology and modeling of Ground Water regime.
2. Also it deals with Ground Water development and rural water supply schemes.

Sl. No.	Syllabus Contents	No. Of Hours
1.	**UNIT – 1 GROUND IMPROVEMENT:** Definition, Objectives of ground improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique. Ground modification for Black Cotton soil **COMPACTION:** Effect of grain size distribution on compaction for various soil types like lateritic soil, coarse-grained soil and micaceous soil. Effect of compaction on engineering behaviour like compressibility, swelling and shrinkage, permeability, relative density, liquefaction potential. Field compaction – static, dynamic, impact and vibratory type. Specification of compaction. Tolerance of compaction. Shallow and deep compaction, Dynamic Compaction, Vibrofloatation.	07
2.	**UNIT – 2 HYDRAULIC MODIFICATION:** Definition, Principle and techniques. gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering. **DRAINAGE & PRELOADING:** Importance, Vertical drains, Sand drains, Drainage of slopes, Electro kinetic dewatering, Preloading.	07
3.	**UNIT – 3 CHEMICAL MODIFICATION:** Definition, cement stabilization, sandwich technique, admixtures. Hydration – effect of cement stabilization on permeability, Swelling and shrinkage and strength and deformation characteristics. Criteria for cement stabilization. Stabilization using Fly ash. Lime stabilization – suitability, process, criteria for lime stabilization. Other chemicals like chlorides, hydroxides, lignin and hydrofluoric acid. Properties of chemical components, reactions and effects. Bitumen, tar or asphalt in stabilization.	07
4.	**UNIT – 4 GROUTING:** Introduction, Effect of grouting. Chemicals and materials used. Types of grouting. Grouting procedure, Applications of grouting.	09
5.	**UNIT – 5 MISCELLANEOUS METHODS (ONLY CONCEPTS & USES):** Soil reinforcement, Thermal methods, Ground improvement by confinement – Crib walls, Gabions and Mattresses, Anchors, Rock bolts and soil nailing. Stone Column, Micropiles.	09

TEXT BOOKS:

1. **Ground Improvement Techniques**- Purushothama Raj P. (1999) Laxmi Publications, New Delhi.

2. **Construction and Geotechnical Method in Foundation Engineering**- Koerner R.M. (1985) - Mc Graw Hill Pub. Co.,

REFERENCE BOOKS / Web links:

1. **Engineering principles of ground modification**- Manfred Hausmann (1990) - Mc Graw Hill Pub. Co., New York.
2. **Methods of treatment of unstable ground**- Bell, F.G. (1975) Butterworths, London.
3. **Expansive soils**- Nelson J.D. and Miller D.J. (1992) -, John Wiley and Sons.
4. **Soil Stabilization; Principles and Practice**- Ingles. C.G. and Metcalf J.B. (1972) - Butterworths, London.

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www.nptel.org.in
http://books.google.co.in

Course Outcomes:

CO1. Provides students in-depth knowledge about aquifer properties, well hydraulics, GW models, use of geophysical methods, water quality, well designing, well construction,
CO2. Ground Water development and deals with rural water supply schemes.
CO3. Students are able to understand the different grouting techiques.

Cos	Mapping with POs
CO1	PO1,PO3, PO4, PO6, PO8,PO9
CO2	PO1,PO2,PO3, PO5, PO6, PO9
CO3	PO1, PO3, PO11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ADVANCED SURVEYING		
Sub Code: CV664	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. The students are exposed to study Theory of errors, triangulation adjustment,
2. Field Astronomy, Hydrographic surveying and electronic distance measurements.

Sl. No	Syllabus Contents	No. Of Hours
1.	**UNIT – 1 THEORY OF ERRORS AND TRIANGULATION ADJUSTMENT:** Errors and classification of errors Precision and accuracy, Laws of weights and accidental errors. **PROBABILITY:** Probability distribution function and density function-normal distribution. RMS error-measure of precision. Rejection of observations-principles of least squares-Normal equations	07
2.	**UNIT – 2 METHOD OF CORRELATES:** Triangulation adjustment. Angle adjustment, station adjustment and figure adjustment.	07
3.	**UNIT – 3 ELECTRONIC DISTANCE MEASUREMENT (EDM):** Introduction, Electro Magnetic (EM) Waves. Phase comparison and modulations. Instruments – Geodimeter – Tellurimeter – Distomat – Range finders – Radars. Introduction to GPS Total station.	07
4.	**UNIT – 4 FIELD ASTRONOMY:** Earth celestial sphere. Solar system Position by altitude and azimuth system-spherical triangle and spherical trigonometry. Astronomical triangle. Nepiers rule. **TIME:** Siderial time, day and year-solar time and day-Greenwich mean time-standard time. Meridian and azimuth-their determination-latitude and its determination.	09
5.	**UNIT – 5 HYDROGRAPHIC SURVEYING:** Methods of soundings. Instruments. Three point problem. Tidal and Stream discharge measurement. **SETTING OUT WORKS:** Introduction. Setting out of buildings, culverts, bridge, pipeline and sewers, tunnels.	09

TEXT BOOKS:

1. **Surveying Vol I, II & III**- Punmia. B.C. - Lakshmi Publications, New Delhi.
2. **Surveying Vol I & II**- Duggal S.K. - Tata Mc Graw-Hill publishing Co.,
3. **Surveying Levelling-Part I & II** – Kanitkar T.P. & Kulkarni S.V. – Pune Vidhyarthi Gruha Prakashana.

REFERENCE BOOKS / Web links:

1. **Introduction to Surveying**- James, M. Anderson and Edward, M. Mikhail – Mc Graw Hill Book Co., 1985.
2. **Analysis and survey measurements**- M. Mikhalil and Gracie, G. - Van Nostrand Reinhold Co., (NY)-1980.

Plane and Geodetic Surveying for Engineers - David Clark -Vol I & II-**CBS** publishers and distributors, New Delhi.

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Note: 1. Questions to be set one each from Unit 2, 3, & 5 and Two each from Unit 1 and Unit 4. Students should answer Five full questions.

Course Outcomes:

CO1 : At the end of the course the student will posses knowledge about Hydrographic surveying,
CO2 : Students are able to understand the precision and acuracy of triangulation adjustments.
CO3 : Survey adjustments, Astronomical surveying and Triangulation surveying.

Cos	Mapping with POs
CO1	PO1,PO3, PO4, PO6, ,PO9
CO2	PO1,,PO3, PO5, PO6, PO9
CO3	PO1, PO3, PO11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : GROUND WATER HYDROLOGY		
Sub Code: CV665	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. Teach students about Ground Water hydrology and modeling of Ground Water regime.
2. To Study the concept of Darcy's law with respect to permeability.
3. To study the well hydraulics with respect to confined and unconfined aquifers.

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1.	**UNIT - 1 INTRODUCTION:** Importance. Vertical distribution of sub-surface water. Occurrence in different types of rocks and soils. Definition of aquifer, Aquifuge, Aquitard and Aquiclude. Confined and unconfined aquifers. **AQUIFER PROPERTIES:** Aquifer parameters – Specific yield, Specific retention, Porosity, Storage coefficient, derivation of the expression. Determination of specific yield. Land subsidence due to ground water withdrawals and numerical examples.	07
2.	**UNIT - 2 DARCY'S LAW AND HYDRAULIC CONDUCTIVITY:** Introduction. Darcy's law. Hydraulic conductivity. Coefficient of permeability and Intrinsic permeability, Transmissibility, Permeability in Isotropic, Unisotropic layered soils. Steady one dimensional flow, different cases with recharge. **WELL HYDRAULICS – STEADY FLOW:** Introduction. Steady radial flow in confined and unconfined aquifers. Pumping tests and numerical examples..	07
3.	**UNIT - 3 WELL HYDRAULICS – UNSTEADY FLOW:** Introduction. General equation derivation; Theis method, Cooper and JaCob method, Chow's method. Solution of unsteady flow equations and numerical examples..	07
4.	**UNIT – 4 GROUND WATER DEVELOPMENT:** Types of wells. Methods of constructions. Tube well design. Dug wells. Pumps for lifting water: Working principles, Power requirements and numerical examples..	09
5.	**UNIT – 5 GROUND WATER EXPLORATION:** Seismic method, Electrical resistivity method, Bore hole geo-physical techniques; Electrical logging, Radio active logging, Induction logging, Sonic logging and Fluid logging and numerical examples.. **GROUND WATER RECHARGE AND RUNOFF:** Recharge by vertical leakage. Artificial recharge. Ground water runoff. Ground water budget and numerical examples.	09

Course Outcomes:

CO1. Provides students in-depth knowledge about aquifer properties, well hydraulics, GW models, use of geophysical methods, water quality, well designing, well construction,

CO2. Ground Water development and deal with rural water supply schemes.

CO3 students are able to understand the calculation of runoff and recharge.

TEXT BOOKS:

1. **Ground Water**- H.M. Raghunath, - Wiley Eastern Limited, New Delhi.
2. **Ground Water Hydrology**- K. Todd, - Wiley and Sons, New Delhi.
3. **Numerical Ground Water Hydrology**- A.K. Rastogi, - Penram, International Publishing (India), Pvt. Ltd., Mumbai.

REFERENCE BOOKS / Web links:

1. **Ground Water Hydrology**- Bower H.- McGraw Hill, New Delhi.
2. **Ground Water and Tube Wells**- Garg Satya Prakash, - Oxford and IBH, New Delhi.
3. **Ground Water Resource Evaluation**- W.C. Walton, - McGraw Hill - Kogakusha Ltd., New Delhi.
4. **Water wells and Pumps** – Michel D.M., Khepar. S.D., Sondhi. S.K., McGraw Hill Education – 2nd Edition.

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Note: 1. Questions to be set one each from Unit 1, 3, & 4 and Two each from Unit 2 and Unit 5. Students should answer Five full questions.

Cos	Mapping with POs
CO1	PO3, PO4, PO6, ,PO9
CO2	PO1,,PO3, PO5, PO6,
CO3	PO1, PO3, PO11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : SOLID WASTE MANAGEMENT		
Sub Code: CV666	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

OBJECTIVE:

1. To enhance the knowledge of Solid waste management in the society.
2. To understand the consequence of life.
3. Management of waste generated in technological society.
4. To develop Solid waste management system.

Sl. No	Syllabus Contents	No. Of Hours Teaching
1	**Introduction** : Solid waste – Definition, land pollution –scope and importance of solid waste management , functional elements of solid waste management. **Sources** : Classification and characteristics – Municipal hospitals/ biomedical waste quantity – Generation rate methods. **Processing Techniques**: Components separation volume reduction, size reduction.	**10** Hours.
2	**Collection and Transportation** : System of collection , collection equipment , garbage chutes, transfer stations- bailing and compacting ,route optimization. **Treatment -** chemical reduction and biological processing	6 Hours
3	**Incineration** : Process 3T's factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolsis	5 Hours
4	**Composting** : Aerobic and Anaerobic composting , factors affecting composting , Indore and Bangalore processes, Mechanical and semi mechanical processes. Vermi-composting. **Sanitary Land Filling** : Deflection, methods, trench area, Ramp and pit method, site selection, basic steps involved , cell design, prevention of site pollution leachate collection and control methods, gas collection systems.	11 Hours
5	**Disposal Methods**: Open dumping – selection of site, ocean disposal , feeding to hogs, incineration , pyrolsis, composting, sanitary land filling, merits and demerits **Recycle and Reuse** : Material and energy recovery operations, reuse in other Industries, plastic wastes environmental significance and reuse.	7 Hours

REFERENCES / Web links:

1. **Integrated Solid Waste Management:** Tchobanoglous : M/c Graw Hill.
2. **Solid Waste Management in developing countries.** Bhide and Sunderashan
3. **Hand book on Solid Waste Disposal**.: Pavoni J.L.
4. **Environmental Engineering**.: Peavy and Tchobanoglous
5. **Environmental Engineering – Vol II.**: S.K. Garg
6. **Biomedical waste handling rules** – 2000.
7. **Solid Waste Engineering by** Vesilind.Pa Worrell & Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi.

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Note : Questions to be set one from each Unit 2, 3 & 5 and Two from Unit 1 and Unit 4. Students should answer five full questions.

Course Outcomes:

CO1. Students develop the sense of importance of solid waste management.
Students are exposed to understand third generation pollution after water and air.

CO2. The student will gain knowledge for the process techniques in managing solid waste disposal methods and reducing to zero waste for hygienic society.

CO3. The knowledge gained can be exhibited and spread to any level of literate or illiterate society and helps in controlling grave disaster and control of vector of diseases in the society due to unplanned solid waste management.

Co1	Po1,Po2,Po3,Po5,Po7,Po8,Po10,Po12
Co2	Po1,Po2,Po3,Po4,Po5,Po6,Po7,Po8,Po9,Po10,Po11,Po12
Co3	Po1,Po2,Po3,Po4,Po6,Po7,Po9,Po10,Po11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : TRAFFIC ENGINEERING		
Sub Code: CV667	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. The main object of studying traffic engineering is to achieve optimum utility of road facilities, maintaining highest speed with maximum safety.
2. The various facilities for smooth movement of vehicles are to be designed, using engineering skill economically.
3. Design of intersection and grade separated roads are also taught to the students. To plan the road networks the traffic data is essential.

Sl. No.	Syllabus Contents	No. Of Hours
1.	**UNIT - 1** **INTRODUCTION:** Definition, objectives of Traffic Engineering and scope of Traffic Engineering. **TRAFFIC CHARACTERISTICS:** Road user characteristics, vehicular characteristics – static and dynamic characteristics, power performance of vehicles, Resistance to the motion of vehicles – Reaction time of driver – Problems on above.	07
2.	**UNIT - 2** **TRAFFIC STUDIES:** Various types of traffic engineering studies, data collection, analysis objectives and method of study – Definition of study area – Sample size and analysis. **INTERPRETATION OF TRAFFIC STUDIES:** Classified traffic Volume at mid block and intersections, PCU, origin and destination, spot speed, speed and delay, parking – on street parking, off street parking, Accident – causes, analysis measures to reduce accident – problems on above.	07
3.	**UNIT - 3** **TRAFFIC FLOW THEORIES:** Traffic flow theory, Green shield theory – Goodness of fit, - correlation and regression analysis (linear only) – Queuing theory, Car following theory and relevant problems on above.	07
4.	**UNIT - 4** **STATISTICAL ANALYSIS:** Poisson's distribution and application to traffic engineering. Normal Distribution – Significance tests for observed traffic data, Chi Square test – problems on above. Traffic forecast – simulation technique.	09
5.	**UNIT - 5** **TRAFFIC REGULATION AND CONTROL:** Driver, vehicle and road controls – Traffic regulations – one way – Traffic markings, Traffic signs, Traffic signals – Vehicle actuated and synchronized signals – Signals co-ordination. Webster's method of signal design, IRC method, traffic rotary elements and designs, traffic operation – Street lighting, Road side furniture, Relevant problems on above. **INTELLIGENT TRANSPORT SYSTEM:** Definition, Necessities, Application in the present traffic scenario	09

TEXT BOOKS:

1. **Traffic Engineering & Transport Planning** – L.R. Kadiyali- Khanna Publishers.
2. **Highway Engineering Nemchand & Bros**- Khanna & Justo-Roorkee (UA).
3. **Traffic Engg.** - Matson & Smith:-Mc.Graw Hill and Co.
4. **Traffic flow theory** – Drew- Mc. Graw Hill and Co.

REFERENCE BOOKS / Web links:

1. **Traffic Engineering.** Pignataro- Prentice Hall.
2. **Highway Capacity Manual** – 2000.
3. **An introduction to traffic engineering**- Jotin Khistey and Kentlal- PHI.
4. **Traffic Engineering**- Mc Shane & Roess- PHI.

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http://books.google.co.in

Note: 1. Questions to be set one each from Unit 1, 3, & 4 and Two each from Unit 2 and Unit 5. Students should answer Five full questions.

Outcome:

CO1.The students are exposed to get the traffic data by conducting various surveys like volume data, speed data, O & D data etc.
CO2. The students able to design the various components of road user facilities.
CO3. The students are able to understand the statistical analysis of traffic data.

Cos	Mapping with POs
CO1	PO1, PO2PO3, PO4, PO6, ,PO9
CO2	PO1,PO3, PO5, PO6, PO8
CO3	PO1, PO3, PO6, PO11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : REPAIR AND REHABILITATION OF STRUCTURES		
Sub Code: CV668	**No of Credits** : 03 = 3:0:0, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Assignment +SEE= 45+5+50 = 100**	**Total Hours : 39**

Objectives:

1. The objective of this course is to make students to investigate the cause of deterioration of concrete structures,
2. To strategize different repair and rehabilitation of structures.
3. To evaluate the performance of the materials for repair.

Sl. No.	Syllabus Content	No. of Hours
1	**Unit -1** General: Introduction, Cause of deterioration of concrete structures, Diagnostic methods &analysis, preliminary investigations, experimental investigations using NDT, load testing, corrosion mapping ,core drilling and other instrumental methods. Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking	**10 hours**
2	**Unit -2** Influence on Serviceability and Durability: Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, and cathodic protection.	**10 hours**
3	**Unit - 3** Maintenance and Repair Strategies: Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects. Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration-testing techniques	**10 hours**
4	**Unit - 4** Materials for Repair: Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete. Techniques for Repair: Rust eliminator sand polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.	**10 hours**
5	**Unit - 5** Examples of Repair to Structures: Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure, engineered demolition techniques for dilapidated structures-case studies.	**10 hours**

Course outcomes:

On completion of this course, students are able to:

CO1. **Achieve Knowledge of design and development of problem solving skills.**

CO2. **Understand the cause of deterioration of concrete structures.**

CO3. Design and develop analytical skills and understands the concept of Serviceability and Durability.

CO4.·**Summarize the principles of repair and rehabilitation of structures**

.

REFERENCEBOOKS:

1. Sidney, M .Johnson "**Deterioration, Maintenance and Repair of Structures**".

2. Denison Campbell, Allen& Harold Roper, "**Concrete Structures Materials, Maintenance and Repair"-**Longman Scientific and Technical

3. R.T.Allen and S.C. Edwards, "**Repair of Concrete Structures**"-Blakie and Sons

4. Raiker R.N., "**Learning for failure from Deficiencies in Design, Construction and Service**"-R&D Center(SDCPL

Cos	Mapping with POs
CO1	PO1, PO2, PO3, ,PO6
CO2	PO1,PO2, PO7, PO8
CO3	PO1, PO3, PO7, PO9
CO4	PO1, PO10, PO11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : GEOTECHNICAL ENGINEERING LABORATORY		
Sub Code: CVL67	**No of Credits** : 1.5 = 0:0:3, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Record+SEE= 20+30+50 = 100**	**Total Hours : 42**

Objectives:

4. A course on geotechnical engineering will expose the students to the importance of the usage of properties, characteristics and behavior of soil
5. To predict the index and engineering properties to be used for the purpose of design of substructures.

Sl. No.	**Syllabus Contents**	**No. Of Hours**
1	Identification of gravel type, sand type, silt type and clay types soils, Tests for determination of Specific gravity (for coarse and fine grained soils) and Water content (Oven drying method).	06
2.	Grain size analysis of soil sample (sieve analysis).	06
3.	In situ density by core cutter and sand replacement methods.	06
4.	Consistency Limits – Liquid Limit (Casagrande and Cone Penetration Methods), plastic limit and shrinkage limit.	06
5.	Standard Proctor Compaction Test and Modified Proctor Compaction Test.	09
6	Coefficient of permeability by constant head and variable head methods.	
7	1. Strength Tests a. Unconfined Compression Test b. Direct Shear Test c. Triaxial Compression Test (undrained)	03
8	Consolidation Test- Determination of compression index and coefficient of consolidation.	03
9	Laboratory vane shear test	01
10	Determination of CBR value	01
11	a) Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor's needle. b) Demonstration of Hydrometer Test. c) Demonstration of Free Swell Index and Swell Pressure Test d) Demonstration of determination of relative density of sands	01
12	Determination of bearing capacity of soil from c and ϕ parameters by Terzaghi's formula for shallow foundation.	
13	Preparing a consolidated report of index properties and strength properties of soil	

REFERENCE BOOKS / Web links:

1. **Soil Mechanics and Foundation Engg.**- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.
2. **BIS Codes of Practice**: IS 2720(Part-3/Sec. 1) – 1987; IS 2720 (Part – 2)- 1973; IS 2720 (Part – 4) – 1985; IS 2720 (Part – 5) – 1985; IS 2720 (Part – 6) – 1972; IS 2720 (Part – 7) – 1980; IS 2720 (Part – 8) – 1983; IS 2720 (Part – 17) – 1986; IS 2720 (Part - 10) – 1973; IS 2720 (Part – 13) – 1986; IS2720 (Part 11) – 1971; IS2720 (Part 15) – 1986; IS 2720 (Part 30) – 1987; IS 2720 (Part 14) – 1977; IS 2720 (Part – 14) – 1983; IS 2720 (Part – 28) – 1974; IS 2720 (Part – 29) – 1966, IS 2720 (Part-60) 1965.
3. **Mittal**
4. **Soil Testing for Engineers**- Lambe T.W., Wiley Eastern Ltd., New Delhi.
5. **Manual of Soil Laboratory Testing-** Head K.H., (1986)- Vol. I, II, III, Princeton Press, London.
6. **Engineering Properties of Soil and Their Measurements**- Bowles J.E. (1988), - McGraw Hill Book Co. New York.

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Note: Student has to conduct one experiment from Sl. No. 01 to 10 for 70% of the total marks . Viva-voce will be conducted for 30% of the Total marks.

Course Outcomes:

CO1. Proper assessment of soil properties in the laboratory is useful in assessing the bearing capacity,
CO2. Students are able to understand the settlement of foundations, computation of earth pressure on retaining structures, analysis of flow through hydraulic structures,
CO3 Design of retaining structures, deep foundations can be done with knowledge of geotechnical engineering.

Cos	Mapping with POs
CO1	PO1, PO2PO3, PO4, PO6, ,PO9, PO10
CO2	PO1,PO3, PO5, PO6, PO8, PO11,PO12
CO3	PO1, PO3, PO6, PO11,Po12

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Sub Title : EXTENSIVE SURVEY PROJECT		
Sub Code: CVL68	**No of Credits** : 1.5 = 0:0:3, (L:T:P)	**No of lecture hours/week : 03**
Exam Duration : 3 hours	**CIE + Report +SEE= 20 +30 +50 = 100**	**Total Hours : 42**

Objectives:

1. Training the students to undergo field exposure to gain knowledge in the field of Irrigation engineering, Highway engineering, water supply and sanitary engineering
2. Location of suitable sites for New Tank Project.
3. Restoration and Renovation of Old Tank to increase its capacity.
4. Selection of suitable sites for construction of underground and overhead storage tanks

Sl. No.	Syllabus Contents	No. Of Hours
1.	General instructions, Reconnaissance of the sites and fly leveling to establish bench marks.	07
2.	**NEW TANK PROJECTS:** The work shall consist of i) Alignment of center line of the proposed bund, Longitudinal and cross sections of the center line. ii) Capacity contours. iii) Details at Waste weir and sluice points. iv) Canal alignment. **(All the surveying work of new tank projects shall be done by using TOTAL STATION)**	07
3.	**WATER SUPPLY AND SANITARY PROJECT:** Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population. Preparation of village map by any suitable method of surveying (like plane tabling), location of sites for ground level and overhead tanks underground drainage system surveys for laying the sewers.	07
4.	**HIGHWAY PROJECT:** Preliminary and detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road**.**	09
5.	**OLD TANK PROJECTS:** The work shall consist of i) Alignment of center line of the existing bund, Longitudinal and cross sections of the centre line. ii) Capacity contours to explore the quantity. iv) Details at existing Waste weir and sluice points. **(All the surveying work of Old tank projects shall be done by using TOTAL STATION)**	09

An extensive survey training involving investigation and design of the following projects is to be conducted for 2 weeks (14 days). The student shall submit a project report consisting of designs and drawings.

Drawings shall be done using Auto CAD and the Report shall be submitted in Printed format.

Note: To be conducted between 5th & 6th Semester for a period of about 2 weeks, Viva voce conducted along with 6th semester examinations.

Course Outcomes:

CO1: The students gain the knowledge to prepare plans, maps and relative drawings for the construction and execution of Hydraulic structures such as New tank Project and Restoration of Old tanks.

CO2: The students gain the knowledge to prepare plans, maps and relative drawings for the construction of roads.

CO3 : The students gain the knowledge to prepare plans, maps and relative drawings for the construction of water supply and sanitation structures.

Cos	Mapping with POs
CO1	PO1, PO2PO3, PO4, PO6, ,PO9, PO10
CO2	PO1,PO3, PO5, PO6, PO8, PO11,PO12
CO3	PO1, PO3, PO6, PO11,Po12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : MINI PROJECT WORK		
Sub Code: CVP69	**No of Credits** : 02 = 0:1:3, (L:T:P)	**No of lecture hours/week : 04**
Exam Duration : 3 hours	**Project presentation +Report + SEE : 25+25+50 = 100**	**Total Hours : 52**

Objectives:

1. Training the students to undergo field exposure and to gain knowledge in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
2. The students are exposed to innovative ideas to carry out the work in the related area of project.

Sl. No.	Syllabus Contents	No. Of Hours	
		Teaching	Tutorial
	Design and Analysis of Multi-storey Frames/ Design of Bridges/ Design of Hydraulic Structures/ Design of Pile foundation/ Study of the properties of various engineering materials and their applications Civil Engineering problems / Study of water and waste water qualities and their applications Solid waste Management solutions		

An extensive Research/training involving investigation and design of the above mentioned projects is to be conducted for 4 hours per weeks. The student shall submit the mini-project report consisting of designs and drawings/Research work.

Course Outcomes:

CO1. Students will be exposed to have practical knowledge in the current civil engg. field.

CO2: The students gain the knowledge to prepare plans, relative drawings of multistoried buildings.

CO3: The students are able to understand the use of alternative materials in the construction industry,

CO4: The students are able to understand the design of Hydraulic structures, roads, use of waste water for domestic and irrigation purpose, etc.

Cos	Mapping with POs
CO1	PO1, PO2PO3, PO4, PO6, ,PO9, PO10
CO2	PO1,PO3, PO5, PO6, PO8, PO11,PO12
CO3	PO1, PO3, PO6, PO11,Po12

Syllabus for 2017-18 Batch UG (CV)

Semester: VII	
Course Title: Quality Management System in Civil Engineering	
Course Code: **CV826**	Evaluation Procedure
Credits: **03**	CIE +Assignment +SEE Marks = 45+5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the various management techniques for successful completion of construction projects.
2	To study the effect of management for project organization, design of construction process, labour, material and equipment utilization, and cost estimation.
3	To study the cost estimation of project.

UNIT – I	
QUALITY MANAGEMENT SYSTEM – QMS: Introduction – Evolution of Quality Management System, Element of Quality, Quality Management System, Concept of Process, Network of Process in an organization, ISO 9000 Family, Applying ISO 9000 in practice, Importance of ISO 9000, Benefits of ISO standards of society, Total Quality Management, Comparison of ISO 9000 and TQM – Quality related definitions – Leaders in Quality or Quality Gurus – Customer Orientation – Mahatma Gandhi. **IMPLEMENTING ISO 9001-2000 QUALITY MANAGEMENT SYSTEM:** ISO 9000 – Quality Management Principles, ISO 9000 Documents Content of ISO 9001 : 2000, ISO 9001-2000 Quality Management System Requirements, General Requirements, Documentation Requirements, Management Responsibilities, Resource Management, Product Realization, Measurement, analysis and Improvement Monitoring and Measurement, Non-conforming Product, Analysis of data, Improvement, Implementing ISO 9001-2000 Quality Management System.	**9 Hrs**
UNIT – II	
PREPARING A ISO 9001-200 QUALITY MANAGEMENT SYSTEM FOR CIVIL ENGINEERING: Quality Manual, Introduction, Scope of the Quality Manual, Applicability, Responsibility, Quality Management System, General Requirements, Management Responsibilities, Management Commitment, Customer Focus, Indian Construction Company Quality Policy, Planning Responsibility, Authority and Communication, Management Review, Resource Management, Provision of Resources, Human Resources Product Realization, Planning or Product Realization, Customer Related Processes, Design and Development, Purchasing, Production and Service Provision, Control of Monitoring and Measuring Devices Measurement, analysis and Improvement, Monitoring and Measurement, Non-conforming product, Analysis of data, Improvement.	**6 Hrs**
UNIT – III	
QUALITY MANAGEMENT SYSTEM PROCEDURES: Introduction, procedure for management review, Format for writing procedures, procedure for preparing Quality plans/ work instructions, Contract review, Design control, Document and data control, Document numbering system, Change request, procedure for purchasing, procedure for control of customer supplied product, procedure for product identification and traceability, procedure for process control, procedure for inspection and testing, procedure for control of inspection, measuring and test equipments, procedure for inspection and test status, procedure for the control of non-conforming product, procedure for corrective and preventive action, procedure for handling, storage, packaging and delivery, control of quality records,	**9 Hrs**

procedure for internal quality audits.	
UNIT – IV (Blended Learning)	
WORK INSTRUCTIONS: Introduction – Document and Data Control, Material Procurement, Material Handling, Tendering and Estimating, Planning, Design, Training, Plant and Equipment, Bar Bending Schedule, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair Works, Road Works, Painting Works, Water Proofing works, Drainage Works, Quality Assurance and Control, Patching and Transportation of Concrete. **METHOD STATEMENT:** Introduction, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair works, Concrete Demolition works, Road Works, Fencing works etc.	**6 Hrs**
UNIT – V	
JOB DESCRIPTION: Introduction, Job Description of Managing Director, Project Manager, Site Manager, Site Engineer, QA/QC Engineer, Foreman, Typist/Clerk, Design Engineer, Planning Engineer. **QUALITY CONTROL PLAN/INSPECTION AND TEST PLANS (ITPS):** Introduction-Preparation of Project Quality Plans, Inspection and Test plant. **QUALITY RECORD/FORMATS:** Preparation of Standard Formats: Revision Control form, Document Distribution List, Document Master List, Non-Conformance Report, Store Issue/Receipt Voucher, Local Purchase Order, Material Stock Card, Audit Notification, Quality Audit Report, Corrective Action Report, Calibration Record, Calibration Master Sheet, Work Instruction, Job Description, Contract/Tender Review Form, Quantity Survey Estimation/Take off sheet, Material/Plant Requisition, Drawing Schedule, Bar-bending Schedule, Design Calculation Sheet, Request for Inspection, Concrete Inspection Request, Inspection Check List – Drainage, Painting, Request for Inspection-Concrete Repair, Accident Report Form, Concrete Production, Concrete Compressive Strength Test Results, Request to Conduct Cube Test, Quality Awareness Training Record.	**9 Hrs**

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Quality Management System in Civil Engineering – D.S. Rajendra Prasad – ISO 9001-2000, Sapna Book House, Bangalore.
2	Productivity and Quality Improvement – John L. Hardesky – McGraw Hill Book Company.
3	ISO 9000 Concepts, Methods, Implementation- Bagchi – Wheeler Publishing.
4	Training Manual on ISO 9000-2000 and TQM- Girdhar J. Gyani – Raj Publishing House.
5	Documenting Quality for ISO 9000 and other Industry Standards – Gary E. MacLean – Tata McGraw Hill Publishing Company Limited.
6	Total Quality Management for Engineers – Mohamed Zairi – Aditya Books Private Limited.
7	Data Book for Civil Engineers Field Practice – Elwyn E. Seelye – John Wiley & Sons, Inc.
8	Properties of Concrete – A.M. Neville – ELBS Publications.
9	IS: 456-2000: Indian Standard Specifications for Plain and Reinforced Concrete Code of Practice:

	4th Revision, Bureau of Indian Standards.
10	IS: 383-1990: Indian Standard Specifications for Coarse and Fine Aggregates from Natural Sources for Concrete: Bureau of Indian Standards.
11	Quality Management – KanishkaBedi – (Oxford university press).

Course Outcomes: The students will be able to	
1	Explain the quality management, conveyance and treatment.
2	Analyse the concept of Quality control plan / inspection and testing plans for various Civil Engineering works.
3	Apply the basic principles of ISO 9001-2000.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√	√									
CO3	√	√						√			√	√

Dr. Ambedkar Institute of Technology, Benaluru -

VII Semester (2017-18)

Sub Title : DESIGN OF STEEL STRUCTURES		
Sub Code: CV71	**No of Credits** : 04 = 4**:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 52**

Objectives:

1. To know different terminologies related to steel design and construction IS codes used for design.
2. The philosophy of steel design and detailing are studied. The concept of limit state design and the basic material properties of structural steel are studied.
3. The design of members under axial loads like tension, compression and flexural loads are also studied.
4. The design of Column bases, simple and gusseted base connections will be discussed.

Sl. No	Syllabus Contents	No. of Hours
1	**UNIT-1** **INTRODUCTION**: Advantages and Disadvantages of Steel structures, Loads and Load combinations, Design considerations, Limit State Method (LSM) of design, Failure criteria for steel, Codes, Specifications and section classification. **BOLTED CONNECTIONS**: Introduction, Behaviour of Bolted joints, Design strength of ordinary Black Bolts, Design strength of High Strength Friction Grip bolts (HSFG), Pin Connections, Simple Connections, Moment resistant connections, Beam to Beam connections, Beam and Column splices, Semi rigid connections	12
	UNIT-2 **WELDED CONNECTIONS**: Introduction, Welding process, Welding electrodes, Advantages of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Effective areas of welds, Design of welds, Simple joints, Moment resistant connections, Continuous Beam to Column connections, Continuous Beam to Beam connections, Beam Column splices.	07
3	**UNIT-3** **Design of Tension Members**: Introduction, Types of tension members, Design of strands, Slenderness ratio, Behaviour of tension members, Modes of failure, Factors affecting the strength of tension members, Angles under tension, other sections, Design of tension member, Lug angles, Splices, Gussets. **Design of Compression Members**: Introduction, Failure modes, Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression members, Effective length of compression members, Design of compression members, Built up compression members.	13
4	**UNIT-4** **Design of Column Bases**: Design of simple slab base and gusseted base	12

	Design of Beams: Introduction, Beam types, Lateral stability of beams, factors affecting lateral stability, Behaviour of simple and built-up beams in bending(without vertical stiffeners), Design strength of laterally supported beams in Bending, Design strength of laterally unsupported beams, Shear strength of steel beams, Maximum deflection, Design of beams and purlins	
5	**UNIT-5** **Plastic Behaviour of Structural Steel**: Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorems of Plastic Analysis, Methods of Plastic analysis, Plastic analysis of continuous beams and Portal frames.	08

Note: Study of this course shall be based on IS: 800-2007

Text books/ Reference Books / Web links:

1) Design of Steel Structures, N. Subramanian, Oxford, 2008
2) Limit State Design of Steel Structures, S.K Duggal. TATA Mc Graw Hill 2010
3) Bureau of Indian Standards, IS: 800-2007, IS: 875-1987
4) Steel Tables
www.vtu.ac.in
www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note: One Question to be set from each unit and for choice two Questions to be set from any two units.

Course Outcomes:

CO1: The student is exposed to latest design philosophy of steel as a construction material.
CO2 : The student will become competent to apply alternative design and construction based on different techniques.
CO3: The basic concept of design and design guidelines will be made familiar to the students.
CO4: With the knowledge gained candidate will be ready to take up the design and construction of steel.
CO5: Opportunities are also available for the expertise in steel design and construction.

Cos	Mapping with POs
CO1	PO1, PO4, PO7, PO8, PO9, PO10. PO12
CO2	PO1, PO2.
CO3	PO1, PO2, PO3, PO6,
CO4	PO1, PO6, PO9, PO11, PO12

CO5	PO1, PO2, PO3, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ESTIMATION & VALUATION		
Sub Code: CV72	**No of Credits** : 03 = 2**:2:0 (L:T:P)**	**No of lecture hours/week : 02+02**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 26+26=52**

Objective:

1. To inculcate the knowledge of measuring the quantity and checking the executed quantity in civil engineering works.
2. To develop the knowledge of calculating the rate of items of work using civil engineering methods.
3. To understand the specification of all the civil engineering works to be executed as per the standards and design.
4. Students to gain knowledge of land appreciation and depreciation value.

Sl No	Syllabus Contents	No. Of Hours	
		Teaching	Tutorial
1	**Unit - 1** **ESTIMATION:** Study of various drawings with estimates, important terms, units of measurement, abstract Methods of taking out quantities and cost – center line method, long and short wall method. Preparation of detailed and abstract estimates for the following Civil Engineering works – Buildings – RCC framed structures with flat, sloped RCC roofs with all Building components.	08	08
2.	**Unit - 2** **ESTIMATE:** Different type of estimates, approximate methods of estimating buildings, cost of materials. Estimation of wooden joineries such as doors, windows & ventilators. **ESTIMATES:** Steel truss (Fink and Howe truss), manhole and septic tanks, RCC Culverts.	06	06
3.	**Unit - 3** **SPECIFICATIONS:** Definition of specifications, objective of writing specifications, essentials in specifications, general and detail specifications of common item of works in buildings **RATE ANALYSIS:** Definition and purpose. Working out quantities and rates for the following standard items of works – earth work in different types of soils, cement concrete of different mixes, bricks and stone masonry, flooring, plastering, RCC works, centering and form work for different RCC items, wood and steel works for doors, windows and ventilators.	05	05
4.	**Unit - 4** **MEASUREMENT OF EARTHWORK FOR ROADS:** Methods for computation of earthwork – cross sections – mid section formula or average end area or mean sectional area, trapezoidal & prismoidal formula with and without cross slopes.	03	03

5	**Unit - 5** **CONTRACTS:** Types of contract – essentials of contract agreement – legal aspects, penal provisions on breach of contract. Definition of the terms – Tender, earnest money deposit, security deposit, tender forms, documents and types. Acceptance of contract documents. Termination of contract, completion certificate, quality control, right of contractor, refund of deposit. Administrative approval – Technical sanction. Nominal muster roll, measurement books – procedure for recording and checking measurements – preparation of bills. **Principle of Real Estate and Property Management** Introduction, principles, analytical methods and tools useful for making investment and finance decisions regarding commercial real estate assets. **Techniques of real estate valuation.** Market analysis, legal and political analysis, and highest and best use analysis; in-depth exposure to the three approaches to valuation; market comparison, income, and cost; the role of valuation in real estate investment; government regulation of appraisers.	04	04

Text books :

Reference Books / Web links:

1. **Estimating & Costing**, B. N. Dutta, Chand Publisher
2. **Quantity Surveying**- P.L. Basin S. Chand: New Delhi.
3. **Estimating & Specification** - S.C. Rangawala: Charotar publishing house, Anand.
4. **Text book of Estimating & Costing**- G.S. Birde, Dhanpath Rai and sons: New Delhi.
5. **A text book on Estimating, Costing and Accounts**- D.D. Kohli and R.C. Kohli S. Chand: New Delhi.
6. **Contracts and Estimates,** B. S. Patil, University Press, 2006.

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www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The students acquire the skill to measure the Civil Engineering work and material quantities and their importance in construction activities.

CO2. The students will understand to quantify and apply the rates for the Civil Engineering work and their individual items.

CO3. The students will finally involve in programming the specification, administrative methods and tendering and valuation process.

Cos	Mapping with Pos
Co1	Po1,Po2,Po3, Po4,Po5, Po6,Po7,Po8, Po9, Po10,Po11,

	Po12
Co2	Po2,Po3,Po4,Po5,Po6, Po7,Po8 ,Po9, Po11, Po12
Co3	Po1,Po3, Po,Po5, Po6,Po7,Po9,Po10,Po11,Po12
CO4	Po1,Po6,Po7,Po9,Po10,Po11,Po12

Sub Title : DESIGN OF PRE-STRESSED CONCRETE STRUCTURES		
Sub Code: CV73	**No of Credits** : 03= 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. It provides method of design for bending, shear, and torsion of PSC structural elements.
2. It provides general principles of PSC members and design confirming to IS 1343-1980
3. It gives knowledge about the design of PSC members and also pre-stressed plates.

Sl No	Syllabus Contents	No.Of Hours
1	**UNIT - 1** **MATERIALS:** High strength concrete and steel, Stress-Strain characteristics and properties. **BASIC PRINCIPLES OF PRESTRESSING:** Fundamentals, Load balancing concept, Stress concept, centre of Thrust. Pre-tensioning and post-tensioning systems, tensioning methods and end anchorages. **ANALYSIS OF SECTIONS FOR FLEXURE:** Stresses in concrete due to pre-stress and loads, stresses in steel due to loads, Cable profiles.	10
2.	**UNIT - 2** **LOSSES OF PRE-STRESS:** Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force. **DEFLECTIONS:** Deflection of a pre-stressed member – Short term and long term deflections, Elastic deflections under transfer loads and due to different cable profiles. Deflection limits as per IS 1343. Effect of creep on deflection, load verses deflection curve, methods of reducing deflection	10
3	**UNIT - 3**	8

	LIMIT STATE OF COLLAPSE: Flexure -IS Code recommendations – Ultimate flexural strength of sections. Shear - IS Code recommendations, shear resistance of sections, shear reinforcement. Limit state of serviceability – control of deflections and cracking.	
4	**UNIT - 4** **DESIGN OF END BLOCKS:** Transmission of prestress in pretensioned members, transmission length, Anchorage stress in post-tensioned members. Bearing stress and bursting tensile force-stresses in end blocks-Methods, I.S. Code, provision for the design of end block reinforcement.	6
5	**UNIT - 5** **DESIGN OF BEAMS:** Design of pre-tensioned and post-tensioned symmetrical and asymmetrical sections. Permissible stress, design of prestressing force and eccentricity, limiting zone of pre-stressing force cable profile.	5

TEXT BOOKS/
REFERENCE BOOKS / Web links:

1. **Pre-stressed Concrete**- N. Krishna Raju, Tata Mc. Graw Publishers.
2. **Pre-stressed Concrete**- P. Dayarathnam: Oxford and IBH Publishing Co.
3. **Design of pre-stressed concrete structures**- T.Y. Lin and Ned H. Burns - John Wiley & Sons, New York.
4. **Fundamental of pre-stressed concrete**- N.C. Sinha & S.K. Roy
5. IS : 1343 : 1980
6. **Pre-stressed Concrete**- N. Rajgopalan

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www.nptel.org.in
http://books.google.co.in

Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The students will be able to understand the basic concept of pre-stressing, post tensioning, behavior of PSC members and use of high tensile strength steel.

CO2. The students can able to learn the analysis of pre-stressing bending stresses and various losses of pre-stress.

CO3: The students can obtain the knowledge about the calculation of deflection in PSC members with respect to short and long time application of forces.

CO4: The students can acquire the knowledge in the analysis and design of beams for flexure both from serviceability and economic point of view.

Cos	Mapping with POs
CO1	PO1, PO2, PO6, PO7, PO8, PO10. PO11, PO12.
CO2	PO1, PO2, PO3, PO6, PO7, PO8, PO10. PO11, PO12.
CO3	PO1, PO2, PO4, PO6, PO7, PO8, PO10. PO11, PO12.
CO4	PO1, PO2, PO3, PO6, PO7, PO8, PO10. PO11, PO12.

Sub Title : MATRIX METHODS OF STRUCTURAL ANALYSIS		
Sub Code: CV741	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To train the students to know how to model and analyze the skeletal structures using displacement /stiffness approach and force/flexibility approach.
2. To analysis of structures at Global level considering the information at element level.

Sl. No	Syllabus Contents	No. Of Hours
1.	UNIT - 1 Introduction to flexibility method, Element flexibility matrix, Principle of contragradience, and Force Transformation Matrix, Member Flexibility matrix, Construction of structure flexibility matrix. Matrix determination of the	09

	displacement vector, Determination of member forces. Analysis of axially rigid continuous beams by flexibility method using Force Transformation Matrix	
2.	UNIT - 2 Analysis of rigid plane frames with axially rigid members by flexibility method using Force Transformation Matrix. Analysis of trusses by flexibility method Using Force Transformation Matrix.	09
3.	**UNIT - 3** Fundamentals of the stiffness method, equivalent joint loads, Displacement Transformation matrix. Member stiffness matrix, Total or System stiffness matrix, Truss analysis by stiffness method using Displacement Transformation Matrix.	06
4.	**UNIT - 4** Continuous Beam and rigid frame analysis with axially rigid members by stiffness method using Displacement Transformation Matrix. Introduction to direct stiffness method, Local and global co-ordinate system, Transformation Of variables, Transformation of the member displacement matrix, Transformation of the member Force matrix, Transformation of the member stiffness matrix, Transformation of the stiffness Matrix of the member of a truss, Transformation of the stiffness matrix of the member of the Rigid frame, Overall stiffness matrix, Boundary conditions, Computation of internal forces.	09
5	**UNIT - 5** Analysis of trusses and continuous beams by direct stiffness method.	06

TEXT BOOKS/REFERENCE BOOKS / Web links:

1. **Matrix, finite elements, Computer and Structural analysis**- M Mukhopadhyay - Oxford & IBW,1984
2. **Matrix Analysis of framed structures**- W. Weaver J.M. Gere - CBS publishers and Disributers,1986
3. **Computational structural Mechanics**- S Rajshekharan. G Sankara Subramanian - PHI, 2001
4. **Structural Analysis A Matrix Approach**- G.S Pandit & S P Gupta Tata Mc Graw-Hill, 1981
5. **Basic structural Analysis**- C.S Reddy - Tata Mc Graw-Hill, 1996
6. **Structural Analysis**- L S Negi and R S Jangid - Tata Mc Graw-Hill, 1997
7. **Introduction to Matrix Methods of Structural analysis -** H C Martin -International text book Company, 1996

Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. Training will help students to understand the basic principles/theorems of structural analysis and their applications in Matrix analysis.

CO2. The Matrix methods of Structural analysis help in solving skeletal structural problems using computers.

CO3. This numerical tool gives an approximate solution to problems, which is very close to exact solution.

CO4. Helps to write simple and general purpose programs to analyze the structural components and structures.

CO5. Computers can be used to model and analyze the Civil structures using this approach.

Cos	Mapping with POs
CO1	PO1, PO2, PO3,
CO2	PO1, PO3, PO4
CO3	PO1, PO2, PO6, PO7
CO4	PO6, PO7, PO8, PO12
CO5	PO8,PO9,PO11

Sub Title : ADVANCED DESIGN OF RC STRUCTURES		
Sub Code: CV742	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**

Dr. Ambedkar Institute of Technology, Benaluru -

Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. It covers the knowledge about the behaviour and design of structural elements and their connections in accordance with latest Indian code of practice.
2. It covers different terminologies related to RCC design and construction and the philosophy of RCC design and detailing.
3. The concept of limit state design, working stress method and the basic material properties of reinforced concrete are studied.

Sl. No.	Syllabus Contents	No. Of Hours
1	**UNIT - 1** Design of RCC overhead circular and rectangular water tanks with supporting towers.	**6**
2	**UNIT - 2** Design of silos, bunkers using Janssen's Theory and Airy's Theory. Design of RCC Chimneys.	9
3	**UNIT - 3** Introduction to shell and folded plate roofs, their forms and structural behaviour. Design of simple cylindrical shell roof by beam theory. Yield line analysis of slabs by virtual work.	**9**
4	**UNIT - 4** Yield line analysis by equilibrium methods. Design of Grid Floors Slabs by approximate method	**9**
5	**UNIT-5** Design of flat slabs by Direct Designer Method (with and without drops)	**6**

Reference Books / Web links:

1. **Reinforced Concrete Structures, Vol -II**- B C Punmia: Laxmi Publications (P) Ltd, New Delhi.
2. **Limit State Design of Reinforced Concrete Vol-II**- P C Varghese: Prentice Hall of India (P) Ltd, New Delhi.
3. **Plain and Reinforced Concrete – Vol-II**- Jai Krishna and Jain,: Nem Chand Bros, Roorkee.
4. **Analysis of Structures- Vol-II** : Vazirani V N & M M Ratwani : Khanna Publishers, New Delhi.
5. **Design Construction of Concrete Shell Roofs** : Ramaswamy G S : CBS Publishers and Distributors, new Delhi.
6. **Advanced Structural Design**- Bensen C
7. IS 456 – 2000 IS 3370 – 1967 (Part I, II and IS 1893)
8. **Advanced RCC Design- Vol-II**,- S. S. Bhavikatti New Age International Publication, New Delhi.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The student is exposed to latest design philosophy of RCC construction.

CO2. Students will be capable of analysing the structural elements by yield line analysis

Co4. Students will gain the knowledge in the design of flat slabs

CO4. With the knowledge gained candidate will be ready to take up the design and construction of RCC structures.

Cos	Mapping with POs
CO1	PO1, PO3, PO5
CO2	PO1, PO2, PO3, PO6
CO3	PO1, PO2, PO3, PO6
CO4	PO1, PO2, PO6, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : DESIGN OF MASONRY STRUCTURES		
Sub Code: CV743	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To know different terminologies related to masonry design and construction, codes used for design.
2. The philosophy of masonry design is studied.
3. It covers the knowledge about the behaviour and design of structural elements and their connections in accordance with latest Indian code of practice.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **MASONRY UNITS, MATERIALS, TYPES & MASONRY CONSTRUCTION:** Brick, stone and block masonry units – strength, modulus of elasticity and water absorption of masonry materials – classification and properties of mortars, selection of mortars. Defects and errors in masonry construction, cracks in masonry, types, reasons for cracking, and methods of avoiding cracks. **STRENGTH AND STABILITY:** Strength and Stability of concentrically loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing, workmanship, strength formulae and mechanism of failure for masonry subjected to direct compression.	**9**
2	**UNIT - 2** **PERMISSIBLE STRESSES:** Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses. **LOAD CONSIDERATIONS FOR MASONRY:** Wall carrying axial load, eccentric load with different eccentricity ratios, walls with openings, free standing wall.	**9**
3	**UNIT - 3** **DESIGN CONSIDERATIONS:** Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels.	**6**
4	**UNIT - 4** **DESIGN OF MASONRY WALLS:** Design of load bearing masonry for building up to 3 storeys using IS: 1905 and SP: 20 procedures.	**9**

5	**UNIT - 5** **REINFORCED MASONRY:** Application, flexural and compression elements, shear walls. **MASONRY WALLS IN COMPOSITE ACTION:** Composite wall-beam elements, infilled frames.	**6**

TEXT BOOKS:

1. **Structural Masonry** - Henry, A.W: Macmillan Education Ltd., 1990.
2. **Brick and Reinforced Brick Structures**- Dayaratnam P: Oxford & IBH, 1987.

REFERENCE BOOKS / Web links:

1. **Design of masonry structures**- Sinha B.P, Davies S.R: E & FN spon 1997
2. IS 1905–1987 "Code of practice for structural use of un-reinforced masonry- (3rd revision) BIS, New Delhi.
3. SP 20 (S & T) – 1991, "Hand book on masonry design and construction (1st revision) BIS, New Delhi.

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www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The student is exposed to latest design philosophy of Masonry construction.
CO2. Students will acquire the knowledge in the design of reinforced masonry structures.
CO3. Students are able to analyse the strength and stability of masonry structures.
CO4. With the knowledge gained candidate will be ready to take up the design and construction of Reinforced masonry structures.

Cos	Mapping with POs
CO1	PO1, PO2, PO3,
CO2	PO1, PO3, PO4, PO5
CO3	PO1, PO4, PO6
CO4	PO1, PO2, PO3, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : EARTH & EARTH RETAINING STRUCTURES		
Sub Code: CV744	**No of Credits** : 03= 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. Soil as a backfill is used for many retaining structures like retaining walls, coffer dams and sheet piles.
2. Soil as a construction material is used for earth and rock fill dams.
3. A course on Earth and Earth Retaining Structures will expose students to the importance of the usage of soil as a retaining as well as construction material and as to how it can be strengthened using reinforcement.

Sl. No.	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **EARTH DAMS AND EMBANKMENTS** - Different types of earthen dams with sketches and their suitability. Hydraulic fill and rolled fill methods of construction – Causes of failure of earth dam – Design criteria of earth dams – Stability analysis of earthen dams – Seepage control in earthen dams. Role of Filters in Earth Dam Design. **RETAINING WALLS:** Types of retaining walls, failure of retaining walls by sliding, overturning and bearing. Stability analysis and Principles of the design of retaining walls – Gravity retaining walls, Cantilever retaining walls,	9

	Counterfort retaining walls (no structural design) – Modes of failure of retaining walls – Drainage from the backfill.	
2	**UNIT - 2** **BULK HEADS: Cantilever sheet pile walls** Types of sheet pile walls – Free cantilever sheet pile - cantilever sheet pile in cohesion-less soils – cantilever sheet pile in clay. **BULK HEADS: Anchored Sheet Pile Walls:** Anchored sheet pile with free earth support in cohesion-less and cohesive soil. Bulkheads with fixed earth support method – Types, locations and design of anchors.	**9**
3	**UNIT - 3** **BRACED CUTS:** Introduction, Lateral earth pressure on sheeting, Different types of sheeting and bracing systems – design of various components of bracings. **ROCK FILL DAMS:** Introduction, Origin and usage of rock fill dams, types of rock fill dams, and design of rock fill dams and construction of rock fill dams.	**9**
4	**UNIT- 4** **COFFER DAMS & CELLULAR COFFER DAMS I:** Introduction – types of coffer dams - Design of cellular coffer dams on rock by Tennesse Valley Authority (TVA) method – safety against sliding, slipping, overturning, vertical shear and stability against bursting.	**6**
5	**UNIT- 5** **CELLULAR COFFER DAMS II:** Design of cellular coffer dam on soil - safety against sliding, slipping, overturning, vertical shear and stability against bursting.	**6**

TEXT BOOKS:

1. **Soil Mechanics and Foundation Engineering**: Dr. K.R. Arora: Standard Publishers & Distributors.
2. **Soil Mechanics and Foundation Engineering**: S.K. Garg: Khanna Publishers.

REFERENCE BOOKS / Web links:

1. **Soil Mechanics and Foundation Engineering,**: Dr. B.C. Punmia: axmi Publications Ltd.,
2. **Foundation Engineering.**: Dr. B.J. Kasmalkar
3. **Numericals in Geotechnical Engineering:** A.V. Narasimha Rao & C. Venkataramaiah: Publications: University Press.
4. **Hydraulic Structures**: S.K. Garg: Khanna Publishers.
5. **Soil Mechanics and Foundation Engineering**: Dr. V.N.S. Murthy: Sai Tech. Publications
6. **Geotechnical Engineering:** Dr. C. Venkataramaiah, New age publications.
7. **Geotechnical Engineering**: Purushotam Raj.
8. **Theory and Practice of Soil Engineering**: Alum Singh.
9. **Principles of Geotechnical Engineering, Das, B**. M., Cengage Learning, 2009

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www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in http://books.google.co.in
Note : One Question to be set from each unit and for choice two questions to be set from any two units

Course Outcomes:

CO1. Students are capable of estimating lateral earth pressure on retaining walls and earthen dams.

CO2. Recent technology as made many constructions possible even on weak soils.

CO3 students are capable of designing cantilever and anchored sheet pile walls.

CO4. This course will prepare students to keep abreast with the changing scenario of the usage of soil as fill and construction material.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO3, PO4, PO5
CO3	PO4, PO5, PO6
CO4	PO1, PO3, PO11, PO12

Sub Title: **HIGHWAY GEOMETRIC DESIGN**		
Sub Code: CV745	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration: 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. The size and shape of various elements of roads are designed according to standards prescribed by IRC.
2. The horizontal and vertical curves are designed to meet the design speed on the various types of roads.
3. The roads are designed to achieve optimum speed with maximum safety economically.

Sl.	Syllabus Contents	No. Of

Dr. Ambedkar Institute of Technology, Benaluru -

No		Hours
1	**UNIT – 1** **INTRODUCTION:** Geometric Control factors like Topography –design speed – design vehicle – Traffic – Capacity – volume – environment and other factors as per IRC and AASHTO standards and specifications- PCU concept – factors controlling PCU for different design purpose **CROSS SECTIONAL ELEMENTS:** Pavement surface characteristics – friction – skid resistance – pavement unevenness - light reflecting characteristics – camber – objectives – types of camber – methods of providing cambers in the field – problems –	**9**
2	**UNIT – 2** **CROSS SECTIONAL ELEMENTS:** Carriage way – kerb – median – shoulder – foot path – parking lanes – service roads – cycle tracks – Driveways – Right of way – Factors influencing right of way – Design of Road humps as per latest I RC provisions. **SIGHT DISTANCE:** Importants, types, Sight distance at uncontrolled intersection, derivation, factors affecting sight distance, IRC, AASHTO standards, problems on above.	**9**
3	**UNIT – 3** **HORIZONTAL ALIGNMENT:** Definition, Checking the stability of vehicle, while moving on horizontal curve, Super elevation, Ruling minimum and maximum radius, Assumptions – problems – method of providing super elevation for different curves – Extra widening of pavement on curves – objectives – Mechanical widening – psychological widening – Transition curve – objectives – Ideal requirements – Types of transition curve – Method of evaluating length of transition curve – Setting the transition curve in the field, set back distance on horizontal curve and problems on above.	9
4	**UNIT – 4** **VERTICAL ALIGNMENT:** Gradient – Types of gradient – Design criteria of summit and valley curve – Design of vertical curves based on SSD – OSD – Night visibility considerations – Design standards for hilly roads – problems on the above. **INTERSECTION DESIGN:** Principle – Atgrade and Grade separated junctions – Types – channelization – Features of channelizing Island – median opening – Gap in median at junction.	**6**
5	**UNIT – 5** **ROTARY INTERSECTION:** Elements – Advantages – Disadvantages – Design guide lines – problem on the above – Grade separated intersection – Three legged inter section – Diamond inter change – Half clover leaf – clover leaf- Advantages- Disadvantages only **HIGHWAY DRAINAGE:** Importance – sub surface drainage –surface drainage – Design of road side drives – Hydrological – Hydraulical considerations and design of filter media, problems on above.	6

TEXT BOOKS:

1. **Principle and practice of Highway Engineering**- L R KADIYALI & N B LAL: Khanna publications
2. **Highway Engineering** – Khanna S K & Justo, Nemchand & Bros.
3. **Highway Engineering** by Srinivas Kumar.

REFERENCE BOOKS / Web links:

1. **Highway Engineering**- Kadiyali L R : Khanna publications
2. **Relevant IRC** Publications
3. **Transportation Engineering and Planning**- Papa Coastas and Prevendors PHI, New Delhi.

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Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The students are exposed to the geometrical design of roadways
CO2. The students are capable of designing the horizontal alignment of road.
CO3 The students are capable of designing the horizontal alignment of road.
CO3. The students are capable of designing the various elements of intersection.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO4, PO5, PO6
CO3	PO1, PO4, PO5, PO6
CO4	PO1, PO3, PO4, PO6, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: **OPEN CHANNEL HYDRAULICS**		
Sub Code: CV746	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. Students are introduced to study the open channel flow characteristics including hydraulic jump and surges.
2. Concept of specific energy and energy losses – Classification of flow, design of channel section will be taught.
3. Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION:** Difference between pipe flow and open channel flow, classification of flow, energy equation, momentum equation, kinetic energy and momentum factors	**6**
2	**UNIT – 2** **UNIFORM FLOW:** Concepts, uniform flow equations, conveyance and hydraulic exponent for uniform flow, design of channels for uniform flow.	**6**
3	**UNIT – 3** **CRITICAL FLOW:** Concept of specific Energy – Classification of flow. Design of channel, Section Factor, Hydraulic exponent for critical flow critical depth as a flow measurement. **GRADUALLY VARIED FLOW:** Concepts, GVF equation, its different forms, Basic assumptions, Dynamic equation, Characteristics of flow profile and classification.	**9**
4	**UNIT – 4** Analysis of flows profiles, Method of singular point and transitional depth, Methods of computation, Practical problems. Gradually Varied Flow Computations: Different methods, direct integration method, Bress's Solution, Chow's solution, direct method, standard step method.	**9**
5	**UNIT – 5** Rapidly Varied Flow: Concepts, hydraulic jump in rectangular channels, classification of jumps, characteristics of jump – length location height, application of hydraulic jump stilling basins, shape type-2 and type-4. Hydraulic jump in rectangular channels, Sloping channels, Jump in non rectangular channels, application of hydraulic jump as energy desipator	**9**

TEXTBOOKS:

1. **Open Channel Hydraulics** : Subramanya : Tata Mc Graw Hill Publishing Co Ltd, New Delhi

2. **Open Channel Flow** – Madan Mohan Das, Prentice Hall of India Pvt. Ltd., New Delhi 2008 Edition.
3. **Flow Through Open Channels** – Rajesh Srivastava, Oxford Press, New Delhi 2008 Edition.

REFERENCE BOOKS / Web links:

1. **Open Channel Hydraulics** : French : Mc Graw Hill Book Company, New Delhi.
2. **Fluid Mechanics** : Modi and Seth : Standard Book Home, New Delhi.
3. **Open Channel Hydraulics** : Henderson : Mr. Millan Publishing Co. Ltd., New York.
4. **Open Channel Hydraulic** : Ven Te Chow : Mc Graw Hill Book Company, New Delhi.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. Students, at the end of the semester will have the abilities to analyze flow characteristics in open channel and design hydraulic machines.
CO2 : Students will acquire the knowledge to calculate critical flow and gradually varied flow.
CO3: Students are able to design the flow profiles.
CO4 : Students will understand the concept of hydraulic jump in rectangular channels.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO, PO, PO, PO, PO, PO. PO, PO,
CO3	PO1, PO3, PO6, PO8
CO4	PO1, PO2, PO3, PO10, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title: **RURAL WATER SUPPLY AND SANITATION ENGINEERING**		
Sub Code: CV747	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03 L-3 T-0 P-0**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To spread the technology of environmental hygiene to the rural community.
2. To adopt the technology of water supply and sanitation as serviceable development in rural locality.
3. To enhance the knowledge of the rural community through the trained engineers to maintain health and hygiene.
4. To create awareness about the protection from communicable diseases.

Sl. No.	Syllabus Contents	No. Of Hours
1.	**UNIT – 1 RURAL WATER SUPPLY:** Introduction: Need for a protected water supply, investigation and selection of water sources, water borne diseases, protection of well water, drinking water quality standards. Types of pumps, supply systems viz., BWS MWS, PWS, water treatment methods – disinfection, deflouridation, hardness and iron removal, ground water contamination and control.	07
2.	**UNIT – 2 RURAL SANITATION:** public latrine, concept of Eco-sanitation, trenching and composting methods, Two pit latrines, aqua privy, W.C, septic tank, soak pit. DRAINAGE SYSTEMS: Storm water and sullage disposal, rain water harvesting and uses.	07
3.	**UNIT – 3 INSECT CONTROL**: House fly and mosquito – life cycle, diseases, transmission and control measures.	07
4.	**UNIT – 4 COMMUNICABLE DISEASES**: Terminology, classifications, methods of communication, general methods of control.	09

5.	**UNIT – 5 REFUSE COLLECTION AND DISPOSAL:** collection methods, transportation, disposal – salvaging, dumping, manure pits, dumping in low lands , composting, dung disposal – digester, biogas plant. **MILK SANITATION:** Essentials, test for milk quality, pasteurization, quality control, cattle borne diseases, planning for a cow shed.	09

TEXT BOOKS:

Environmental Sanitation - Joseph. A. Solveto

1. Water Supply & Sanitary Engineering - E.W. Steel

REFERENCE BOOK / Web links:

Preventive & Social Medicine - Park & Park

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Note: 1. Questions to be set one each from Unit 2, 3, & 4 and Two each from Unit 1 and Unit 5. Students should answer Five full questions.

Course Outcomes:

CO1. Students will come to know the importance and necessity of proper water supply and wastewater treatment and disposal and recycling of waste water.

CO2. Civil Engineering students will finally gain knowledge of designing Waste water treatment system and also low cost and economical process for safe and hygienic disposal of wastewater.

CO3. Students are able to design the structure to control the insects and diseases.

CO4. The knowledge gained can be exhibited and spread to any level of rural and illiterate society and helps in controlling grave disaster and control of vector of diseases in the society due to unplanned water supply and sanitation

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO6
CO2	PO1, PO2, PO4, PO6
CO3	PO1, PO5, PO6, PO8, PO9
CO4	PO1, PO6, PO10, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : NUMERICAL METHODS IN CIVIL ENGINEERING		
Sub Code: CV751	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To teach different numerical/approximate methods available for solving civil engineering problem.
2. To train the students to write algorithms to solve problems in a step by step procedure
3. Application of Numerical Integration for solving simple beam problems.
4. Student will be trained to create mathematical models for Civil Engineering problems in the areas of Structural analysis, Stability analysis, Fluid mechanics, and Geotechnical stability analysis of different structures.

Sl.	Syllabus Contents	No. Of

Dr. Ambedkar Institute of Technology, Benaluru -

No		Hours
1	**UNIT – 1** **INTRODUCTION:** Historical development of Numerical techniques, role in investigations, research and design in the field of civil engineering **DEVELOPMENT OF ALGORITHM/ FLOW CHARTS FOR FOLLOWING METHODS FOR SOLUTION OF LINEAR SIMULTANEOUS EQUATION:** a) Gaussian elimination method, b) Gauss-Jordan matrix inversion method, c) Gauss-Siedel method and d) Factorization method	6
2		
3	**UNIT – 3** **APPLICATION OF NUMERICAL INTEGRATION FOR SOLVING SIMPLE BEAM PROBLEMS:** Development of algorithm for a) Trapezoidal rule and b) Simpson's one third rule and its application for computation of area of BMD drawn for statically determinate beams. Newmark's method for computation of slopes and deflections in statically determinate beams	**9**
4	**UNIT – 4** **DEVELOPMENT OF ALGORITHM AND APPLICATION OF SOLUTION OF ORDINARY DIFFERENTIAL EQUATION TO CIVIL ENGINEERING PROBLEMS BY**: a) Euler's method b) Runge-Kutta 4^{th} order method Application of Finite difference technique in structural mechanics (Contd..) a) Buckling of columns, b) Beams on elastic foundation.	9
5	**UNIT – 5** **APPLICATION OF FINITE DIFFERENCE TECHNIQUE IN STRUCTURAL MECHANICS**: i. Introduction, expression of derivatives by finite difference: backward differences, forward differences and central differences. Ii. Application of finite difference method for analysis of a) statically determinate beams, b) statically indeterminate beams	**6**

REFERENCE BOOKS / Web links:

1. **Numerical Methods for Engineers**- Chapra S.C. & R.P. Canale: McGraw Hill, 1990.
2. **Numerical methods in Engineering Problem**- N. Krishna Raju, K.U. Muthu: MacMillan Indian Limited, 1990.
3. **Numerical methods for Engineers and Scientists**- Iqbal H. Khan, Q. Hassan: Galgotia, New Delhi, 1997.
4. **Numerical methods in Computer Programs in C^{++}"** – Pallab Ghosh: Prentice Hall of India Private Limited, New Delhi, 2006.
5. **Numerical methods for engineers using MATLAB and C – I** Edition SCHILLING " Thomson Publications"

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The student gets familiar with various numerical mathematical tools.

CO2. Student will be trained to create mathematical models for Civil Engineering problems in the areas of Structural analysis, Stability analysis, Fluid mechanics, and Geotechnical stability analysis of different structures.

CO3. The open ended mathematical models with assumed boundary conditions, different geometry and loadings can be solved using numerical mathematical tools.

CO4. The student will come to know how to use computers and programming tools in problem solving. Basic knowledge of Finite difference techniques and Finite element methods will help the student to solve the civil engineering problems numerically.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO3
CO3	PO1, PO3, PO6, PO8
CO4	PO1, PO3, PO5, PO6, PO10,

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ROCK MECHANICS		
Sub Code: CV752	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To study the mechanical and structural behaviour of different kinds of rocks of the earth crust when they are subjected to various kinds of stresses due to construction of various civil engineering activities
2. To study the engineering properties of rocks as site for construction and as material for construction.
3. To study the stability of rock slopes and rock foundation.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION**: Definition, Importance, History of Rock Mechanics, Distribution of rocks – Archean Rocks, Cuddapah Rocks, Vindhyan Rocks, Paleozoic Rocks, Mesozoic rocks, Gondwana Rocks, Deccan Traps, Stereographic presentation of Geological data – Representation and plotting line and plane **LABORATORY TESTS ON ROCK**.S Tests for Physical Properties, Compressive strength, Tensile strength, Direct shear, Triaxial Shear, Slake Durability, Schmidt Rebound Hardness, Sound Velocity, Swelling Pressure & Free Swell, Void Index.	9
2	**UNIT – 2** **STRENGTH, MODULUS AND STRESS STRAIN BEHAVIOUR OF ROCKS** Factors influencing rock behaviour, Strength criteria for Isotropic Intact Rocks, Modulus of Isotropic Intact Rocks, Compressive strength and modulus from SPT, Stress Strain models – Elastic model, Elasto plastic model, Visco elastic model **ENGINEERING CLASSIFICATION OF ROCK AND ROCK MASS** – RQD, RMR system, Terzaghi's rock load classification, Deere Miller, CMRS and RSR System. Classification based on strength and modulus, Classification based on strength and failure strain, rock discontinuity qualitative description, friction in rocks – Amonton's law of friction,.	**9**
3	**UNIT – 3** **FIELD TESTS ON ROCKS AND ROCK MASS** Geophysical methods Seismic Refraction method, Electrical Resistivity method, Deformability tests – Plate Jack Test, Goodman Jack Test, Field shear test - Field Permeability Test – Open end Test, Packers Test. **STABILITY OF ROCK SLOPES** Modes of failure – Rotational, Plane and wedge failures, Plane failure method of Analysis, Wedge method of Analysis, Toppling failure, Protection against slope failure.	**9**
4	**UNIT – 4** **ROCK FOUNDATION** Estimation of Bearing Capacity – Intact, Fractured rocks, Stress distribution in rocks, Factor of Safety, Sliding stability of dam foundation, Settlement in rocks, Bearing capacity of piles in rock, Measures for strengthening rock mass – Concrete shear keys, Bored concrete piles, Tensioned cable anchors,	**6**

	concrete block at toe	
5	**UNIT – 5** MISCELLANEOUS TOPICS Drilling, Blasting and underground open excavation, Mining and other Engineering applications, criteria for design of underground excavations, tubular excavations; pillars and ribs support multiple excavations. Structural defects in Rock masses, their improvement by rock bolting, grouting and other methods. Rock grouting, Rock Reinforcement	**6**

TEXT BOOKS:

1. **Foundation of Rock masses** – Joegar and Cook: 3rd Edition Chapman and Hall, London.
2. **Engineering in Rocks for Slopes foundations and Tunnels – Ramamurthy, T., PHI Publishers, 2007**
3. **Introduction to rock mechanics**- Goodman: Wiley International.

REFERENCE BOOKS / Web links:

1. **Rock Mechanics and the design of structures in Rock** : John Wiley, New York.
2. **Rock Mechanics in Engineering practice**- Ziekiewicz. O.C. and Stagg K.G: John, Wiley, New York.

Note : One Question to be set from each unit and for choice two questions to be set from any two units

Outcome:

CO1. Students are exposed to update their knowledge with latest technology from time to time and Getting well intact / stable civil engineering structures by overcoming all the structural defects by introducing safety factors.

CO2. Students are able to understand the behaviour of rock mechanics under different loading conditions

CO3. Students are able to understand testing methods to know the characteristics of rocks.

CO4. Students are able to understand precautions to be taken for the constructions of structures.

Cos	Mapping with POs
CO1	PO1, PO2, PO5, PO6
CO2	PO1, PO3, PO7,
CO3	PO1, PO2, PO4
CO4	PO4, PO5, PO8

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : PAVEMENT MATERIALS AND CONSTRUCTION		
Sub Code: CV753	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. The materials used for construction of roads are studied for their characteristics, suitability and availability.
2. It is also taught the new and innovative and waste materials used for construction of roads and reduces the pollution.
3. The different methods of construction of different types of pavements are also taught.
4. The new equipments used for construction are also dealt.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **AGGREGATES:** Origin, classification, requirements, properties and tests on road aggregates, concepts of size and gradation – design gradation, maximum aggregate size, aggregate blending by different methods to meet specification. **BITUMEN AND TAR:** Origin, preparation, properties and chemical constitution of bituminous road binders; requirements.	**6**
2	**UNIT – 2** **BITUMINOUS EMULSIONS AND CUTBACKS:** Preparation, characteristics, uses and tests. Adhesion of Bituminous Binders to Road Aggregates: Adhesion failure, mechanism of stripping, tests and methods of improving adhesion. **BITUMINOUS MIXES:** Mechanical properties, dense and open textured mixes, flexibility and brittleness, (no Hveem Stabilometer & Hubbar – Field Tests) bituminous mix, design methods using Rothfuch's Method only and specification, Marshal mixed design criteria- voids in mineral aggregates, voids in total mix, density, flow, stability, percentage voids filled with bitumen.	**9**
3	**UNIT – 3** **EQUIPMENT IN HIGHWAY CONSTRUCTION:** Various types of equipment for excavation, grading and compaction – their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement and	**6**

	stabilized soil road construction	
4	**UNIT – 4** **SUBGRADE:** Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests. **FLEXIBLE PAVEMENTS:** Specifications of materials, construction method and field control checks for various types of flexible pavement layers.	9
5	**UNIT – 5** **SUBGRADE:** Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests. **FLEXIBLE PAVEMENTS:** Specifications of materials, construction method and field control checks for various types of flexible pavement layers	9

TEXT BOOKS:

1. **Highway Engineering**- Khanna, S.K., and Justo, C.E.G : Nem Chand and Bros. Roorkee
2. **Construction Equipment and its Management**- Sharma, S.C: Khanna Publishers.
3. **Hot Mix Asphalt Materials, Mixture Design and Construction**- Freddy L. Roberts, Kandhal, P.S: University of Texas Austin, Texas. NAPA Education Foundation Lanham, Maryland.

REFERENCES BOOKS / Web links:

1. RRL, DSIR, '**Bituminous Materials in Road Construction**', HMSO Publication.
2. RRL, DSIR, '**Soil Mechanics for Road Engineers**', HMSO Publication.
3. Relevant IRC codes and MoRT & H specifications.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Outcome:

CO1. Students able to know the properties of pavement materials
CO2. Students will understand the properties of bituminous emulsions, cutbacks and bituminous mixes
CO3.The students are exposed to design of pavement using locally available materials.
CO4. Students are able to understand the construction methods of pavements.

Cos	Mapping with POs
CO1	PO1, PO2, PO4
CO2	PO1, PO2, PO4,
CO3	PO1, PO2, PO3, PO6
CO4	PO1, PO2, PO3, PO8, PO10

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : PHOTOGRAMMETRY AND REMOTE SENSING		
Sub Code: CV754	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To obtain information about physical objects through process of recording, measuring and interpreting the photographs of the area.
2. It deals with the photo interpretation, recognizing and identifying the objects and judging their significance through careful systematic analysis.
3. To acquire the knowledge of Remote sensing and its applications.

Sl. No	Syllabus Contents	No. Of Hours
1	**Unit 1: Photogrammetry** – Introduction, basic definitions, terrestrial photogrammetry, phototheodolite, horizontal and vertical angles from terrestrial photographs, horizontal position of a point from photographic measurements, elevation of points by photographic measurements, determination of focal length.	**6**
2	**Unit 2: Aerial Photogrammetry**- advantages, vertical, tilted and oblique photographs, geometry of vertical photographs, scale of vertical photograph over flat and variable terrain, ground coordinates, computation of length of a line,	**9**

	computation of flying height, relief displacement, overlaps, flight planning, computation of required number of photographs for a given area, ground control in photogrammetry Basics of stereoscopy, stereoscopes, uses, parallax. Basic elements in photographic interpretation. Introduction to digital photogrammetry	
3	**Unit 3: Remote sensing**: Introduction, Ideal remote sensing system, basic principles of electromagnetic remote sensing, electromagnetic energy, electromagnetic spectrum, interaction with earth's atmosphere, interaction with earth- surface materials, spectral reflectance of earth surface materials **Remote sensing platforms and sensors:** Introduction, platforms- IRS, Land sat, SPOT, Cartosat, Ikonos, Envisat etc. Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal)	**9**
4	**Unit 4:** Properties of digital image data, data formats, Basics of digital image processing- radiometric and geometric corrections, image enhancements, image transforms based on arithmetic operations, image. Remote sensing image interpretation, thematic classification (supervised and unsupervised), maximum likelihood classification, introduction to accuracy assessment of classification	**9**
5	**Unit 5:** Applications of remote sensing: applications in land use land cover analysis, change detection, water resources, urban planning, environmental and geological applications	**6**

Reference Books / Web links:

1. Mikhail E., J. Bethel, and J.C. McGlone, **Introduction to modern photogrammetry**. Wiley, 2001.
2. Wolf P.R, and B.A. Dewitt, **Elements of photogrammetry: with applications in GIS**. 3rd ed, McGraw-Hill, 2000.
3. Lillesand T.M., and R.W. Kiefer, **Remote sensing and image interpretation**. 4th ed, John Wiley & Sons, 2000.
4. Jensen J.R., **Introductory digital image processing: a remote sensing perspective**. 2nd ed Prentice Hall, 1996.
5. Richards J.A., and X. Jia, **Remote sensing digital image analysis: an introduction**. 3rd ed Springer, 1999.
6. Mather P.M., **Computer processing of remotely-sensed images: an introduction.** Wiley, 1988.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1:The most common application is in the topographic mapping of large area and also used in the preparation of special purpose maps for various engineering projects such as highways, railway, Dams, Harbors etc.

CO2: Students will understand the applications of Remote sensing.

CO3. Students are able to interpret the data collected by remote sensing.

CO4. Students are to apply the knowledge of remote sensing in the design of urban planning water resource etc.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO5, PO6
CO3	PO1, PO2, PO3, PO5, PO8, PO9
CO4	PO1, PO2, PO5, PO10, PO11, PO12

Sub Title : AIR POLLUTION AND CONTROL		
Sub Code: CV755	**No of Credits** : 03= 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives: Air pollution is woven throughout the fabric of our modern life. A by-product of the manner in which we build our cities, air pollution is waste remaining from the ways we produce our

goods, transport ourselves and our goods, and generate the energy to heat and light the places where we live, play, and work. The objectives of the course is summarized as follows,

1. To study the sources of different sectors of the air pollution
2. To study the formation of different secondary air pollutants in the atmosphere
3. To study the influential factors (meteorological parameters) of air pollutants transportation in the atmosphere
4. To study the effects of air pollution on receptor (human, different species, and environment, etc.,) and the different control methods of air pollution at source

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION:** Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behavior and Fate of air Pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced smog, Air Pollution Inventories. **EFFECTS OF AIR POLLUTION:** On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes – London Smog, Los Angeles Smog & Bhopal Gas Tragedy.	9
2	**UNIT – 2** **METEOROLOGY:** Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Wind rose, General Characteristics of Stack Plumes, Meteorological Models –Gaussian Plume Model.	**6**
3	**UNIT – 3** Factors to be considered in Industrial Plant Location and Planning. **SAMPLING, ANALYSIS AND CONTROL:** Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement,	6
4	**UNIT – 4** **AIR POLLUTION CONTROL METHODS:** Contd.,-- Air Pollution Control Methods – Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment, Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odours and their control. Indoor Air Pollution.	**9**
5	**UNIT – 5** **AIR POLLUTION DUE TO AUTOMOBILES:** Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. **BURNING ENVIRONMENTAL ISSUES:** 1. Acid Rain 2. Global Warming 3. Ozone Depletion in Stratosphere 4. Indoor Air Pollution	6

	ENVIRONMENTAL LEGISLATION: Environmental Policy, Environmental Acts Water, Air and Noise Pollution Standards.	

REFERENCES / Web links:

1. Boubel, R.W., Donald, L.F., Turner, D.B., and Stern, A.C., (1994), **Fundamentals of Air Pollution** –Academic Press.
2. Crawford, M., (1980), **Air Pollution Control Theory** –TMH Edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
4. Henry. C. Perkins, (1980), **Air Pollution** –McGraw Hill.
3. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986), **Environmental Engineering** – Mc Graw Hill Book Co.
4. Sincero, A.P and Sincero, G.A., (1999), **Environmental Engineering – A Design Approach** –Prentice Hall of India.
5. Wark, K., Warner, C.F. and Davies, W.T., (1998), **Air Pollution- Its Origin and Control** – Harper & Row Publishers, New York.

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Note : Questions to be set One from each Unit 1, 3& 5 and Two from Unit 2 and Unit 4. Students should answer Five full questions.

Course Outcomes:

CO1. The course on air pollution and control gives the complete understanding of various sources and formation of secondary pollutants thoroughly.
CO2. Further the course extends to understand the behaviour of pollutants in the atmosphere due the meteorological parameters.
CO3. The effect of these pollutants on receptors (human, different species and surrounding environment) is studied and the control methods can be designed accordingly.
CO4. At the end of the course the student can give the necessary information required for the policy makers to manage the system.

COs	Mapping with POs
CO1	PO1,PO2, PO6, PO12
CO2	PO1,PO2, PO5,PO6,PO8,PO9, PO10, PO12
CO3	PO1,PO2, PO5, PO6,PO8,PO9, PO10, PO11, PO12
CO4	PO1,PO2, PO3,PO4,PO5,PO6, PO7,PO8,PO9, PO10, PO11, , PO12

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Sub Title : DESIGN AND DRAWING OF BRIDGES		
Sub Code: CV756	**No of Credits** : 03 = 1**:1:3 (L:T:P)**	**No of lecture hours/week : 01+01+03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 13+13+ 24 = 50**

Objectives:

1. To know different terminologies related to Bridge design and construction, codes used for design.
2. The philosophy of bridge design and detailing are studied.
3. The design of members under various type of loads coming on the bridge and connections details are discussed.

Sl. No.	Syllabus Contents	No. Of Hours	
		Teaching	Drawing
1	**UNIT – 1** **BRIDGE PRELIMINARIES:** Classification of bridges and standard loads, Bridge-definition, components of bridges, various classification, types of bridges, forces to be considered for the design, IRC standards. **HYDRAULIC DESIGN:** Methods of finding design discharge, natural, artificial and linear water ways, afflux, economic span. **SUBSTRUCTURES AND FOUNDATIONS:** Types of abutments, piers and wing walls, forces to be considered for the design, Types of foundations and forces to be considered for the design, depth of scour.	**6 Hours**	**3 Hours**
2	**UNIT – 2** **DESIGN AND DRAWING OF RC SLAB CULVERT** for IRC class-AA loading, & class A loading. Design of pipe culvert. Empirical design of bank connections. Drawing slab culvert & pipe culvert for given site particulars.	**6 Hours**	**6 Hours**
3	**UNIT – 3** **DESIGN AND DRAWING OF RC T BEAM BRIDGE** with cross beams by Piegaud's and Courbon's method for Class-AA loading, empirical design of substructures and foundations.	**6 Hours**	**6 Hours**
4	**UNIT – 4** **DESIGN OF COMPOSITE BRIDGE:** Design of composite bridge for EUDL, Shear connectors-design 130equirements for shear connectors. Drawing of composite bridge.	**5 Hours**	**6 Hours**
5	**UNIT – 5**	**3 Hours**	**3 Hours**

	Typical Design and detailing of approach slab, Hand rails- Typical design and detailing of slab culverts and girder bridges as per MOT standards		

TEXT BOOKS:

1. **Essentials of Bridge Engineering**: Johnson – Victor: Oxford IBH Publications, New Delhi.
2. **Design of Bridges**: Krishna Raju N, Oxford IBH Publications, New Delhi.

REFERENCE BOOK / Web links:

Design of Bridge Structures: Jagadish T. R & Jayaram M. A: Prentice Hall of India, New Delhi.

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Course Outcomes:

CO1. Students are capable understand the types of bridges, uses, and component structures.
CO2. They get knowledge about design and drawing of bridges.
CO3: With the knowledge gained candidate will be ready to take up the design and construction of Bridge.
CO4: Opportunities are available for the expertise in Bridge design and construction.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO3, PO6, PO8
CO3	PO1, PO2, PO6, PO11,
CO4	PO1, PO2, PO6, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : STRUCTURAL DYNAMICS		
Sub Code: CV757	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To make the students to learn principles of structural dynamics and to evaluate the dynamic characteristics of the structure.
2. Analysis of structure under time varying loads to find stresses, strains, displacements for all points of the structure and for all times.
3. Also it helps to understand the response of a structure to dynamic loading such as moving or pulsating or suddenly applied loads.

Sl No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** Introduction to structural dynamics, Brief history of vibration and Earthquakes, Major earthquakes, Earthquakes zones, some basic definitions, Vibration of single degree of freedom system, undamped, damped, free vibrations, logarithmic decrement. Forced vibrations of single degree freedom systems, response of undamped and damped systems subjected to harmonic loading, rotation unbalance, reciprocating unbalance.	**9**
2	**UNIT – 2** Duhamel's integral, response due to general system of loading, dynamic load factor, response spectrum, response of SDOF subjected to harmonic base excitation, vibration isolation.	**9**

	Free vibration of multi degree of freedom systems, natural frequencies, normal modes, orthoganality property of normal modes, eigen values.	
3	**UNIT – 3** Shear buildings modeled as multi degree of freedom systems, free vibrations, natural frequencies. Forced vibration motion of shear buildings, modal super position method, response of shear buildings to base motion, harmonic forced excitation.	9
4	**UNIT – 4** Damped motion of shear buildings, equations for damped shear buildings, uncoupled damped equations, conditions for damping uncoupling.	**6**
5	**UNIT – 5** Dynamic analysis of beams stiffness matrices, lumped mass and consistent mass formulation equations of motion.	**6**

REFERENCE BOOK / Web links:

1. **Vibrations, structural dynamics**- M. Mukhopadhaya: Oxford IBH
2. **Structural Dynamics**- Mario Paz: CBS publishers.
3. **Structural Dynamics**- Anil Chopra: PHI Publishers.
2. **Structural Dynamics**- Clough & Penzen: TMH.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The students are able to understand the knowledge of principles of dynamics, free and forced vibrations and damping

CO2. The students are able to derive the equation of motion of undamped and under damped single degree of freedom systems subjected to free and forced vibration.

CO3. The students are able to analyze multistory frames and draw mode shapes of vibrations

CO4. The students are exposed to dynamic analysis of structure which is time consuming than equivalent static analysis.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO3, PO6
CO3	PO1, PO6, PO8, PO11
CO4	PO1, PO2, PO5, PO11, PO12

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Sub Title : CONSTRUCTION PROJECT MANAGEMENT		
Sub Code: CV758	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To study the various management techniques for successful completion of construction projects.
2. To study the effect of management for project organization, design of construction process, labour, material and equipment utilization, and cost estimation.
3. To study the cost estimation of project.

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Sl No	Syllabus Contents	No. Of Hours
1	**UNIT 1** **THE OWNERS' PERSPECTIVE** : Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers.	**9**
2	**UNIT 2** **ORGANIZING FOR PROJECT MANAGEMENT**: Project Management – modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants -Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team.	**9**
3	**UNIT 3** **DESIGN AND CONSTRUCTION PROCESS**: Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment.	**9**
4	**UNIT 4** **LABOUR, MATERIAL AND EQUIPMENT UTILIZATION**: Historical Perspective - Labour Productivity - Factors Affecting Job-Site Productivity - Labour Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management. - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks.	**6**
5	**UNIT 5** **COST ESTIMATION**: Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.	**6**

Course Outcomes:

1. On completion of this course the students will be able to know the modern trends in project management viz. design, construction, resource utilization and cost estimation.
2. Students are capable of handling labour, materials and equipments.
3. Students are able to design and construct the different kinds of projects.
4. Students are able to estimate the quantities and cost of a structure.

REFERENCES / Web links:

1. Chitkara, K.K. **Construction Project Management: Planning, Scheduling and Control**, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Choudhury S , **Project Management**, McGraw-Hill Publishing Company, New Delhi, 1988.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
4. Frederick E. Gould, **Construction Project Management**, Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000.
5. George J.Ritz , **Total Construction Project Management** - McGraw-Hill Inc, 1994.

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Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO4
CO3	PO1, PO2, PO5, PO6, PO8
CO4	PO1, PO3, PO6, PO10, PO11

Sub Title : ENVIRONMENTAL ENGINEERING LABORATORY

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Code: CVL76	**No of Credits** : 1.5 = 0**:0:3 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 42**

Objectives:

1. To familiarize the students to understand the standard methods of analyzing various parameters in water quality, wastewater pollutant, air pollutants and bacteriological pollution.
2. So as to utilize the results to design efficient treatment units / control measures to protect environment.

Sl. No.	Syllabus Contents	No. Of Hours
1	Alkalinity, Acidity and pH.	06
2	Determination of total Hardness, permanent and temporary Hardness. Calcium and Magnesium.	09
3	Determination of chlorides	03
4	Determination of percentage of available chlorine in bleaching powder , Residual Chlorine and Chlorine demand	06
5	Jar Test for Optimum dosage of Alum turbidity determination	03
6	Determination of Dissolved oxygen.	03
7	Determination of BOD	06
8	Determination of Solids in Sewage: Total solids, suspended solids, Dissolved solids, volatile, fixed solids, Settable solids.	06

Reference Books / Web links:

1. Manual of water & wastewater Analysis- NEERI Publications
2. Standards methods for examination of water & Waste water (1995) American publications- Association, water pollution Control Federation, American water works Association , Washington DC
3. IS Standards :2490-1974, 3360-1974
4. Sayer and McCarthy, Chemistry for Environment Engineering

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Scheme of Examination: Any one of the above exercise is to be conducted in the examination by the student.

Course Outcomes:

CO1: The students gain the knowledge of method of analysis of the pollutants present in water, wastewater, industrial wastewater, and air.
CO2: Understand to analyze the physical, chemical and biological characteristics of water.

CO3. Understand to analyze the physical, chemical and biological characteristics of wastewater.

Cos	Mapping with POs
CO1	PO1, PO4, PO5
CO2	PO1, PO2, PO4
CO3	PO1, PO2, PO4, PO11, PO12

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Sub Title : CONCRETE AND HIGHWAY MATERIALS LABORATORY		
Sub Code: CVL77	**No of Credits** : 1.5 = 0**:0:3 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 42**

Objectives:

1. To understand the properties of concrete in fresh and hardened state with Destructive and Non-destructive tests.
2. To examine and select the best material from the project options available.
3. To study the material behaviour, and benefits of the projects.

Sl. No	Syllabus Contents	No. Of Hours
1	**PART – A** **CEMENT:** Normal Consistency, Setting time, Soundness by Autoclave method, Compression strength test and Air permeability test for fineness, Specific gravity of cement.	9
2	**FRESH CONCRETE:** Workability – slump, Compaction factor and Vee Bee tests. **HARDENED CONCRETE:** Compression strength and Split tensile tests. Test on flexural strength of RCC beams, Permeability of concrete.	12
3	**Non-destructive Tests on Hardened Concrete:** Rebound hammer Test and Ultrasonic pulse velocity Tester	3
4	**PART – B** **SOIL:** Density of Soil by Sand replacement method, core cutter method, CBR Test.	6
5	**AGGREGATES:** Crushing, abrasion, impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and water absorption.	6
6	**BITUMINOUS MATERIALS AND MIXES:** Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity, Marshall Stability tests.	6

REFERENCE BOOK / Web links:

1. Relevant IS Codes and IRC Codes.
2. **Highway Material Testing Laboratory Manual** by Khanna S K and Justo CEG Nemi

Chand & Bros. 3. M. L. Gambhir : Concrete Manual : Dhanpat Rai & sons New – Delhi.
Scheme of Examination: Any two of the above exercise (one from each part) is to be conducted in the examination by the student.

Course Outcomes:

CO1. The students will be exposed to identification of different materials proposed for different construction projects.

CO2. They understand how to achieve strength and durability of concrete subjected to various types of loads and environmental hazards

CO3.Students are able to understand the bahaviour of highway materials.

Cos	Mapping with POs
CO1	PO1, PO2, PO4
CO2	PO1, PO2, PO4
CO3	PO1, PO2, PO4

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Sub Title : INTEGRATED SOLID WASTE MANAGEMENT		
Sub Code: CVE01	**No of Credits** : 04 = 4**:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 52**

Objectives:

5. To enhance the knowledge of Solid waste management in the society.
6. To understand the consequence of life.
7. Management of waste generated in technological society.
8. To develop Solid waste management system.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION:** Definition, Land Pollution – scope and importance of solid waste management, functional elements of solid waste management. **SOURCES:** Classification and characteristics – municipal, commercial & industrial. Methods of quantification.	**10**
2	**UNIT – 2** **COLLECTION AND TRANSPORTATION:** Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, route	**12**

	optimization techniques and problems. **TREATMENT / PROCESSING TECHNIQUES:** Components separation, volume reduction, size reduction, chemical reduction and biological and thermal processing problems.	
3	**UNIT – 3** **INCINERATION:** Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolisis, design criteria for incineration. **COMPOSTING:** Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting, Gasification..	**12**
4	**UNIT – 4** **SANITARY LAND FILLING:** Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, requirements of fabrics in sanitary land fills, sanitary land fill lining with design aspects. Different types of Liners, transportation and migration of Leachate.	**8**
5	**UNIT – 5** **DISPOSAL METHODS:** Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal. E-waste and its disposal methods. **RECYCLE AND REUSE:** Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse. Energy production, By Product recovery.	10

Text Book:

1. **Integrated Solid Waste Management:** Tchobanoglous : M/c Graw Hill.

REFERENCES / Web links:

2. **Solid Waste Management in developing countries.** Bhide and Sunderashan
3. **Hand book on Solid Waste Disposal**.: Pavoni J.L.
4. **Environmental Engineering**.: Peavy and Tchobanoglous
5. **Environmental Engineering – Vol II.**: S.K. Garg
6. **Biomedical waste handling rules** – 2000.
7. **Solid Waste Engineering by** Vesilind.Pa Worrell & Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

1. Students develop the sense of importance of solid waste management.
2. Students are exposed to understand third generation of pollution after water and air.
3. The knowledge gained can be exhibited and spread to any level of literate or illiterate society and helps in controlling grave disaster and control of vector of diseases in the society due to unplanned solid waste management.

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO5, PO7,PO8, PO10, ,PO12,
CO2	PO1, PO2, PO3,PO4, PO5,PO6,PO7, PO8, PO.9 PO10, PO11,PO12,
CO3	PO1, PO2, PO3,PO4, PO6, PO7, PO.9 PO10, PO11,PO12,

Sub Title : AIR POLLUTION AND CONTROL METHODS		
Sub Code: CVE02	**No of Credits** : 04 = 4**:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 52**

Objectives: Air pollution is woven throughout the fabric of our modern life. A by-product of the manner in which we build our cities, air pollution is waste remaining from the ways we produce our

goods, transport ourselves and our goods, and generate the energy to heat and light the places where we live, play, and work. The objectives of the course is summarized as follows,

1. To study the sources of different sectors of the air pollution
2. To study the formation of different secondary air pollutants in the atmosphere
3. To study the influential factors (meteorological parameters) of air pollutants transportation in the atmosphere
4. To study the effects of air pollution on receptor (human, different species, and environment, etc.,)
5. To study the control methods of air pollution at source

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION:** Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behavior and Fate of air Pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced smog, Air Pollution Inventories. **EFFECTS OF AIR POLLUTION:** On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes – London Smog, Los Angeles Smog & Bhopal Gas Tragedy. Chernobyl Nuclear Disaster episode.	12
2	**UNIT – 2** **METEOROLOGY:** Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Wind rose, General Characteristics of Stack Plumes, Meteorological Models –Gaussian Plume Model.	**9**
3	**UNIT – 3** Factors to be considered in Industrial Plant Location and Planning. **SAMPLING, ANALYSIS AND CONTROL:** Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement, Smoke and Indoor Air Pollutants Measurements and Image processing Techniques.	9
4	**UNIT – 4** **AIR POLLUTION CONTROL METHODS:** Contd.,-- Air Pollution Control Methods – Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment, Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odours and their control. Efficiency of Air Pollution Control Equipments.	**12**

5	**UNIT – 5** **AIR POLLUTION DUE TO AUTOMOBILES:** Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. **BURNING ENVIRONMENTAL ISSUES:** 5. Acid Rain 6. Global Warming 7. Ozone Depletion in Stratosphere 8. Indoor Air Pollution **ENVIRONMENTAL LEGISLATION:** Environmental Policy, Environmental Acts Water, Air and Noise Pollution Standards.	10

REFERENCES / Web links:

1. Boubel, R.W., Donald, L.F., Turner, D.B., and Stern, A.C., (1994), **Fundamentals of Air Pollution** –Academic Press.
2. Crawford, M., (1980), **Air Pollution Control Theory** –TMH Edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
3. Henry. C. Perkins, (1980), **Air Pollution** –McGraw Hill.
4. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986), **Environmental Engineering** – Mc Graw Hill Book Co.
5. Sincero, A.P and Sincero, G.A., (1999), **Environmental Engineering – A Design Approach** –Prentice Hall of India.
6. Wark, K., Warner, C.F. and Davies, W.T., (1998), **Air Pollution- Its Origin and Control** – Harper & Row Publishers, New York.

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Note : Questions to be set One from each Unit 1, 3& 5 and Two from Unit 2 and Unit 4. Students should answer Five full questions.

Course Outcomes:

CO1. The students will acquire the complete knowledge in understanding of various sources and formation of air pollutants in the atmosphere.

CO2. The students will understand the behavior of pollutants in the atmosphere due the meteorological parameters and study the effect of these pollutants on receptors (human, different species and surrounding environment).

CO3.students will be able to understand the different air pollution control methods.

CO4. At the end of the course the student will be able to design the control methods and can give the necessary information required for the policy makers to manage the system

Cos	Mapping with POs

CO1	PO1, PO2, PO6, PO12
CO2	PO1, PO2, PO5, PO10, PO11, PO12
CO3	PO1, PO2, PO4, PO5, PO8, PO.9 PO10, PO11,PO12,
CO4	PO1, PO2, PO3,PO4, PO5, PO6, PO7,PO8, PO.9 PO10, PO11,PO12,

Semester: VII	
Course Title: PROJECT PHASE - I	
Course Code: CVP78	**CIE + SEE = 50 + 50 = 100 Marks**
Credits: 02	
Hours: 26 Hrs. (L:T:P:S:0:0:26:0)	**SEE Duration: 3 Hrs**

Course Learning Objectives:	
1	To improve the professional competency and research aptitude by touching the specific areas which otherwise not covered by theory or laboratory classes.
2	The project work aims to develop the work practice in students to apply theoretical and practical tools / techniques to solve real life problems related to industry/field and current research.

The project work can be analysis and design projects of innovative nature or experimental investigation or numerical simulations or a combination of these.

Appropriate software developments with sufficient literature contributions can also be taken up. Each student batch will be allotted with a faculty as guide.

In specific cases student may consult with an external guide with the prior consents of internal guide and head of the department.

In this semester, students are expected to finalize appropriate topic of research, complete the required literature survey and about 25% of the objectives of their intended research.

Reading Materials	
1	Journal Publication.
2	Conference / Seminar Proceedings.
3	Handbooks / Research Digests / Codebooks.

Course Outcomes: The students will be able to	
1	Identify and chose appropriate topic of relevance.
2	Critically evaluate literature in chosen area of research & Establish Scope of work.
3	Define Research Problem Statement.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO5, PO11, PO12
CO2	PO1, PO2, PO4, PO5, PO6, PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11, PO12

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Design and Drawing of Steel Structures	
Course Code: **CV81**	Evaluation Procedure:
Credits: **02**	CIE + Drawings + SEE Marks = 20 + 30 + 50 = 100
Teaching Hours: 26 Hrs (L:T:P:2:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To gain knowledge in Design and detailing are discussed to make the student ready to take up the field problems related to steel construction.
2	To understand detailing and to draw the various sections clearly understandable to fabricators.
3	To learn Design of structural elements and their connections in accordance with latest code of practice IS-800-2007 based on limit state design has been discussed in detail.

PART-A (DRAWINGS TO BE PREPARED FOR GIVEN STRUCTURAL DETAILS USING CAD)	**No. of Hours**	
UNIT - I	**Teaching**	**Drawing**
CONNECTIONS: Bolted and welded, beam-beam, Beam column, seated, stiffened and un-stiffened	**01**	**03**
UNIT - II (Blended Learning) **COLUMNS:** Splices, Column-column of same and different sections. Lacing and battens.	**01**	**03**
UNIT - III **COLUMN BASES:** Slab base and gusseted base, grillage foundation.	**04**	**15**
PART-B		
UNIT – IV **Design and drawing of** i) Bolted and welded plate girder. ii) Roof Truss. (Forces in the members to be given) iii) Gantry girder.	**07**	**18**

NOTE:

Part-A: Drawing shall be done using CAD and practical examination shall be conducted separately.

In part A, Two questions to be set, out of which one question to be answered (30% weightage).

Part-B: Design as per IS 800-2007, steel table and theory examination shall be conducted separately.

In part B, Two questions to be set, out of which one question to be answered (70% weightage).

Course Outcomes: The students will be able to	
1	Analyse and design ofsteel structures like trusses, plate girders and gantry girder.
2	Design for safety and serviceability of various steel structural members.
3	Illustrate their conclusions through drawings using drafting tools.

Text Books:	
1	Structural Design & Drawing – N. Krishna Raju, Unversities Press, India.
2	Design of Steel Structures - N. Subramanian: Oxford University, Press.
3	Design of Steel Structures - Negi - Tata Mc Graw Hill Publishers.
4	Design of Steel Structures - Arya and Ajaman- Nem Chand & Bros. Roorkee.
5	Bureau of Indian StandardsIS : 800, SP 6 (1) or Steel Table

Reference Books:	
1	K.S.Sai Ram, Design of Steel Structures, Pearson Publishers.
2	Dr. Ramachandra &VirendraGehlot, Design of Steel Structures 1&2, SCIENTIFIC (INDIA).Publishers.
3	N.Subramanian, Design of Steel Structures (Limit state Design), Oxford Publishers.
4	Dr. Anand S. Arya & Dr.J.L. Ajmani, Design of Steel Structures, printed by N.C Jain, Roorkee press, Roorkee.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓								
CO2			✓	✓			✓				✓	
CO3			✓			✓					✓	
CO4					✓					✓		✓

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Advanced Pre-stressed Concrete Structures	
Course Code: **CV821**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand method of design for Shear, Bending, Torsion and Ultimate flexural strength of Pre-stressed Concrete elements.
2	To expose vividly theory and design of Pre-stressed Concrete in accordance with the latest code of practice IS 1343-2012provisions.
3	To explore knowledge about design of deformation of Pre-stressed Concrete members and Pre-stressed plates.

UNIT – I	
ANCHORAGE ZONE STRESSES IN POST-TENSIONED MEMBERS: Introduction, stress distribution in end block, investigations on Anchorage zone stresses, Magnel and Guyon's Methods, Comparative Analysis, Anchorage zone reinforcement. **SHEAR AND TORSIONAL RESISTANCE:** Shear and principal stresses, ultimate shear resistance, design of shear reinforcement, Torsion, Design of reinforcement for torsion.	**9 Hrs**
UNIT – II (Blended Learning)	
COMPOSITE BEAMS: Introduction, types of composite beams, analysis for stresses, differential shrinkage, serviceability limit state. Design for flexural and shear strength.	**6 Hrs**
UNIT – III	
TENSION MEMBERS: Introduction, Ties, Pressure pipes – fabrication process, analysis, design and specifications. Cylindrical containers- construction techniques, analysis, design and specifications. **STATICALLY INDETERMINATE STRUCTURES:** Introduction, Advantages of continuous members, effect of pre-stressing in indeterminate structures, methods of analysis for secondary moments, concordant cable profile, Guyon's theorem, Ultimate load analysis, Design of continuous beams and portal frames.	**9 Hrs**
UNIT – IV	
COMPRESSION MEMBERS: Introduction, Columns, short columns, long columns, bi-axially loaded columns, Design specifications. **SLAB AND GRID FLOORS:** Types of floor slabs, Design of one way, two way and flat slabs. Distribution of prestressing tendons, Analysis and design of grid floors.	**9 Hrs**
UNIT – V	
PRECAST ELEMENTS: Introduction, Pre-stressed concrete poles- manufacturing techniques, shapes and cross sectional properties, design loads, design principles. Railway sleepers-classification and Manufacturing techniques, design loads, analysis and design principles, Pre-stressed concrete pavements, slab and wall panels	**9 Hrs**

Course Outcomes: The students will be able to	
1	Define and estimate the losses on pre-stressed concrete structures.
2	Analyse and design Tension and Compression members of Pre-stressed Concrete structures.
3	Analyse and design composite Pre-stressed Concrete beams
4	Analyse and design Precast RC elements.

Text Books:	
1	Design of Pre-stressed concrete structures - Lin T.Y. and H. Burns - John Wiley & Sons, 1982.
2	Pre-stressed Concrete - N. Krishna Raju - Tata McGraw Hill, 3rd edition, 1995.
3	Pre-stressed Concrete Structures- P. Dayaratnam - Oxford & IBH, 5th Edition, 1991.
4	IS: 1343-2012.

Reference Book:	
1	G.S. Pandit and S.P. Gupta,Prestressed Concrete - CBS Publishers, 1993.
1	Praveen Nagarjun, Prestressed Concrete Design, Pearson Publishers.
2	Dr.S.N.Sinha&Dr.S.K.Roy, Fundamentals of Prestressed Concrete, S.Chand Publishers.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										√
CO2	√	√				√						√
CO3		√	√									√
CO4		√	√									√

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Advanced Foundation Design	
Course Code: **CV822**	Evaluation Procedure
Credits: **03**	CIE + Assignment + SEE = 45 + 5 + 50 = 100
Hours: 39 Hrs – L:T:P:S:3:0:0:0	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To gain knowledge on advanced topics of foundation design and analyses.
2	To understand the shallow and deep foundation analyses.
3	To develop the choice of foundation design parameters.
4	To learn the cause and effect of dynamic loads on foundation.

UNIT – I	
Proportioning of shallow foundation: Proportion of shallow foundation for equal settlement, Computation of design loads, design of combined footings (rectangular and trapezoidal), strap footings and wall footings, Types of rafts, bearing capacity and settlements of raft foundation, Rigid methods, Flexible methods, coefficient of subgrade reaction, Problems.	**8 Hrs**
UNIT – II	
Pile Foundations: Types of piles, Load Transfer mechanism, Static formulae, Dynamic formulae, Pile load Test, SPT and SCPT. Pile groups in clay: Efficiency, Bearing capacity and settlement, Negative skin friction, Problems.Underreamer piles.	**9 Hrs**
UNIT – III (Blende learning)	
Foundations on Expansive Soils: Parameters of expansive soils, classification, causes of moisture changes in soils, effect of swelling on buildings, preventive measures for expansive soils, modification of expansive soil, Design of foundation in swelling soils.	**7 Hrs**
UNIT – IV	
Drilled Pier and Caissons: Construction of drilled pier, Construction of open caisson, Pneamatic caisson and floating caisson, Problems. **Well foundations:** Different shapes of wells, Grip length, Forces acting on the well foundation, Terzaghi's analysis, Individual components of well, Sinking of wells, Measures for rectification of tilts and shifts, Problems.	**8 Hrs**
UNIT – V	
Machine Foundations: Introduction, Types of machine foundations, Basic definitions, Degree of freedom of block foundation, General criteria for design of machine foundations, Free vibration, Forced Vibration, Vibration analysis of machine foundation, Determination of natural frequency, Design criteria of foundations of reciprocating machines, Reinforcement and construction details, Weight of foundation, Vibration Isolation and control. Problems.	**7 Hrs**

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks.

- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Course Outcomes: The students will be able to	
1	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.
2	Design the load carrying capacity and settlement of single and group of piles.
3	Analyse and design of well foundation, drilled piers and caissons.
4	Analyse and design of machine foundations.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C, Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering - Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Bowles J E , Foundation analysis and design, McGraw- Hill Publications
2	Shashi K. Gulathi& Manoj Datta, Geotechnical Engineering, Tata McGraw Hill Publications
3	T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley & Sons.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√				√						
CO3		√	√									
CO4		√	√									

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Pavement Design	
Course Code: **CV823**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the process of collecting data required for pavement design and factors affecting on it and maintenance of the pavement.
2	To illustrate the design concepts of flexible pavement by various methods (CBR, IRC 37-2001, Mc loads, Kansas and also the same of rigid pavement by IRC 58-2002.
3	To understand the various causes leading to failure of pavements and remedies for the same.
4	To develop skills to perform functional and structural evaluation of pavement by suitable methods.

UNIT-I	
INTRODUCTION: Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement – Design strategies of variables – Functions of sub-grade, sub base – Base course – surface course – comparison between Rigid and flexible pavement. **FUNDAMENTALS OF DESIGN OF PAVEMENTS:** Design life – Traffic factors – climatic factors – Road geometry – Subgrade strength and drainage, Stresses and deflections, Boussinesqs theory – principle, Assumptions – Limitations and problems on above – Busmister theory – Two layered analysis – Assumptions – problems on above.	**9 Hrs**
UNIT-II (Blended Learning)	
DESIGN FACTORS: Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EWL concept. **FLEXIBLE PAVEMENT DESIGN:** Assumptions – McLeod Method – Kansas method – Tri-axial method – CBR method – IRC Method (old) – CSA Method using IRC 37-2001, problems on above.	**9 Hrs**
UNIT-III	
STRESSES IN RIGID PAVEMENT: Principle – Factors – wheel load and its repetition – properties of sub grade – properties of concrete. External conditions – joints – Reinforcement – Analysis of stresses – Assumptions – Westergaard's Analysis – Modified Westergaard equations – Critical stresses – Wheel load stresses, Warping stress – Frictional stress – combined stresses (using chart / equations) – problems on above. **DESIGN OF RIGID PAVEMENT:** Design of C.C. Pavement by IRC: 58 – 2002 for dual and Tandem axle load – Reinforcement in slabs – Requirements of joints – Types of joints – Expansion joint – contraction joint – warping joint – construction joint – longitudinal joint, Design of joints, Design of Dowel bars, Design of Tie bars – problems of the above.	**9 Hrs**
UNIT-IV	
FLEXIBLE PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial/maintenance measures in flexible pavements – Functional Evaluation by visual inspection and unevenness measurement by using different technics – Structural Evaluation by Benkelman Beam Deflection Method, Falling weight deflectometer, GPR Method. Design factors for Runway Pavements – Design methods for	**6 Hrs**

Airfield pavements and problems on above.	
UNIT-V	
RIGID PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial/maintenance measures in rigid pavements – Functional Evaluation by visual inspection and unevenness measurements. Design factors for Runway Pavements – Design methods for Airfield pavements.	**6 Hrs**

Course Outcomes: The students will be able to	
1	Explain the fundamentals and desirable characteristics of flexible pavement design as per standard IRC codes.
2	Illustrate the various stress components & design of rigid pavements as per standard IRC codes.
3	Explain the factual knowledge of failures, its causes and maintenance by structural and functional evaluation of flexible and rigid pavements.

Text Books:	
1	Highway Engineering – S K Khanna and C E G Justo, Nem Chand Bros, 10th edition, Roorkee.
2	Principle and practice of Highway Engineering - L R KADIYALI & N B LAL: Khanna publications, 2017 edition, New Delhi
3	Pavement Analysis & Design - Yang H. Huang- II edition, university of Kentucky, 2004.
4	Relevant IRC codes – IRC – 37 – 2001 & IRC – 58 -2002

Reference Books:	
1	Principles of Pavement Design- Yoder and Witzack - 2nd edition, John Wileys and Sons

CO-PO Mapping												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	√	√	√	√					√			
2	√	√		√								
3	√	√		√	√				√			

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Earthquake Resistant Design of Structures	
Course Code: **CV824**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To Study the principle of Engineering Seismology and seismic zoning map of India.
2	To study the behaviour of buildings subjected to earthquake forces and the performance of Structures during past earthquakes.
3	The study of Seismic design philosophy, Determination of design lateral forces.

UNIT-I	
Earthquake ground Motion, Engineering Seismology, Theory of plate tectonics, seismic waves, Magnitude and intensity of earthquakes, local site effects and seismic zoning map of India. Seismic Design Parameters: Types of Earthquakes, earthquake ground motion characteristics, response spectra and design spectrum.	**9 Hrs**
UNIT-II	
Structural modelling, Code based seismic design methods. Response control concepts, seismic evaluation and retrofitting methods. Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity and plan configuration problems, Seismo resistant building architecture – lateral load resistant systems, building characteristics.	**9 Hrs**
UNIT-III (Blended Learning)	
Seismic design philosophy, Determination of design lateral forces - Equivalent lateral force procedure, dynamic analysis procedure.	**9 Hrs**
UNIT-IV	
Step by step procedure for seismic analysis of RC buildings (maximum of 4 storeys, without infills) - Equivalent static lateral force method, response spectrum methods.	**6 Hrs**
UNIT-V	
Earthquake resistant analysis and design of RC buildings – Preliminary data, loading data, load combinations, analysis and design of subframes. (Maximum of 4 storeys, without infills). Earthquake resistant design of masonry buildings - elastic properties of structural masonry, lateral load analysis, Design of two storied masonry buildings.	**6 Hrs**

Course Outcomes: The students will be able to	
1	Explain the dynamic loading system and how it is subjected and distributed for the safe working condition buildings, Bridges, Monumental structures, Assemblies and health centers.
2	Apply the seismic design philosophy and determination of lateral forces.
3	Explain Earthquake resistant analysis and design of RC and masonry buildings.

Text Books:	
1	Earthquake resistant design of structures - Pankaj Agarwal, Manish Shrikande - PHI India.
2	Earthquake Resistant Design of Structures - S.K. Duggal - Oxford University Press, 2007.

Reference Books:

1	Earthquake Resistant Design- Anil Chopra
2	Earth Quake Engineering Damage Assessment and Structural design- S.F. Borg - (John Wiley and Sons. 1983).

CO-PO Mapping												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	√	√	√	√								
2	√	√	√		√							
3	√	√			√			√		√	√	

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Industrial Wastewater Treatment	
Course Code: **CV825**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50= 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To create the awareness about the importance of proper collection and conveyance of Industrial wastewater from various industries.
2	To expose to various industrial wastewater treatment methods.
3	To provide operational and control measures for industrial wastewater treatment technologies.

UNIT – I	
INTRODUCTION: Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Sampling, effluent and stream Standards and Legislation to Control Water Pollution. Stream Quality, Dissolved oxygen Sag Curve in Stream, Streeter–Phelps formulation, Numerical Problems on DO prediction.	**9 Hrs**
UNIT – II (Blended Learning)	
TREATMENT METHODS-I: Volume Reduction, Strength Reduction, Neutralization, Equalization and Proportioning. **TREATMENT METHODS-II:** Removal of Inorganic suspended solids, Removal of Organic Solids, Removal of suspended solids and colloids. Treatment and Disposal of Sludge Solids	**9 Hrs**
UNIT – III	
COMBINED TREATMENT: Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated Wastes to Streams.	**6 Hrs**
UNIT – IV	
TREATMENT OF EFFLUENT FROM SELECTED INDUSTRIES-1 Process flow sheet showing origin / sources of waste water, characteristics of waste, alternative treatment methods, disposal, reuse and recovery along with flow sheet. Effect of waste disposal on water bodies **THE INDUSTRIES TO BE COVERED ARE:** 1. Cotton Textile Industry 2. Tanning Industry 3. Cane Sugar Industry 4. Distillery Industry	**6 Hrs**
UNIT – V	
TREATMENT OF EFFLUENT FROM SELECTED INDUSTRIES-2 1. Dairy Industry 2. Cement Industry 3. Steel Industry 4. Paper and Pulp Industry 5. Pharmaceutical Industry 6. Food Processing Industry	**9 Hrs**

Course Outcomes: The students will be able to	
1	Illustrate the importance of proper collection, conveyance, treatment and disposal of industrial wastewater.

2	Identify pollution problems and precautionary measures can be incorporated for various industries.
3	Analyse the health aspects of the community due to Industrial wastewater disposal and adopt control measures.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Industrial Waste Water Treatment.- Rao MN, and Dutta A.K.
2	Industrial Wastewater Treatment, Recycling and Reuse Book by Vinay M Bhandari and VivekRanadeISBN: 9780444634030 2014 edition

Reference Books:	
1	Industrial Waste Water Treatment- Nelsol L. Nemerow. 2016 edition
2	Waste Water Treatment, Disposal and Reuse – Metcalf and Eddy inc – Tata McGraw Hill Publications, 2003.
3	Industrial Wastewater Treatment – Patwardhan A.D., PHI Learning Private Ltd., New Delhi, 2009
4	Pollution Control Processes in industries- Mahajan S.P.
5	Relevant IS Codes.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓								✓			
CO2	✓					✓	✓		✓			
CO3		✓	✓			✓				✓		

Syllabus for 2018-19 Batch UG (CV)

Semester: VIII	
Course Title: Remote Sensing and Geographical Information System	
Course Code: **CV827**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE = 45 + 5 + 50= 100
Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the concept of photographic data application to determine relative positions of points, preparation of different thematic maps and its analysis.
2	To study the use of electromagnetic energy for acquiring qualitative and quantitative land information.
3	To analyse the data gathered from various sensors and interpret for various applications.
4	To understand the various applications of RS, GIS and GPS.

UNIT – I	
Remote Sensing: Remote Sensing- Definition, types of remote sensing, components of remote sensing, Electromagnetic Spectrum, Black body, Atmospheric windows, energy interaction with earth surface features. Spectral reflectance curve- physical basis for spectra reflectance curve, false color composite. Platforms and sensors. Sensor resolutions. Types of satellites- Indian and other remote sensing satellites (IRS, IKONS and Landsat). Concept of image interpretation and analysis - Principle of visual interpretation, recognition elements. Fundamentals of image rectification. Digital Image classification - supervised and unsupervised	**8 Hrs**
UNIT – II	
Photogrammetry: Introduction types of Photogrammetry, Advantages of Photogrammetry, and Introduction to digital Photogrammetry. Locating points from two phases determination of focal length. Aerial Photogrammetry: Advantages over ground survey methods - geometry of vertical photographs, scales of vertical photograph. Ground coordination- relief displacement, scale ground coordinates – flight planning	**9 Hrs**
UNIT – III	
Geographic Information System: Introduction, Functions and advantages, sources of data for GIS. Database – Types, advantages and disadvantages. Data Management – Transformation, Projection and Coordinate systems. Data input methods, Data Analysis. Overlay operations, network analysis, and spatial analysis. Outputs and map generation. . Introduction to GPS- components and working principles	**7 Hrs**
UNIT – IV (Blended Learning)	
Applications of GIS, Remote Sensing and GPS: Case studies on Water Resources engineering and management (prioritization of river basins, water perspective zones and its mapping), Case studies on applications of GIS and RS in highway alignment, Optimization of routes, accident analysis, Environmental related studies. Case studies on applications of GIS and RS in Disaster Management (Case studies on post disaster management - Earthquake and tsunami and pre disaster management - Landslides and floods) Urban Planning & Management - mapping of zones, layouts and infrastructures.	**8 Hrs**
UNIT – V	
Mapping, Planning and Management: Land use land cover (LULC) mapping. Case studies on infrastructure planning and management- Case studies on urban sprawl. Change detection studies – case studies on forests and urban area.	**7 Hrs**

Case studies on agriculture. Applications of geo-informatics in natural resources management: Geo Technical case Studies, site suitability analysis for various applications.	

Course Outcomes: The students will be able to	
1	Explain the principle of Remote Sensing (RS) and Geographical Information Systems (GIS) data acquisition and its applications
2	Apply RS and GIS technologies in various fields of engineering and social needs
3	Analyse and evaluate the information obtained by applying RS and GIS technologies

Text Books:	
1	Geographic Information System-An Introduction, Tor Bernharadsen, 3rd Edition, Wiley India Pvt. Ltd. New Delhi, 2009.
2	Principles of Remote sensing and Image Interpretation, Lillesand and Kiefer, 5th Edition, John Wiley Publishers, New Delhi, 2007

Reference Books:	
1	Remote Sensing and GIS, Bhatta B, Oxford University Press, New Delhi, 2008
2	Remote Sensing, Robert A. Schowengerdt, 3rd Edition, Elsevier India Pvt Ltd, New Delhi, 2009

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√			√		√	√					√
CO2	√	√		√		√	√					√
CO3	√	√		√	√	√	√					

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Finite Element Analysis	
Course Code: **CV831**	Evaluation Procedure: CIE + Assignment + SEE Marks = 45 + 5 + 50 = 100
Credits: **03**	
Hours: 39Hrs (L:T:P:S:2:2:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To learn modelling and analysis of the skeletal and continuum structures using displacement /stiffness approach.
2	To analyze the structure by force/flexibility approach based on direct approach and energy based methods.
3	To generate the elements and meshes by manual or digital approach.

UNIT – I	
INTRODUCTION: Basic Concepts, Background Review: Theory of Elasticity, Matrix displacement formulation, Energy concepts, Equilibrium and energy methods for analyzing structures.	**6 Hrs**
UNIT – II	
Rayleigh – Ritz Method, Galerkin's Method, Simple applications in structural analysis.	**6 Hrs**
UNIT – III	
FUNDAMENTALS OF FINITE ELEMENT METHOD: Displacement function and natural coordinates, construction of displacement functions for 2D truss and beam elements, Applications of FEM for the analysis of plane truss, continuous beam and simple plane frame problems.	**9 Hrs**
UNIT – IV	
ANALYSIS OF 2D CONTINUUM PROBLEMS: Elements and shape functions, Triangular, rectangular and quadrilateral elements, different types of elements, their characteristics and suitability for application. Polynomial shape functions, Lagrange's and Hermitian polynomials, compatibility and convergence requirements of shape functions.	**9 Hrs**
UNIT – V (Blended Learning)	
THEORY OF ISOPARAMETRIC ELEMENTS: Isoparametric, subparametric and super- parametric elements, characteristics of isoparametric quadrilateral elements. **FEM PROGRAM:** Structure of computer program for FEM analysis, description of different modules, pre and post processing.	**9 Hrs**

Course Outcomes: The students will be able to	
1	Identify the numerical techniques for solving engineering problems using FEM
2	Apply FEM based software's help to create different structural models and to change the elements and geometry of the system and structural analysis outputs are obtained in post processing stage.
3	Analyse the obtained results like deflections, stresses, strains and other parameters.

Text Books:	
1	Finite Element Analysis – Theory and Programming- Krishnamurthy. C.S – Tata McGraw Hill

	Co. Ltd., New Delhi. 2000
2	Introduction to Finite Elemnts in Engineering- Chadrupatha, Tirupathi R and Ashoka D University Press, India 2003
3	Finite Element Methods in Engineering- Butterworth and Heinemann 2001

Reference Books:	
1	Finite element analysis in engineering design- Rajasekharan. S. – Wheeler Publishers.
2	A First Course on Finite Element Method – Daryl L Logan, Cengage Learning
3	The Finite Element Method- Zienkeiwicz. O.C. – Tata McGraw Hill Co. Ltd., New Delhi.
4	Finite Element Analysis- S.S. Bhavikatti, - New Age International Publishers, New Delhi.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓		✓		✓							
CO3		✓	✓	✓								

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Reinforced Earth Structures	
Course Code: **CV832**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE = 45 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the importance of soil and its properties in Civil Engineering applications.
2	To demonstrate the index properties and engineering properties of different soils and Soil Structure.
3	To interpret the various factors influencing the soil behaviour.
4	To summarize the significance of soils and its behaviour in various applications of Civil engineering.

UNIT – I	
BASICS OF REINFORCED EARTH CONSTRUCTION: Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil. **GEOSYNTHETICS AND THEIR FUNCTIONS:** Historical developments, Recent developments, manufacturing process-woven & non-woven, Raw materials – polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Elastomers, Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geo-synthetics – Geo-textiles, Geo-grids, Geo-membranes, Geo-composites, Geo-nets, Geo-foam, Geo-mats, Geomeshes, Geo-webs etc.	**8 Hrs**
UNIT – II	
PROPERTIES AND TESTS ON MATERIALS: Properties – Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties. **DESIGN OF REINFORCED EARTH RETAINING WALLS:** Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, typical design problems.	**9 Hrs**
UNIT – III	
DESIGN OF REINFORCED EARTH FOUNDATIONS AND EMBANKMENTS: **Foundations:** Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, bearing capacity improvement in soft soils, General guidelines. **Embankments:** Concept of Reinforced Embankments, Internal and external stability, Selection of materials, typical design problems.	**7 Hrs**
UNIT – IV	
SOIL NAILING TECHNIQUES: Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken. **GEOSYNTHETICS FOR ROADS AND SLOPES:** Roads – Applications to Temporary and Permanent roads, Role of Geo-synthetic in enhancing properties of road, control of mud pumping, Enhancing properties of subgrade, Design requirements. Slopes – Causes for slope failure, Improvement of slope stability with Geo-synthetic, Drainage requirements, Construction technique.	**8 Hrs**
UNIT – V (Blended Learning)	

GEOSYNTHETICS – FILTER, DRAIN AND LANDFILLS:	**7 Hrs**
Filter & Drain – Conventional granular filter design criteria, Geo-synthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geosynthetic permeability, anti-clogging, survivability and durability. Landfills – Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps	

Course Outcomes: The students will be able to	
1	Interpret the type of soil in the field or in the laboratory
2	Predict the Suitability of soil for a particular project based on its Engineering properties
3	Calculate the rate and amount of settlement of foundation and compaction behaviour of soils
4	Evaluate the index and engineering properties and application to Civil engineering problems

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C, Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering - Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

Reference Books:	
1	Design with geosynthetics- Koerner. R.M. – Prince Hall Publication, 2005.
2	An introduction to Soil Reinforcement and Geosynthetics – SivakumarBabu G. L., Universities Press, Hyderabad, 2006
3	Engineering with Geosynthetics- Venkattappa Rao, G., &Suryanarayana Raju., G. V.S. – Tata Mc Graw Hill publishing Company Limited., New Delhi.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√				√						
CO3		√	√									
CO4		√	√									

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Urban Transport Planning	
Course Code: **CV833**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand and apply basic concepts and methods of urban transportation planning.
2	To explain the various methods of designing, conducting and administering surveys to provide the data required for transportation planning.
3	To understand the process of developing an organized mathematical modelling approach to solve select urban transportation planning problem.
4	To illustrate the various types of models used for travel forecasting, prediction of future travel patterns.

UNIT-I	
INTRODUCTION: Scope of Urban transport planning – Inter dependency of land use and traffic – System Approach to urban planning. **STAGES IN URBAN TRANSPORT PLANNING:** Trip generation – Trip production - Trip distribution – Modal split – Trip assignment.	**9 Hrs**
UNIT-II	
URBAN TRANSPORT SURVEY: Definition of study area-Zoning-Types of Surveys – Inventory of transportation facilities – Expansion of data from sample.	**6 Hrs**
UNIT-III	
TRIP GENERATION: Trip purpose – Factors governing trip generation and attraction – Category analysis – Problems on above **TRIP DISTRIBUTION:** Methods – Growth factors methods – Synthetic methods – Fractor and Furness method and problems on the above.	**9 Hrs**
UNIT-IV	
MODAL SPLIT: Factors affecting – characteristics of split – Model split in urban transport planning – problems on above **TRIP ASSIGNMENT:** Assignment Techniques – Traffic fore casting –Land use transport models – Lowry Model – Garin Lowry model Applications in India – (No problems on the above)	**9 Hrs**
UNIT-V	
URBAN TRANSPORT PLANNING FOR SMALL AND MEDIUM CITIES: Introduction – Difficulties in transport planning – Recent Case Studies	**6 Hrs**

Course Outcomes: The students will be able to	
1	Explain the importance of urban transport planning and its relation between various survey involved in urban transport for smooth flow of traffic.
2	Apply the fundamental principles of mathematical models for the trip generation and its assignment techniques for modal split and trip distribution methods.
3	Explain the basic elements and its related case studies with respect to urban transport planning for

	small and medium cities.

Text Books:	
1	Traffic Engineering and Transport Planning- L.R. Kadiyali - Khanna Publishers, New Delhi.
2	Principles of urban transport system planning - B.G. Hutchinson - Scripta Book Co., Washington D.C. & McGraw Hill Book Co.
3	Introduction to transportation engineering- JotinKristey and Kentlal - PHI, New Delhi.

Reference Books:	
1	Urban Transport planning- Black John - Croom Helm ltd, London.
2	Urban and Regional models in geography and planning- Hutchison B G – John Wiley and sons London.
3	Entropy in urban and regional modeling- Wilson A G - Pion ltd, London.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	√	√				√						
2	√	√		√								
3	√					√						

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Advanced Design of Steel Structures	
Course Code: **CV834**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50= 100
Teaching Hours: 39Hrs(L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To know different terminologies related to steel design and construction, codes used for design.
2	To study the philosophy of steel design and detailing.
3	To ackowledge the concept of limit state design and the basic material properties of structural steel.
4	To design members under axial loads like tension, compression and flexural loads are studied. Column bases, simple and gusseted base connections.

UNIT – I	
Basic principles of design, stress strain relationship for mild steel, shape factors for different cross sections. Evaluation of full plastic moment for mild steel beams, plastic hinges - Fixed, simply supported beams, effect of partial fixity, rectangular portal frames and gable frames. Statement of theorems with examples, application of principles of virtual work, partial and over collapse. Trial error method. Method of combined mechanisms, plastic moment distribution method and other methods of determining plastic collapse load. Estimation of deflection, factors affecting fully plastic moment.	**09 Hrs**
UNIT – II	
Minimum weight theories. Application of theorems and methods of solution. Plastic analysis applied to the design of fixed and continuous beams, portal and gable frames.	**06 Hrs**
UNIT – III	
Design of Built-up beams. Design of encased beams. Design of open web structures - Advantages and design methods.	**09 Hrs**
UNIT – IV	
Small moment resistant connections, large moment resistant connections, semi-rigid and behavior of semi-rigid connections, Beam line method, modified slope deflection method, modified moment distribution method.	**06 Hrs**
UNIT – V (Blended Learning)	
Principal axes of section, maximum stress due to unsymmetrical bending, the Zpolygon, deflection of beams under unsymmetrical bending, design of purlins subjected to unsymmetrical bending. Tubular structures – Introduction, permissible stresses, tubular columns and compression members, tubular tension members. Design of tubular members roof truss for given member forces and their combination, joints in tubular trusses, design of tubular beams and purlins.	**09 Hrs**

Course Outcomes: The students will be able to	
1	Apply steel as a construction material for advanced Civil Engineering structural elements for various applications.
2	Apply the concept of limit state design by applying various theories and methods to design and construction of steel structures.
3	Design steel tubular structures under various elastic properties using different design approaches.

Text Books:	
1	Plastic Analysis of steel structures. – Beedle, John wiley& sons Publishers.
2	Design of steel structures – William T. Segui, Cengage Learning, India-2007. 5.Steel Structures Vol - 1 and 2- J.F. Baker
3	Design of Steel Structures - Arya and Ajaman- Nem Chand & Bros. Roorkee.
4	Bureau of Indian Standards, IS: 800, IS: 875
5	Steel tables.

Reference Books:	
1	K.S.Sai Ram, Design of Steel Structures, Pearson Publishers.
2	Dr.Ramachandra&VirendraGehlot,Design of Steel Structures 1&2, SCIENTIFIC (INDIA).Publishers.
3	N.Subramanian, Design of Steel Structures(Limit state Design), Oxford Publishers.
4	Dr.Anand s. Arya &Dr.J.L.Ajmani, Design of Steel Structures, printed by N.C Jain, Roorkeepress,Roorkee.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓				✓		
CO2	✓		✓	✓								
CO3			✓	✓							✓	

Syllabus for 2018-19 Batch UG (CV)

Semester: VIII	
Course Title: Water Resources Engineering	
Course Code: **CV835**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 +50 = 100
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study various aspects of water resources, Surface and groundwater, design of hydraulic structures like dams, spillways and Canal systems.
2	To understand the concept of open wells, tube well and the site suitability for hydraulic structures.
3	To know the water quality aspects, water management and water supply, Surface and ground water flow modelling.

UNIT – I	
INTRODUCTION: Introduction, The world's fresh water resources, water use in the world, water management sectors, the water management community, the future of water resources. **HYDROLOGIC PROCESS:** Introduction to hydrology, hydrologic cycle, atmospheric and ocean circulation. **Precipitation:** Formation and types, rainfall variability, disposal of rainfall on a watershed, design storms.	**9 Hrs**
UNIT – II (Blended Learning)	
SURFACE RUNOFF: Drainage basins, hydrologic losses and rainfall excess, rainfall-runoff analysis using unit hydrograph approach, SCS rainfall-runoff relation. **WATER USE DATA:** Classification of uses, water for energy. Water for agriculture: irrigation trends and needs, irrigation infrastructures, irrigation system selection and performance, water requirement for irrigation, impacts of irrigation Drought management: options, severity, economic aspects of water storage. **ANALYSIS OF SURFACE WATER SUPPLY:** Surface water reservoir systems, Storage-firm yield analysis for water supply reservoir simulation.	**9 Hrs**
UNIT – III	
FLOOD CONTROL: Introduction, flood plain management, flood plain definition, hydrologic and hydraulic analysis of floods, storm water management. **FLOOD CONTROL ALTERNATIVES:** Structural and non-structural measures. Flood damage and net benefit estimation: damage relationships, expected damages, risk based analysis. Operation of reservoir systems for flood control.	**6 Hrs**
UNIT – IV	
STORM WATER CONTROL: Storm water management, storm system: information needs and design criteria. Rational method design. Hydraulic analysis of design, storm sewer appurtenances. Storm detention: effects of urbanisation, types of surface detention, subsurface disposal of storm water **STORM WATER CONTROL STREET AND HIGHWAY DRAINAGE AND CULVERTS:**	**9 Hrs**

Drainage of street and highway pavements: design considerations, flow in gutters, pavement drainage inlets, inlet locations, median, and embankment and bridge culvert design. Hydraulic design of culverts: culvert hydraulics, culver design.	
UNIT – V	
DESIGN OF SPILLWAYS FOR FLOOD CONTROL, STORAGE AND CONVEYANCE SYSTEM: Hydrologic considerations, Dams: types, hazard classification, spillway capacity, criteria, safety of existing dams. **Spillways:** Functions, overflow and free overfall spillways, ogee spillways, baffled chute spillways, culvert spillways. Gates and valves: spillway crest gates, gates for outlet works, valves for outlet works.	**6 Hrs**

Course Outcomes: The students will be able to	
1	Explain the problems related to water resources engineering.
2	Analyse water supply aspects to rural and urban schemes and in designing of hydraulic structures.
3	Design hydraulic structures to control the flood and storm waters.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Text Books	
1	Water resources engineering: Ralph A Wurbs, Wesley P. James, PHI Learning pvt. Ltd. New Delhi (2009 Ed.)
2	Water resources engineering: Chin D.A., Prentice Hall (2009 Ed.).
3	Water resources engineering: Larry W. Mays, John Wiley & sons (2005).

Reference Books	
1	Water resources engineering: Sathya Narayana Murthy Challa, New Age International Publishers, New Delhi, (2002 Ed.).
2	Elements of water resources engineering, Duggal K.N., Soni J.P., New age international publishers, New Delhi.
3	Water resources engineering, David Chin, Pearson Educaion, NJ, (2006 Ed.).
4	Water resources engineering, lecture notes, IIT Kharagpur.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓			✓	✓						
CO3	✓	✓	✓		✓	✓					✓	✓

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Environmental Impact Assessment	
Course Code: **CV836**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50= 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To foresee the potential environmental problems that would arise out of a proposed development.
2	To examine and select the suitable methodology for the various project options and predict significant environmental impact.
3	To identify the appropriate abatement and mitigating measures for the implementation of projects.

Unit-I	
INTRODUCTION TO EIA Development Activity and Ecological Factors, EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**09 Hrs**
Unit-II	
METHODOLOGIES OF EIA Frame work of Impact Assessment. Developmental Projects- Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	**06 Hrs**
Unit-III	
ENVIRONMENTAL ATTRIBUTES Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA. (Explanations with flow charts and examples)	**09 Hrs**
Unit-IV (Blended Learning)	
PUBLIC PARTICIPATION PROGRAM Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships-Matrices.	**09 Hrs**
Unit-V	
EIA FOR PROJECTS 1. EIA for Water resource developmental projects, 2. Highway projects: 3. Nuclear-Power plant projects, 4. Mining project (Coal, Iron ore), 5. Thermal Power Plant, and 6. Infrastructure Construction Activities.	**06 Hrs**

Text Books:	
1.	Methodologies for Environment Impact Assessment. - Anjaneyalu. Y.

Reference Books:	
1	Environmental Impact Analysis-Jain R.K.-Van Nostrand Reinhold Co.
2	Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
3	Environment Impact Assessment - Larry W. Canter - McGraw Hill

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub - questions) from each unit. • Each full question will have sub - question covering all the topics under a unit. • The students will have to answer five full questions, selecting one full question from each unit.

Course Outcomes: The students will be able to	
1	Explain systematic identification and evaluation of the potential impacts of proposed projects on components of the total environment.
2	Apply and identify the measures to be adopted to avoid environmental impact and reinforce a commitment in an organized and systematic approach by involving agencies and public participation.
3	Develop environmental protection mechanism for the proposed projects to protect and restore good environment with sustainable development.

CO-PO Mapping												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	✓					✓	✓					
2		✓				✓				✓		
3	✓						✓		✓		✓	

Syllabus for 2017-18 batch UG (CV)

Semester: VIII	
Course Title: Infrastructure Development	
Course Code: **CV837**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + SEE Marks = 45 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To exposed to practical aspects of Construction Industry.
2	To exposed to the status of Infrastructure and its related issues in India.

UNIT – I	
Construction Industry: Nature, characteristics, size and structure. Role of infrastructure development in employment generation and improving of the National economy. Various Agencies associated with infrastructure development in India as regards various sectors.	**9 Hrs**
UNIT – II	
Status of Infrastructure in India: Road sector, Port, Railway, communication, water supply and drainage, Power sector, oil and gas industry, Health and educational services. Infrastructure Development, Indian budget and its relation with Infrastructure development projects in India. Various programs related with Infrastructure development in rural and urban sector. Public Private Partnership (PPP) in Infrastructure, Draft Concession Agreement for PPP projects, Escrow Agreement.	**9 Hrs**
UNIT – III	
Issues related to infrastructure development: Pre– requisites necessary to ensure success for switching over from public sector management to private sector management, issues in developing, funding and managing infrastructure projects, role, responsibility of project management consultants. FDI in Infrastructure development, Problem areas and solutions.	**9 Hrs**
UNIT – IV	
Provisions made for Infrastructure Development in the 12th and 13th five year plans of the planning commission Government of India. Formation of the Indian Infrastructure Development Corporation. SPV's for Infra projects.	**6 Hrs**
UNIT – V (Blended Learning)	
JNNURM - Jawaharlal Nehru National Urban Renewal Mission, PMGSY – Pradhan Mantri Gram SadakYojana, RGGVY - Rajiv Gandhi GrameenVidyutikaranYojana, Ports Connectivity Projects, Indira Gandhi International Air Port project, Indo – US Nuclear Deal, Nuclear Power Projects in India.	**6 Hrs**

Course Outcomes: The students will be able to	
1	Apply and analyse to involve with the construction Industry for infrastructure development.
2	Develop project plan for different sectors.
3	Identify the various projects for state and central government works.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks.

- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books	
1	Construction Engineering & management of Projects(For Infrastructure & Civil Works) by S. C. Sharma, Khanna Publishers, 2nd Edition, 2011
2	Public Private Partnership in Infrastructure by R. N. Joshi Vision Publications – 2010.

Reference Books	
1	India Infrastructure Report – Rakesh Mohan
2	Infrastructure Today - Magazine
3	Document of five year plans, published by Govt. of India.
4	Infrastructure Development in India by RajarshiMajumderRawat Publications – 2010 Journal of the 'Indian Roads' Congress.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓					✓	
CO2			✓		✓			✓				✓
CO3						✓			✓			✓

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: ECOLOGY AND ENVIRONMENTAL IMPACT ASSESSMENT	
Course Code: **CVEO3**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + SEE Marks = 45 + 5 + 100
Teaching Hours: 52 Hrs (L:T:P:S:4:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To foresee the potential environmental problems that would arise out of a proposed development.
2	To examine and select the suitable methodology for the various project options and predict significant environmental impact.
3	To identify the appropriate abatement and mitigating measures for the implementation of projects.

UNIT – I	
INTRODUCTION TO EIA: Ecological Factors and Development Activity and, EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**12 Hrs**
UNIT – II	
METHODOLOGIES OF EIA: Frame work of Impact Assessment. Developmental Projects- Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	**9 Hrs**
UNIT – III	
ENVIRONMENTAL ATTRIBUTES: Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.	**12 Hrs**
UNIT – IV(Blended Learning)	
PUBLIC PARTICIPATION PROGRAM : Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships-Matrices.	**9 Hrs**
UNIT – V	
EIA FOR PROJECTS: EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Explain systematic identification and evaluation of the potential impacts of proposed projects on components of the total environment.
2	Apply and identify the measures to be adopted to avoid environmental impact and reinforce a commitment in an organized and systematic approach by involving agencies and public participation.
3	Develop environmental protection mechanism for the proposed projects to protect and restore good environment with sustainable development.

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks.

- There will be two full questions (with a maximum of four sub - questions) from each unit.
- Each full question will have sub - question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	Methodologies for Environment Impact Assessment. - Anjaneyalu. Y.

Reference Books:	
1	Environmental Impact Analysis-Jain R.K.-Van Nostrand Reinhold Co.
2	Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
3	Environment Impact Assessment - Larry W. Canter - McGraw Hill

CO-PO Mapping												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	√		√	√		√	√					
2		√		√		√		√		√		√
3	√		√				√	√	√		√	

Syllabus for 2017-18 Batch UG (CV)

Semester: VIII	
Course Title: Remote Sensing and Geographical Information System	
Course Code: **CVE04**	Evaluation Procedure:
Credits: **04**	CIE + Assignment + SEE = 45 + 5 + 50 = 100
Teaching Hours: 52 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the concept of photographic data application to determine relative positions of points, preparation of different thematic maps and its analysis.
2	To study the use of electromagnetic energy for acquiring qualitative and quantitative land information.
3	To analyse the data gathered from various sensors and interpret for various applications.
4	To understand the various applications of RS, GIS and GPS.

UNIT – I	
Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, and vegetation), Resolution, image registration and Image and False colour composite, elements of visual interpretation technique.	**10Hrs**
UNIT – II	
Remote sensing platforms and sensors Indian Satellites and Sensors characteristics, Remote Sensing Platforms, Sensors and Properties of Digital Data, Data Formats: Introduction, platforms- IRS, Landsat, SPOT, CARTOSAT, IKONOS, ENVISAT etc. sensors, sensor resolutions (spatial, spectral, radiometric and temporal). Basics of digital image processing- introduction to digital data, systematic errors(Scan Skew, Mirror-Scan Velocity, Panoramic Distortion, Platform Velocity , Earth Rotation) and non-systematic [random] errors (Altitude, Attitude), Image enhancements (Gray Level Thresholding, level slicing, contrast stretching), image filtering.	**12 Hrs**
UNIT – III	
Geographic Information System: Introduction to GIS; components of a GIS; Geographically Referenced Data, Spatial Data-Attribute data-Joining Spatial and attribute data, GIS Operations: Spatial Data Input – Attribute data Management, Geographic coordinate System, Datum; Map Projections: Types of Map Projections, Projected coordinate Systems. UTM Zones.	**10 Hrs**
UNIT – IV	
Data Models: Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Relational Database, Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion.	**12Hrs**
UNIT – V (Blended Learning)	
Integrated Application of RS and GIS: Applications in land use land cover analysis, change detection, water resources, urban planning, environmental planning, Natural resource management and Traffic management. Location Based Services and Its Applications.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the principle of Remote Sensing (RS) and Geographical Information Systems (GIS) data acquisition and its applications
2	Apply RS and GIS technologies in various fields of engineering and social needs
3	Analyse and evaluate the information obtained by applying RS and GIS technologies

Text Books:	
1	Principles of GIS - Peter A BurroughReachael A Mc. Donnel - (Oxford).
2	The GIS Book - George B. Korte, P.E. - 5th Edn.,Thomson Learning.

Reference Books:	
1	Remote sensing and image interpretation - Lillesand - (John Wiley and Sons).
2	Geographical Information system: Bemhard Sen -Wiley publications.
3	GIS and Computer cartography - Christopher Jones - (Longman).

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√	√									
CO3	√	√						√			√	√

Dr. Ambedkar Institute of Technology, Benaluru -

VIII Sem. BE (Civil) 2017-18

Sub Title : DESIGN AND COMPUTER AIDED DRAWING OF STEEL STRUCTURES		
Sub Code: CV81	**No of Credits** : 02= 2**:0:0 (L:T:P)**	**No of lecture hours/week :02**
Exam Duration : 3 hours	CIE + Drawings + SEE = 20 +30 + 50 = 100	**Total Hours : 26**

Objectives:

1. Design and detailing are taught to make the student ready to take up the field problems related to steel construction.
2. The scale used for different sections and detailing are explained to students to draw details clearly understandable to fabricators in the field.
3. It covers the knowledge about the behaviour and design of structural elements and their connections in accordance with latest code of practice IS-800-2007 based on limit state design.

Sl. No	Syllabus Contents	No. Of Hours	
		Teaching	Drawing
1	**PART - A** *(DRAWINGS TO BE PREPARED FOR GIVEN STRUCTURAL DETAILS USING CAD)* **UNIT - 1** **CONNECTIONS:** Bolted and welded, beam-beam, Beam-column, seated, stiffened and un-stiffened.	01**(T)**	03(D)
	UNIT - 2 **COLUMNS:** Splices, Column-column of same and different sections. Lacing and battens.	01**(T)**	03(D)
	UNIT - 3 **COLUMN BASES:** Slab base and gusseted base, grillage foundation.	**04 (T)**	15(D)
2	***PART – B,*** ***UNIT – 4, Design and drawing of*** i) Bolted and welded plate girder ii) Roof Truss (Forces in the members to be given) iii) Gantry girder	**7 (T)**	18(D)

NOTE (i):

(iii) Part-A : Drawing shall be done using CAD and practical examination shall be conducted separately.

(iv) Part-B: Design as per IS 800-2007, steel table and theory examination shall be conducted separately.

TEXT / REFERENCE BOOKS / Web links:

1. **Structural Design & Drawing** – N. Krishna Raju, Unversities Press, India.
2. **Design of Steel Structures** - N. Subramanian: Oxford University, Press.
3. **Design of Steel Structures** - Negi - Tata Mc Graw Hill Publishers.
4. **Design of Steel Structures** - Arya and Ajaman- Nem Chand & Bros. Roorkee.

5. Design of Steel Structures- Raghupati 6. IS : 800 – 2007 7. SP 6 (1) – 1984 or Steel Table. www.vtu.ac.in www.iitg.ernet.in>rkbc>presentation www.nptel.org.in http://books.google.co.in
Note (ii)
i. In part A, Two questions to be set, out of which one question to be answered (30% weightage). **ii. In part B, Two questions to be set, out of which one question to be answered (70% weightage).**

Course Outcomes:

CO1:The students will be ready to take up design and drawing of steel members, and sections with necessary details for practical problems.
CO2: Students gain the knowledge in the design of bolted and welded connections.
CO3: Students gain the knowledge in the design of plate girder and trusses.
CO4: They are trained to do job or consultancy.

Cos	Mapping with POs
CO1	PO1, PO2, PO8, PO9, PO10, PO11. PO12,
CO2	PO3, PO4, PO7, PO11,
CO3	PO1, PO5
CO4	PO6, PO7, PO8, PO10, PO12,

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Sub: Advanced Pre-stressed concrete Structures		
Sub Code: CV821	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. It provides method of design for shear, bending, torsion and ultimate flexural strength of PSC elements.
2. It provides a lucid exposition of theory and design of PSC in accordance with IS 1343-1980 code provisions.
3. It gives knowledge about design of deformation of PSC members and also presrtessed plates.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **ANCHORAGE ZONE STRESSES IN POST-TENSIONED MEMBERS:** Introduction, stress distribution in end block, investigations on Anchorage zone stresses, Magnel and Guyon's Methods, Comparative Analysis, Anchorage zone reinforcement. **SHEAR AND TORSIONAL RESISTANCE:** Shear and principal stresses, ultimate shear resistance, design of shear reinforcement, Torsion, Design of reinforcement for torsion.	**9**
2	**UNIT - 2** **COMPOSITE BEAMS:** Introduction, types of composite beams, analysis for stresses, differential shrinkage, serviceability limit state. Design for flexural and shear strength.	**6**

3	**UNIT – 3** **TENSION MEMBERS:** Introduction, Ties, Pressure pipes – fabrication process, analysis, design and specifications. Cylindrical containers- construction techniques, analysis, design and specifications. **STATICALLY INDETERMINATE STRUCTURES:** Introduction, Advantages of continuous members, effect of prestressing in indeterminate structures, methods of analysis for secondary moments, concordant cable profile, Guyon's theorem, Ultimate load analysis, Design of continuous beams and portal frames.	9
4	**UNIT – 4** **COMPRESSION MEMBERS:** Introduction, Columns, short columns, long columns, bi-axially loaded columns, Design specifications. **SLAB AND GRID FLOORS:** Types of floor slabs, Design of one way, two way and flat slabs. Distribution of pre-stressing tendons, Analysis and design of grid floors	**9**
5	**UNIT - 5** **PRECAST ELEMENTS:** Introduction, Prestressed concrete poles- manufacturing techniques, shapes and cross sectional properties, design loads, design principles. Railway sleepers-classification and Manufacturing techniques, design loads, analysis and design principles, Pre-stressed concrete pavements, slab and wall panels	**6**

TEXT Books / REFERENCE BOOKS / Web links:

1. **Design of Prestressed concrete structures - Lin T.Y. and H. Burns - John Wiley & Sons, 1982.**
2. **Prestressed Concrete- N. Krishna Raju - Tata McGraw Hill, 3rd edition, 1995.**
3. **Prestressed Concrete Structures- P. Dayaratnam - Oxford & IBH, 5th Edition, 1991.**
4. **Prestressed Concrete- G.S. Pandit and S.P. Gupta - CBS Publishers, 1993.**
5. **IS: 1343 : 1980.**

www.vtu.ac.in
www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1: The students gain the knowledge to estimate the losses in prestress.
CO2: With its up to date coverage and useful examples and valuable reference has been helping structural engineers.
CO3. Students are able to design of composite PSC beams
CO4. Students are capable of design and handle precast elements.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO3, PO5
CO3	PO1, PO2, PO5, PO6, PO11
CO4	PO1, PO2, PO5, PO7, PO11, PO12

Sub Title : ADVANCED FOUNDATION DESIGN		
Sub Code: CV822	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. Most civil engineering structures rest either on soil / rock. An analysis depending on type and shape of foundation is a prerequisite for any safe, economical and efficient design a sub structure.
2. The knowledge of the primary criteria to be considered in design and construction of deep foundations will expose the students face the challenges in dealing with the design of different types of foundations.

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Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **BEARING CAPACITY & SETTLEMENT:** Presumptive bearing capacity according to BIS, Factors affecting bearing capacity, Factors influencing selection of depth of foundation, types of shallow foundations, Settlement of Shallow Foundations: Immediate, consolidation, & differential settlements, Factors influencing settlement, Safe Bearing Capacity and Allowable Bearing Pressure. **SHALLOW FOUNDATIONS:** Principles of Design of foundation, Definition for Shallow and Deep foundation, Requirements for geotechnical and structural aspects of design, Proportioning of isolated footing, combined footing, Strap footing, Strip footing and Raft foundation	**9**
2	**UNIT - 2** **PILE FOUNDATIONS – SINGLE PILE:** Historical Development, Necessity of pile foundations, Classification, Load bearing capacity of single pile by Static formula, Dynamic formula, Pile load test and Penetration tests, Laterally Loaded Pile. **PILE FOUNDATIONS – GROUP EFFECT:** Pile groups, group action of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction, under reamed piles	**9**
3	**UNIT - 3** **WELL FOUNDATIONS:** Historical Development, Different shapes and characteristics of wells, Components of well foundation. Forces acting on well foundation. Sinking of wells. Causes and remedies for tilts and shifts.	**6**
4	**UNIT - 4** **DRILLED PIERS & CAISSONS:** Construction, advantages and disadvantages of drilled piers. Design concepts and Advantages and disadvantages of open, pneumatic and floating caissons. **FOUNDATIONS ON EXPANSIVE SOILS:** Definition, Identification, Mineral Structure, Index properties of expansive soils, Swell potential and Swell pressure, free swell, Tests on expansive soils, foundation treatment for structures in expansive soil, CNS layer.	**9**
5	**UNIT - 5** **MACHINE FOUNDATIONS:** Basic definitions in vibration, free and forced vibrations, determination of natural frequency, types of Machine foundations, general criteria for design of machine foundation., vibration analysis of a machine foundation, degrees of freedom of a block foundation, vibration isolation and control.	**6**

TEXT BOOKS:

1. **Soil Mechanics & Foundation Engineering** - V.N.S. Murthy - Pub: Sai Tech.
2. **Foundation Engineering** - Braja M. Das – Cengage Learning.
3. **Soil Mechanics Foundations** - Dr. B.C. Punmia - Pub: Laxmi publications, pvt. Ltd.

REFERENCE BOOKS / Web links:

1. **Foundation Analysis and Design** - Bowles J.E. (1996) - 5th Ed, McGraw Hill Pub. Co., New

York.
2. **Advanced Foundation Engineering** - V.N.S. Murthy - Publications: Sai Tech.
3. **Pile Foundation**.- Chellies
4. **Geotechnical Engineering.-** P. Purushotham Raj
5. **Geotechnical Engineering** - Dr. C. Venkataramaiah - Pub: New age Publications.
6. **Foundation Engineering** - Dr. P.C. Varghese: - Pub: Prentice Hall of India.
www.vtu.ac.in
www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note: One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. To familiarize the students with the design and construction aspects of shallow, deep foundations-like pile, pier, caisson and well foundations.

CO2. The method of treatment to black cotton soils with various testing methods will go a long way in dealing with modern methods of testing and usage.

CO3. Students are able to design the machine foundations.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO3, PO5, PO11,
CO3	PO1, PO2, PO5, PO11, PO12

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Sub Title: **PAVEMENT DESIGN**		
Sub Code: CV823	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. The materials used for construction of roads are studied for their characteristics, suitability and availability.
2. It is also taught the new and innovative methods to use waste materials for construction of roads and reduces the pollution.
3. The different methods of construction and different types of pavements are also taught.
4. The new equipments used for construction are also dealt.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **INTRODUCTION:** Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement – Design strategies of variables – Functions of sub-grade, sub base – Base course – surface course – comparison between Rigid and flexible pavement. **FUNDAMENTALS OF DESIGN OF PAVEMENTS:** Design life – Traffic factors – climatic factors – Road geometry – Subgrade strength and drainage, Stresses and deflections, Boussinesqs theory – principle, Assumptions – Limitations and problems on above - Busmister theory – Two layered analysis – Assumptions – problems on above	9
2	**UNIT - 2** **DESIGN FACTORS:** Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EWL concept. **FLEXIBLE PAVEMENT DESIGN:** Assumptions – McLeod Method – Kansas method – Tri-axial method - CBR method – IRC Method (old) - CSA Method using IRC 37-2001, problems on above.	9
3	**UNIT - 3** **STRESSES IN RIGID PAVEMENT:** Principle – Factors - wheel load and its repetition – properties of sub grade – propertie Pp ps ppppppconcrete. External conditions – joints – Reinforcement – Analysis of stresses – Assumptions – Westergaard's Analysis – Modified Westergaard equations – Critical stresses – Wheel load stresses, Warping stress – Frictional stress – combined stresses (using chart / equations) - problems on above. **DESIGN OF RIGID PAVEMENT:** Design of C.C. Pavement by IRC: 38 – 2002 for dual and Tendem axle load – Reinforcement in slabs – Requirements of joints – Types of joints – Expansion joint – contraction joint – warping joint – construction joint – longitudinal joint, Design of joints, Design of Dowel bars, Design of Tie bars – problems of the above	**9**

4	**UNIT - 4** **FLEXIBLE PAVEMENT FAILURES, MAINTENANCE AND EVALUATION:** Types of failures, causes, remedial/maintainance measures in flexible pavements – Functional Evaluation by visual inspection and unevenness measurement by using different technics - Structural Evaluation by Benkelman Beam Deflection Method, Falling weight deflectometer, GPR Method. Design factors for Runway Pavements - Design methods for Airfield pavements and problems on above.	**6**
5	**UNIT - 5** **RIGID PAVEMENT FAILURES, MAINTENANCE AND EVALUATION:** Types of failures, causes, remedial/maintainance measures in regid pavements – Functional Evaluation by visual inspection and unevenness measurements. Design factors for Runway Pavements - Design methods for Airfield pavements.	**6**

TEXT BOOKS:

1. **Highway Engineering**- Khanna & Justo
2. **Principles & Practices of Highway Engineering**- L R Kadiyalli & N B. Lal
3. **Pavement Analysis & Design** - Yang H. Huang- II edition.
4. Relevant IRC codes

REFERENCE BOOKS / Web links:

1. **Principles of Pavement Design**- Yoder and Witzack - 2nd edition, John Wileys and Sons
2. **Principles of Pavement Design**- Subha Rao

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www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1: The student gain the knowledge in the construction of Roads and the type of materials used for construction of roads and to reduces the pollution.
CO2: The students can acquire the knowledge related to Flexible pavement failures, maintenance and evaluation.
CO3: The students can acquire the knowledge related to Rigid pavement failures, maintenance and evaluation.

Cos	Mapping with POs

CO1	PO1, PO2,PO4
CO2	PO1, PO2, PO3, PO5
CO3	PO1, PO2, PO5, PO6, PO10

Sub Title : **EARTHQUAKE RESISTANT DESIGN OF STRUCTURES**		
Sub Code: CV824	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To Study the principle of Engineering Seismology and seismic zoning map of India.
2. To study the behaviour of buildings subjected to earthquake forces and the performance of Structures during past earthquakes..
3. The study of Seismic design philosophy, Determination of design lateral forces.
4. To achieve knowledge of design and development of problem solving skills.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** Earthquake ground Motion, Engineering Seismology, Theory of plate tectonics, seismic waves, Magnitude and intensity of earthquakes, local site effects, seismic zoning map of India. Seismic Design Parameters: Types of Earthquakes, earthquake ground motion characteristics, response spectra and design spectrum.	**9**
2	**UNIT - 2** Structural modelling, Code based seismic design methods. Response control concepts, seismic evaluation and retrofitting methods. Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity and plan configuration problems, Seismo resistant building architecture – lateral load resistant systems, building characteristics.	9
3	**UNIT - 3** Seismic design philosophy, Determination of design lateral forces - Equivalent lateral force procedure, dynamic analysis procedure.	**6**

4	UNIT - 4 Step by step procedure for seismic analysis of RC buildings (maximum of 4 storeys, without infills) - Equivalent static lateral force method, response spectrum methods.	**6**
5	UNIT - 5 Earthquake resistant analysis and design of RC buildings – Preliminary data, loading data, load combinations, analysis and design of subframes. (maximum of 4 storeys, without infills). Earthquake resistant design of masonry buildings - elastic properties of structural masonry, lateral load analysis, Design of two storied masonry buildings.	**9**

TEXT / REFERENCE BOOKS / Web links:

1. **Earthquake resistant design of structures** - Pankaj Agarwal, Manish Shrikande - PHI India.
2. **Earthquake Resistant Design of Structures** - S.K. Duggal - Oxford University Press, 2007.
3. **Earthquake Resistant Design**- Anil Chopra
4. **Earth Quake Engineering Damage Assessment and Structural design**- S.F. Borg - (John Wiley and Sons. 1983).

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www.nptel.org.in
http://books.google.co.in

Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1:The student are exposed to understand the dynamic loading system and how it is subjected and distributed for the safe working condition buildings, Bridges, Monumental structures, Assemblies and health Centers.
CO2: students will acquire the seismic design philosophy and determination of lateral forces.
CO3. The student are exposed to Earthquake resistant analysis and design of RC and masonry buildings

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO3, PO5
CO3	PO1, PO2, PO5, PO8, PO10, PO11

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Sub Title : INDUSTRIAL WASTEWATER TREATMENT		
Sub Code: CV825	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives :

1. To create the knowledge about the importance of proper collection and conveyance of Industrial wastewater from different polluting chemical / hazardous industries.
2. To create the importance of proper treatment methods of industrial waste water without creating nuisance to the society.
3. To create the importance of providing the control measures and treatment technologies to the industrial wastewater to develop healthy community.

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Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION:** Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Sampling, effluent and stream Standards and Legislation to Control Water Pollution. Stream Quality, Dissolved oxygen Sag Curve in Stream, Streeter– Phelps formulation, Numerical Problems on DO prediction.	9
2	**UNIT – 2** **TREATMENT METHODS-I:** Volume Reduction, Strength Reduction, Neutralization, Equalization and Proportioning. **TREATMENT METHODS-II:** Removal of Inorganic suspended solids, Removal of Organic Solids, Removal of suspended solids and colloids. Treatment and Disposal of Sludge Solids.	**9**
3	**UNIT – 3** **COMBINED TREATMENT:** Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated Wastes to Streams.	**6**
4	**UNIT – 4** **TREATMENT OF SELECTED INDUSTRIAL WASTE:** Process flow sheet showing origin / sources of waste water, characteristics of waste, alternative treatment methods, disposal, reuse and recovery along with flow sheet. Effect of waste disposal on water bodies **THE INDUSTRIES TO BE COVERED ARE:** 1. Cotton Textile Industry 2. Tanning Industry 3. Cane Sugar Industry & Distillery Industry	**6**
5	**UNIT – 5** **TREATMENT OF SELECTED INDUSTRIAL WASTE-I:** 1. Dairy Industry 2. Cement Industry 3. Steel and Cement Industry **TREATMENT OF SELECTED INDUSTRIAL WASTE-II:** 1. Paper and Pulp Industry 2. Pharmaceutical Industry 3. Food Processing Industry	**9**

REFERENCES

1. **Industrial Waste Water Treatment**- Nelsol L. Nemerow.
2. **Industrial Waste Water Treatment**.- Rao MN, and Dutta A.K.
3. **Waste Water Treatment, Disposal and Reuse** – Metcalf and Eddy inc – Tata McGraw Hill Publications, 2003.
4. **Industrial Wastewater Treatment** – Patwardhan A.D., PHI Learning Private Ltd., New Delhi, 2009
5. **Pollution Control Processes in industries**- Mahajan S.P.

6. Relevant IS Codes.
Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1:Students will come to know about the importance of proper collection, conveyance, treatment and disposal of industrial wastewater.

CO2: Pollution awareness problems can be identified and precautionary measures can be given

CO3: Health aspects of the community due to Industrial wastewater disposal can be identified and control measures can be adopted.

CO4: Haphazard distribution of Industries lead to environmental degradation leads to economical loss to the society.

Cos	Mapping with POs
CO1	PO2, PO4, PO5, PO6, PO8, PO11.
CO2	PO2, PO4, PO6, PO10, PO11.
CO3	PO2, PO5, PO6, PO10, PO12.
CO4	PO2, PO5, PO6, PO10.

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Sub Title : QUALITY MANAGEMENT SYSTEM IN CIVIL ENGINEERING		
Sub Code: CV826	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To create the knowledge about the importance of quality management system.
2. To create the importance of ISO 9001 - 2000 quality management system.
3. To study the quality management system procedures.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **QUALITY MANAGEMENT SYSTEM – QMS:** Introduction – Evolution of Quality Management System, Element of Quality, Quality Management System, Concept of Process, Network of Process in an organization, ISO 9000 Family, Applying ISO 9000 in practice, Importance of ISO 9000, Benefits of ISO standards of society, Total Quality Management, Comparison of ISO 9000 and TQM – Quality related definitions – Leaders in Quality or Quality Gurus – Customer Orientation – Mahatma Gandhi. **IMPLEMENTING ISO 9001-2000 QUALITY MANAGEMENT SYSTEM:** ISO 9000 – Quality Management Principles, ISO 9000 Documents Content of ISO 9001 : 2000, ISO 9001-2000 Quality Management System Requirements, General Requirements, Documentation Requirements, Management Responsibilities, Resource Management, Product Realization, Measurement, analysis and Improvement Monitoring and Measurement, Non-conforming Product, Analysis of data, Improvement, Implementing ISO 9001-2000 Quality Management System.	**9**
2	**UNIT – 2** **PREPARING A ISO 9001-200 QUALITY MANAGEMENT SYSTEM FOR CIVIL ENGINEERING:** Quality Manual, Introduction, Scope of the Quality Manual, Applicability, Responsibility, Quality Management System, General Requirements, Management Responsibilities, Management Commitment, Customer Focus, Indian Construction Company Quality Policy, Planning Responsibility, Authority and Communication, Management Review, Resource Management, Provision of Resources, Human Resources Product Realization, Planning or Product Realization, Customer Related Processes, Design and Development, Purchasing, Production and Service Provision, Control of Monitoring and Measuring Devices Measurement, analysis and Improvement, Monitoring and Measurement, Non-conforming product, Analysis of data, Improvement	**6**
3	**UNIT – 3** **QUALITY MANAGEMENT SYSTEM PROCEDURES:** Introduction, procedure for management review, Format for writing procedures, procedure for preparing Quality plans/ work instructions, Contract review, Design control,	**9**

	Document and data control, Document numbering system, Change request, procedure for purchasing, procedure for control of customer supplied product, procedure for product identification and traceability, procedure for process control, procedure for inspection and testing, procedure for control of inspection, measuring and test equipments, procedure for inspection and test status, procedure for the control of non-conforming product, procedure for corrective and preventive action, procedure for handling, storage, packaging and delivery, control of quality records, procedure for internal quality audits.	
4	**UNIT – 4** **WORK INSTRUCTIONS:** Introduction – Document and Data Control, Material Procurement, Material Handling, Tendering and Estimating, Planning, Design, Training, Plant and Equipment, Bar Bending Schedule, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair Works, Road Works, Painting Works, Water Proofing works, Drainage Works, Quality Assurance and Control, Patching and Transportation of Concrete. **METHOD STATEMENT:** Introduction, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair works, Concrete Demolition works, Road Works, Fencing works etc.	6
5	**UNIT – 5** 1. **JOB DESCRIPTION:** Introduction, Job Description of : Managing Director, Project Manager, Site Manager, Site Engineer, QA/QC Engineer, Foreman, Typist/Clerk, Design Engineer, Planning Engineer. 2. **QUALITY CONTROL PLAN/INSPECTION AND TEST PLANS (ITPS):** Introduction-Preparation of Project Quality Plans, Inspection and Test plant. **QUALITY RECORD/FORMATS:** Preparation of Standard Formats: Revision Control form, Document Distribution List, Document Master List, Non-Conformance Report, Store Issue/Receipt Voucher, Local Purchase Order, Material Stock Card, Audit Notification, Quality Audit Report, Corrective Action Report, Calibration Record, Calibration Master Sheet, Work Instruction, Job Description, Contract/Tender Review Form, Quantity Survey Estimation/Take off sheet, Material/Plant Requisition, Drawing Schedule, Bar-bending Schedule, Design Calculation Sheet, Request for Inspection, Concrete Inspection Request, Inspection Check List – Drainage, Painting, Request for Inspection-Concrete Repair, Accident Report Form, Concrete Production, Concrete Compressive Strength Test Results, Request to Conduct Cube Test, Quality Awareness Training Record.	9

REFERENCE BOOKS:

1. **Quality Management System in Civil Engineering** – D.S. Rajendra Prasad – ISO 9001-2000, Sapna Book House, Bangalore.
2. **Productivity and Quality Improvement** – John L. Hardesky – McGraw Hill Book Company.
3. **ISO 9000 Concepts, Methods, Implementation**- Bagchi – Wheeler Publishing.
4. **Training Manual on ISO 9000-2000 and TQM**- Girdhar J. Gyani – Raj Publishing House.
5. **Documenting Quality for ISO 9000 and other Industry Standards** – Gary E. MacLean –

Tata McGraw Hill Publishing Company Limited.
6. **Total Quality Management for Engineers** – Mohamed Zairi – Aditya Books Private Limited.
7. **Data Book for Civil Engineers Field Practice** – Elwyn E. Seelye – John Wiley & Sons, Inc.
8. **Properties of Concrete** – A.M. Neville – ELBS Publications.
9. IS : 456-2000 : Indian Standard Specifications for Plain and Reinforced Concrete Code of Practice : 4th Revision, Bureau of Indian Standards.
10. IS : 383-1990 : Indian Standard Specifications for Coarse and Fine Aggregates from Natural Sources for Concrete : Bureau of Indian Standards.
11. **Quality Management –** Kanishka Bedi –(Oxford university press).

/ Web links:

www.vtu.ac.in
www.iitg.ernet.in>rkbc>presentation
www.nptel.org.in
http://books.google.co.in

Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1: Students will come to know about the importance of quality management, conveyance, treatment.
CO2: The concept of disposal of industrial wastewater, Quality control plan / inspection and test plans can be acquired.
CO3. Students are able to understand the basic principles of ISO 9001-2000.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO3, ,
CO3	PO1, PO2, PO8, PO11, PO12,

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Sub Title : FINITE ELEMENT ANALYSIS		
Sub Code: CV831	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To train the students to know how to model and analyze the skeletal and continuum structures using displacement /stiffness approach.
2. To analyze the structure by force/flexibility approach based on direct approach and energy based methods.
3. The elements and meshes can be generated manually or automatically using computer as a tool.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT – 1** **INTRODUCTION:** Basic Concepts, Background Review: Theory of Elasticity, Matrix displacement formulation, Energy concepts, Equilibrium and energy methods for analyzing structures.	**6**
2	**UNIT – 2** Rayleigh – Ritz Method, Galerkin's Method, Simple applications in structural analysis.	**6**
3	**UNIT – 3** **FUNDAMENTALS OF FINITE ELEMENT METHOD:** Displacement function and natural coordinates, construction of displacement functions for 2D truss and beam elements. Applications of FEM for the analysis of plane truss, continuous beam and simple	9

	plane frame problems.	
4	**UNIT – 4** **ANALYSIS OF 2D CONTINUUM PROBLEMS:** Elements and shape functions, Triangular, rectangular and quadrilateral elements, different types of elements, their characteristics and suitability for application. Polynomial shape functions, Lagrange's and Hermitian polynomials, compatibility and convergence requirements of shape functions.	9
5	**UNIT – 5** **THEORY OF ISOPARAMETRIC ELEMENTS:** Isoparametric, subparametric and super- parametric elements, characteristics of isoparametric quadrilateral elements. **FEM PROGRAM:** Structure of computer program for FEM analysis, description of different modules, pre and post processing.	9

TEXT / REFERENCE BOOKS / Web links:

1. **Finite Element Analysis – Theory and Programming**- Krishnamoorthy – Tata McGraw Hill Co. Ltd., New Delhi.
2. **Finite Element Analysis for Engineering and Technology**- Chadrupatla, Tirupathi R., University Press, India
3. **Introduction to the Finite Element Method**- J.F. Abel and Desai. C.S. – Affiliated East West Press Pvt. Ltd., New Delhi.
4. **Finite Element Methods** – Debatis Deb – Prentice hall of India.
5. **Finite element analysis in engineering design**- Rajasekharan. S. – Wheeler Pulishers.
6. **A First Course on Finite Element Method** – Daryl L Logan, Cengage Learning
7. **The Finite Element Method**- Zienkeiwicz. O.C. – Tata McGraw Hill Co. Ltd., New Delhi.
8. **Finite Element Analysis**- S.S. Bhavikatti, - New Age International Publishers, New Delhi.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The Finite Element Method of Structural analysis helps in solving skeletal and continuum structural problems using computers.

CO2. Computers can be used to model and analyze the structures using this approach. It is a numerical method which gives an approximate solution which is very close to exact solution.

CO3. The elements and meshes can be generated manually or automatically using computer as a tool.

CO4. FEM based software's help to create different structural models, and to change the elements and geometry of the system and structural analysis outputs are obtained in post processing stage.
CO5. Results like deflections, stresses, strains, and other parameters can be obtained.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO5, PO6
CO3	PO1, PO2, PO3, PO5, PO8
CO4	PO1, PO2, PO5, PO11, PO12
CO5	PO1, PO2, PO3, PO5, PO8, PO11, PO12

Sub Title : REINFORCED EARTH STRUCTURES		
Sub Code: CV832	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. Soil is a particulate material capable of withstanding compression but is weak in tension.
2. A newly emerging solution has been devised by strengthening the soil by introducing reinforcement as ground anchors or soil nailing.
3. This solution is very useful in retaining structures and slope stability.
4. Many new reinforcing geo-synthetics like Geo-textiles, geo-grids, and Geo-composites have been found to serve the purpose.

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Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT- 1** **BASICS OF REINFORCED EARTH CONSTRUCTION:** Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil. **GEOSYNTHETICS AND THEIR FUNCTIONS** Historical developments, Recent developments, manufacturing process-woven & non-woven, Raw materials – polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Elastomers, Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geo-synthetics – Geo-textiles, Geo-grids, Geo-membranes, Geo-composites, Geo-nets, Geo-foam, Geo-mats, Geo-meshes, Geo-webs etc.	**9**
2	**UNIT- 2** **PROPERTIES AND TESTS ON MATERIALS** Properties – Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties **DESIGN OF REINFORCED EARTH RETAINING WALLS** Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, typical design problems	**9**
3	**UNIT- 3** **DESIGN OF REINFORCED EARTH FOUNDATIONS AND EMBANKMENTS** **Foundations –** Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, bearing capacity improvement in soft soils, General guidelines. **Embankments** – Concept of Reinforced Embankments, Internal and external stability, Selection of materials, typical design problems	**6**
4	**UNIT – 4** **SOIL NAILING TECHNIQUES** Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken. **GEOSYNTHETICS FOR ROADS AND SLOPES** Roads – Applications to Temporary and Permanent roads, Role of Geo-synthetic in enhancing properties of road, control of mud pumping, Enhancing properties of sub-grade, Design requirements Slopes – Causes for slope failure, Improvement of slope stability with Geo-synthetic, Drainage requirements, Construction technique.	**9**

5	**UNIT- 5** **GEOSYNTHETICS – FILTER, DRAIN AND LANDFILLS:** Filter & Drain – Conventional granular filter design criteria, Geo-synthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geo-synthetic permeability, anti-clogging, survivability and durability. Landfills – Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps	**6**

TEXT BOOKS:

1. **Design with geosynthetics**- Koerner. R.M. – Prince Hall Publication, 2005.
2. **Construction and Geotechnical Engineering using synthetic fabrics**- Koerner. R.M. & Wesh, J.P.- Wiley Inter Science, New York, 1980.
3. **An introduction to Soil Reinforcement and Geosynthetics** – Sivakumar Babu G. L., Universities Press, Hyderabad, 2006
4. **Reinforced Soil and its Engineering Applications, Swami Saran,** I. K. International Pvt. Ltd, New Delhi, 2006
5. **Engineering with Geosynthetics**- Venkattappa Rao, G., & Suryanarayana Raju., G. V.S. – Tata Mc Graw Hill publishing Company Limited., New Delhi.

REFERENCE BOOKS / Web links:

1. **Earth reinforcement and Soil structure**- Jones CJEP Butterworth's, London, 1996.
2. **Geotextile Hand Book**- Ingold, T.S. & Millar, K.S. – Thomas, Telford, London.
3. **Earth Reinforcement Practices** – Hidetoshi Octial, Shigenori Hayshi & Jen Otani –Vol. I, A.A. Balkema, Rotterdam, 1992.
4. **Ground Engineer's reference Book**- Bell F.G. – Butterworth's, London, 1987.
5. **Reinforced Earth**- Ingold, T.S. – Thomas, Telford, and London.
6. **Geosynthetics in Civil Engineering**, Editor Sarsby R W, Woodhead Publishing Ltd & CRC Press, 2007

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. A Course on Reinforced earth structures will introduce to the students the emerging trends and recent advances made in strengthening soil by using inclusions, to overcome its deficiency and make it useful for design and construction even when the bearing capacity is poor or in the design of steep and stable slopes.

CO2. The suitable reinforcing technique is based on the function the geo-synthetic performs at the site.

CO3. Students are able to design the filters, drains and land fills.

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Cos	Mapping with POs
CO1	PO1, PO2,
CO2	PO1, PO2, PO5, PO8,
CO3	PO1, PO2, PO5, PO10, PO12

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Sub Title: **URBAN TRANSPORT PLANNING**		
Sub Code: CV833	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration: 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. Due to urbanization, the people are settling in town and cities, hence urban planning is required.
2. Due to growing population in cities, lot of congestion and slums are developed.
3. The planning of towns and cities for smooth flow of traffic is very essential.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **INTRODUCTION:** Scope of Urban transport planning – Inter dependency of land use and traffic – System Approach to urban planning. **STAGES IN URBAN TRANSPORT PLANNING**: Trip generation – Trip production - Trip distribution – Modal split – Trip assignment.	9
2	**UNIT - 2** **URBAN TRANSPORT SURVEY** - Definition of study area-Zoning-Types of Surveys – Inventory of transportation facilities – Expansion of data from sample.	**6**
3	**UNIT - 3** **TRIP GENERATION:** Trip purpose – Factors governing trip generation and attraction – Category analysis – Problems on above **TRIP DISTRIBUTION:** Methods – Growth factors methods – Synthetic methods – Fractor and Furness method and problems on the above.	**9**
4	**UNIT - 4** **MODAL SPLIT:** Factors affecting – characteristics of split – Model split in urban transport planning – problems on above **TRIP ASSIGNMENT:** Assignment Techniques – Traffic fore casting –Land use transport models – Lowry Model – Garin Lowry model Applications in India – (No problems on the above)	9
5	**UNIT - 5** **URBAN TRANSPORT PLANNING FOR SMALL AND MEDIUM CITIES:** Introduction – Difficulties in transport planning – Recent Case Studies	**6**

TEXT BOOKS:

1. **Traffic Engineering and Transport Planning**- L.R. Kadiyali - Khanna Publishers.
2. **Principles of urban transport system planning** - B.G. Hutchinson - Scripta Book Co., Washington D.C. & McGraw Hill Book Co.
3. **Introduction to transportation engineering**- Jotin Kristey and Kentlal - PHI, New Delhi.

REFERENCE BOOKS / Web links:

1. **Urban Transport planning**- Black John - Croom Helm ltd, London.
2. **Urban and Regional models in geography and planning**- Hutchison B G - John Wiley and sons London.
3. **Entropy in urban and regional modeling**- Wilson A G - Pion ltd, London.

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1: The students are exposed to plan the new cities and to achieve smooth flow of traffic.
CO2: Students are exposed to urban transport planning for small and medium cities
CO3. Students are able to forecast the future traffic demands.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO5, PO6
CO3	PO1, PO2, PO5, PO6, PO10, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ADVANCED DESIGN OF STEEL STRUCTURES		
Sub Code: CV834	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. To know different terminologies related to steel design and construction, codes used for design.
2. The philosophy of steel design and detailing are studied.
3. The concept of limit state design and the basic material properties of structural steel are studied.
4. The design of members under axial loads like tension, compression and flexural loads are also studied. Column bases, simple and gusseted base connections are discussed.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** **INTRODUCTION:** Basic principles of design, stress strain relationship for mild steel, shape factors for different cross sections. Evaluation of full plastic moment for mild steel beams, plastic hinges - Fixed, simply supported beams, effect of partial fixity, rectangular portal frames and gable frames. Statement of theorems with examples, application of principles of virtual work, partial and over collapse. Trial error method. Method of combined mechanisms, plastic moment distribution method and other methods of determining plastic collapse load. Estimation of deflection, factors affecting fully plastic moment.	**9**
2	**UNIT - 2** Minimum weight theories. Application of theorems and methods of solution. Plastic analysis applied to the design of fixed and continuous beams, portal and gable frames.	**6**
3	**UNIT - 3** Design of Built-up beams. Design of encased beams. Design of open web structures - Advantages and design methods	**9**

4	**UNIT - 4** Small moment resistant connections, large moment resistant connections, semi-rigid and behavior of semi-rigid connections, Beam line method, modified slope deflection method, modified moment distribution method.	**6**
5	**UNIT - 5** Principal axes of section, maximum stress due to unsymmetrical bending, the Z-polygon, deflection of beams under unsymmetrical bending, design of purlins subjected to unsymmetrical bending. Tubular structures – Introduction, permissible stresses, tubular columns and compression members, tubular tension members. Design of tubular members roof truss for given member forces and their combination, joints in tubular trusses, design of tubular beams and purlins.	**9**

TEXT/REFERENCE BOOKS / Web links:

1. **Plastic Analysis**- B.G. Neal.
2. **Introduction to Plastic Analysis of Steel Structures**- J.F. Banker and Heyman
3. **Plastic Analysis of steel structures**.- Beedle
4. **Design of steel structures** – William T. Segui, Cengage Learning, India-2007.
5. **Steel Structures Vol - 1 and 2**- J.F. Baker
6. **Design of Steel Structures**- Ramachandra.
7. **Design of Steel Structures**.- Arya and Ajmani
8. CMERI Design Hand Book for Open Web Structures, Durgapur.
9. IS : 800-2007, Steel Table SP-6 (6) ,

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1. The student is exposed to latest design philosophy of steel as a construction material.

CO2. With the knowledge gained candidate will be ready to take up the design and construction of steel.

CO3. Opportunities are available for the expertise in steel design and construction.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO5, PO6, PO
CO3	PO1, PO2, PO3, PO11. PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : WATER RESOURCES ENGINEERING		
Sub Code: CV835	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

Objectives:

1. Students to undergo training about various aspects of water resources, Surface and ground water, design of hydraulic structures like dams, spillways, Canal systems, bore wells.
2. To understand the concept of open wells, site suitability for hydraulic structures.
3. To know the water quality aspects, water management and water supply, Surface and ground water modeling etc.

Sl. No	Syllabus Contents	No. Of Hours

1	**UNIT:1** INTRODUCTION: Introduction, The world's fresh water resources, water use in the world, water management sectors, the water management community, the future of water resources. HYDROLOGIC PROCESS: Introduction to hydrology, hydrologic cycle, atmospheric and ocean circulation. Precipitation: formation and types, rainfall variability, disposal of rainfall on a watershed, design storms.	**9**
2	**UNIT:2** SURFACE RUNOFF Drainage basins, hydrologic losses and rainfall excess, rainfall-runoff analysis using unit hydrograph approach, SCS rainfall-runoff relation. WATER WITHDRAWLS AND USES Water use data: classification of uses, water for energy. Water for agriculture: irrigation trends and needs, irrigation infrastructures, irrigation system selection and performance, water requirement for irrigation, impacts of irrigation Drought management: options, severity, economic aspects of water storage. Analysis of surface water supply: surface water reservoir systems, storage-firm yield analysis for water supply reservoir simulation.	**9**
3	**UNIT:3** FLOOD CONTROL Introduction, flood plain management, flood plain definition, hydrologic and hydraulic analysis of floods, storm water management. Flood control alternatives: structural and non-structural measures. Flood damage and net benefit estimation: damage relationships, expected damages, risk based analysis. Operation of reservoir systems for flood control.	**6**
4	**UNIT:4** STORM WATER CONTROL: Storm water management, storm system: information needs and design criteria. Rational method design. Hydraulic analysis of design, storm sewer appurtenances. Storm detention: effects of urbanisation, types of surface detention, subsurface disposal of storm water STORM WATER CONTROL STREET AND HIGHWAY DRAINAGE AND CULVERTS: Drainage of street and highway pavements: design considerations, flow in gutters, pavement drainage inlets, inlet locations, median, embankment and bridge culvert design. Hydraulic design of culverts: culvert hydraulics, culver design.	**9**

5	**UNIT:5** DESIGN OF SPILLWAYS FOR FLOOD CONTROL, STORAGE AND CONVEYANCE SYSTEM: Hydrologic considerations, Dams: types, hazard classification, spillway capacity, criteria, safety of existing dams. Spillways: functions, overflow and free overfall spillways, ogee spillways, baffled chute spillways, culvert spillways. Gates and valves: spillway crest gates, gates for outlet works, valves for outlet works.	**6**

Text Books:

1. Water resources engineering: Ralph A Wurbs, Wesley P. James, PHI Learning pvt. Ltd. New Delhi (2009 Ed.).
2. water resources engineering: Chin D.A., Prentice Hall (2009 Ed.).
3. wate resources engineering: Larry W. Mays, John Wiley & sons (2005).

Reference Books / Web links:

1. Water resources engineering : Sathya Narayana Murthy Challa, New Age International Publishers, New Delhi, (2002 Ed.).
2. Water resources engineering, lecture notes, IIT Kharagpur.
3. Elements of water resources engineering, Duggal K.N., Soni J.P., New age international publishers, New Delhi.
4. Water resources engineering, David Chin, Pearson Educaion, NJ, (2006 Ed.).

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Note : One Question to be set from each unit and for choice two questions to be set from any two units.

Course Outcomes:

CO1: Make students competent to deal with problems related to water resources engineering
CO2: Water supply aspects to rural and urban schemes and in designing of hydraulic structures.
CO3. Students are able to design the structure to control the flood and storm water.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO5, PO6,
CO3	PO1, PO2, PO3, PO5, PO6, PO11. PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : ENVIRONMENTAL IMPACT ASSESSMENT		
Sub Code: CV836	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

OBJECTIVES:

1. Is to foresee the potential environmental problems that would arise out of a proposed development and address them in the project's planning and design stage.
2. To examine and select the best from the project options available.
3. Predict significant reticular environmental impact.
4. To identify and incorporate into the project plan appropriate abatement and mitigating measures and the environmental costs and benefits of the projects to the community.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information,	**9**
2	**UNIT - 2** Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Step-by-step procedures for conducting EIA, Limitations of EIA.	**6**
3	**UNIT - 3** Methodologies, Application and Techniques of EIA. Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects.	**9**
4	**UNIT - 4** Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements.	**9**
5	**UNIT - 5** EIA for Water resource developmental projects, Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Highway Project.	**6**

REFERENCES / Web links:

1. **Environmental Impact Analysis**-Jain R.K.-Van Nostrand Reinhold Co.
2. **Environment Impact Assessment.-** Anjaneyalu. Y.
3. Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
4. **Environment Impact Assessment** - Larry W. Canter - McGraw Hill Publication.

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http://books.google.co.in
Note : One Question to be set from each unit and for choice two questions to be set from unit 1 and 3.

Course Outcomes:

CO1. The students will be exposed to understand a systematic identification and evaluation of the potential impacts (effects) of proposed projects on components of the total environment.

CO2. The students will understand how to plan and program the measures to be adopted to avoid environmental impact and reinforce a commitment in an organized and systematic approach by involving agencies and public participation.

CO3. The students finally will be able to develop environmental protection mechanism in the proposed projects to protect and restore good environment with sustainable development

Co1	Po1,Po2
Co2	Po1,Po2,Po3,Po4,Po5,Po7,Po9,Po11,Po12
Co3	Po1,Po2,Po3,Po5,Po6,Po7,Po8,Po9,Po10,Po11,Po12

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Sub Title : INFRASTRUCTURE DEVELOPMENT		
Sub Code: CV837	**No of Credits** : 03 = 3**:0:0 (L:T:P)**	**No of lecture hours/week : 03**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 39**

OBJECTIVES:

1. The students will be exposed to practical aspects of Construction Industry.
2. The students will be exposed to the status of Infra-structure and related issues in India

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT—1** **Construction Industry**: Nature, characteristics, size and structure. Role of infrastructure development in employment generation and improving of the National economy. Various Agencies associated with infrastructure development in India as regards various sectors.	9
2	**UNIT—2 Status of Infrastructure in India**: Road sector, Port, Railway, communication, water supply and drainage, Power sector, oil and gas industry, Health and educational services. Infrastructure Development, Indian budget and its relation with Infrastructure development projects in India. Various programs related with Infrastructure development in rural and urban sector. Public Private Partnership (PPP) in Infrastructure, Draft Concession Agreement for PPP projects, Escrow Agreement.	9

3	**UNIT—3** **Issues related to infrastructure development** – pre– requisites necessary to ensure success for switching over from public sector management to private sector management, issues in developing, funding and managing infrastructure projects, role, responsibility of project management consultants. FDI in Infrastructure development, Problem areas and solutions.	9
4	**UNIT– 4** **Provisions made for Infrastructure Development** in the 12th and 13th five year plans of the planning commission Government of India. Formation of the Indian Infrastructure Development Corporation. SPV's for Infra projects.	6
5	**UNIT– 5** JNNURM - Jawaharlal Nehru National Urban Renewal Mission, PMGSY – Pradhan Mantri Gram Sadak Yojana, RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana, Ports Connectivity Projects, Indira Gandhi International Air Port project, Indo – US Nuclear Deal, Nuclear Power Projects in India.	6

Course Outcomes:

1. The students understand how to involve with the construction Industry for infrastructure development.
2. This subject is base for issues related to Construction Industry to all technical professional.
3. Students are able to implement the various projects of state and central government.

Reference Books / Web links:

1. Construction Engineering & management of Projects(For Infrastructure & Civil Works) by S. C. Sharma, Khanna Publishers, 2nd Edition, 2011
2. India Infrastructure Report – Rakesh Mohan
3. Infrastructure Today - Magazine
4. Document of five year plans, published by Govt. of India.
5. Public Private Partnership in Infrastructure by R. N. Joshi Vision Publications – 2010.
6. Infrastructure Development in India by Rajarshi Majumder Rawat Publications – 2010 7. Journal of the 'Indian Roads' Congress.

Cos	Mapping with POs
CO1	PO1, PO2
CO2	PO1, PO2, PO3, PO5
CO3	PO1, PO2, PO5, PO10, PO11

Sub Title : ECOLOGY AND ENVIRONMENTAL IMPACT ASSESSMENT		
Sub Code: CVE03	**No of Credits** : 04 = 4**:0:0 (L:T:P)**	**No of lecture hours/week : 04**
Exam Duration : 3 hours	CIE + Assignment + SEE = 45 +5 + 50 = 100	**Total Hours : 52**

OBJECTIVE:

1. Is to foresee the potential environmental problems that would arise out of a proposed development and address them in the project's planning and design stage.

2. To examine and select the best from the project options available and to predict significant reticular environmental impact
3. To identify and incorporate into the project plan appropriate abatement and mitigating measures.
4. To identify the environmental costs and benefits of the projects to the community.

Sl. No	Syllabus Contents	No. Of Hours
1	**UNIT - 1** Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**12**
2	**UNIT - 2** Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	9
3	**UNIT - 3** Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.	**12**
4	**UNIT - 4** Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships- Matrices.	**9**
5	**UNIT - 5** EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.	**10**

Text Book:

1. **Environment Impact Assessment.-** Anjaneyalu. Y.

REFERENCES / Web links:

2. **Environmental Impact Analysis**-Jain R.K.-Van Nostrand Reinhold Co.
3. Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
4. **Environment Impact Assessment** - Larry W. Canter - McGraw Hill Publication.

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http://books.google.co.in

Note : One Question to be set from each unit and for choice two questions to be set from unit 1 and 3

Course Outcomes:

CO1. The students will be exposed to understand a systematic identification and evaluation of the

potential impacts (effects) of proposed projects on components of the total environment.

CO2. The students will understand how to plan and program the measures to be adopted to avoid environmental impact and reinforce a commitment in an organized and systematic approach by involving agencies and public participation.

CO3. The students finally will be able to develop environmental protection mechanism in the proposed projects to protect and restore good environment with sustainable development immaterial of their branch of engineering.

Cos	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO5, PO6
CO3	PO1, PO2, PO5, PO10, PO11

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Sub Title : Main-Project		
Sub Code: CVP84	**No of Credits** : 12 = 0**:0:12 (L:T:P)**	**No of contact hours/week : 12**
Exam Duration : 3 hours	CIE + SEE = 50 + 50 = 100	**Total Hours : 52**

Objectives:

3. Training the students to undergo Research exposure and to gain knowledge in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
4. The students are exposed to innovative ideas to carry out the project work in the related area of project.

Sl. No.	Syllabus Contents	No. Of Hours
	Analysis of Structure for earthquake ground motion, Time history analysis, Pushover analysis, Wind load analysis. Structural behaviour of RC Structural elements, Health monitoring, Repair and Rehabilitation of Structural members. Study on the behaviour of Steel Structural Elements. Study on Special Concrete, Strength and durability properties of Concrete with mineral admixtures. Study of Engineering properties of different types of soil and their application. Soil Stabilization techniques, Soil Structure interaction and liquefaction of soil. Traffic Volume and design of automatic signal system, Pavement design, Study on Mono Rail. and Metro Rail. Water sheds management, Water sheds management using ARC GIS, De-siltation of tank, Rain water harvesting and Ground water recharge, Impact of Urbanization on ground water using Remote Sensing and GIS, River bank filtration study. Application of data mining techniques in the field of air pollution. Characterization of industrial effluents, Health risk analysis due to air pollution, Study on impact of various developmental activities on climate change, Solid waste management.	

An extensive Research/training involving investigation/design/ management of the above mentioned projects is to be conducted for 4 hours per week. The student shall submit the project (Phase-I in VII Sem BE and Phase-II in VIII Sem. BE) report consisting of Research work.

Course Outcomes:

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CO1: The students gain the knowledge in the analysis of Structure due to natural disaster, Health monitoring, repair and rehabilitation of structure and development of new materials in the construction Industry,

CO2: The students gain the knowledge in the soil structure interaction.

CO3: The students gain the knowledge in the field of water resources management and ground water recharge

CO4: The students gain the knowledge in the field of Traffic engineering and pavement design.

CO5: The students gain the knowledge in the field of environmental engineering and solid waste management.

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO5,PO11,PO12
CO2	PO1, PO2,PO4, PO5, PO6,PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11,PO12
CO4	PO1, PO2, PO5, PO10, PO11,PO12
CO5	PO1, PO2, PO5, PO10, PO11,PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : SEMINAR		
Sub Code: CVS85	**No of Credits** : 2 = 0**:0:2 (L:T:P)**	**No of contact hours/week : 02**
Exam Duration : 3 hours	CIE = 50	**Total Hours :**

Objectives:

1. Training the students to present a seminar on the current topics in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
2. The students are exposed to innovative ideas to present a seminar in the related area of research.

Sl. No.	Syllabus Contents	No. Of Hours
	Area of seminar topics : 1. Structural engineering 2. Concrete technology 3. Construction technology 4. Transportation engineering 5. Water resource engineering 6. Geotechnical engineering 7. Environmental engineering 8. Bridge engineering 9. Irrigation engineering 10. Earthquake engineering	

Course Outcomes:

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CO1: The students gain the knowledge in the analysis of Structure due to natural disaster, Health monitoring, repair and rehabilitation of structure and development of new materials in the construction Industry,

CO2: The students gain the knowledge in the soil structure interaction.

CO3: The students gain the knowledge in the field of water resources management and ground water recharge

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Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO5,PO11,PO12
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CO3	PO1, PO2, PO5, PO10, PO11,PO12
CO4	PO1, PO2, PO5, PO10, PO11,PO12
CO5	PO1, PO2, PO5, PO10, PO11,PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : Main-Project		
Sub Code: CVP84	**No of Credits** : 12 = 0**:0:12 (L:T:P)**	**No of contact hours/week : 12**
Exam Duration : 3 hours	CIE + SEE = 50 + 50 = 100	**Total Hours : 52**

Objectives:

3. Training the students to undergo Research exposure and to gain knowledge in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
4. The students are exposed to innovative ideas to carry out the project work in the related area of project.

Sl. No.	Syllabus Contents	No. Of Hours
	Analysis of Structure for earthquake ground motion, Time history analysis, Pushover analysis, Wind load analysis. Structural behaviour of RC Structural elements, Health monitoring, Repair and Rehabilitation of Structural members. Study on the behaviour of Steel Structural Elements. Study on Special Concrete, Strength and durability properties of Concrete with mineral admixtures. Study of Engineering properties of different types of soil and their application. Soil Stabilization techniques, Soil Structure interaction and liquefaction of soil. Traffic Volume and design of automatic signal system, Pavement design, Study on Mono Rail. and Metro Rail. Water sheds management, Water sheds management using ARC GIS, De-siltation of tank, Rain water harvesting and Ground water recharge, Impact of Urbanization on ground water using Remote Sensing and GIS, River bank filtration study. Application of data mining techniques in the field of air pollution. Characterization of industrial effluents, Health risk analysis due to air pollution, Study on impact of various developmental activities on climate change, Solid waste management.	

An extensive Research/training involving investigation/design/ management of the above mentioned projects is to be conducted for 4 hours per week. The student shall submit the project (Phase-I in VII Sem BE and Phase-II in VIII Sem. BE) report consisting of Research work.

Course Outcomes:

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CO1: The students gain the knowledge in the analysis of Structure due to natural disaster, Health monitoring, repair and rehabilitation of structure and development of new materials in the construction Industry,

CO2: The students gain the knowledge in the soil structure interaction.

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Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO5,PO11,PO12
CO2	PO1, PO2,PO4, PO5, PO6,PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11,PO12
CO4	PO1, PO2, PO5, PO10, PO11,PO12
CO5	PO1, PO2, PO5, PO10, PO11,PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : SEMINAR		
Sub Code: CVS85	**No of Credits** : 2 = 0**:0:2 (L:T:P)**	**No of contact hours/week : 02**
Exam Duration : 3 hours	CIE = 50	**Total Hours :**

Objectives:

1. Training the students to present a seminar on the current topics in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
2. The students are exposed to innovative ideas to present a seminar in the related area of research.

Sl. No.	Syllabus Contents	No. Of Hours
	Area of seminar topics : 1. Structural engineering 2. Concrete technology 3. Construction technology 4. Transportation engineering 5. Water resource engineering 6. Geotechnical engineering 7. Environmental engineering 8. Bridge engineering 9. Irrigation engineering 10. Earthquake engineering	

Course Outcomes:

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CO1: The students gain the knowledge in the analysis of Structure due to natural disaster, Health monitoring, repair and rehabilitation of structure and development of new materials in the construction Industry,

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CO4	PO1, PO2, PO5, PO10, PO11,PO12
CO5	PO1, PO2, PO5, PO10, PO11,PO12

Semester: VII	
Course Title: PROJECT PHASE - I	
Course Code: CVP78	**CIE + SEE = 50 + 50 = 100 Marks**
Credits: 02	
Hours: 26 Hrs. (L:T:P:S:0:0:26:0)	**SEE Duration: 3 Hrs**

Course Learning Objectives:	
1	To improve the professional competency and research aptitude by touching the specific areas which otherwise not covered by theory or laboratory classes.
2	The project work aims to develop the work practice in students to apply theoretical and practical tools / techniques to solve real life problems related to industry/field and current research.

The project work can be analysis and design projects of innovative nature or experimental investigation or numerical simulations or a combination of these.

Appropriate software developments with sufficient literature contributions can also be taken up. Each student batch will be allotted with a faculty as guide.

In specific cases student may consult with an external guide with the prior consents of internal guide and head of the department.

In this semester, students are expected to finalize appropriate topic of research, complete the required literature survey and about 25% of the objectives of their intended research.

Reading Materials	
1	Journal Publication.
2	Conference / Seminar Proceedings.
3	Handbooks / Research Digests / Codebooks.

Course Outcomes: The students will be able to	
1	Identify and chose appropriate topic of relevance.
2	Critically evaluate literature in chosen area of research & Establish Scope of work.
3	Define Research Problem Statement.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO5, PO11, PO12
CO2	PO1, PO2, PO4, PO5, PO6, PO11, PO12
CO3	PO1, PO2, PO5, PO10, PO11, PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : Main-Project		
Sub Code: CVP84	**No of Credits** : 12 = 0**:0:12 (L:T:P)**	**No of contact hours/week : 12**
Exam Duration : 3 hours	CIE + SEE = 50 + 50 = 100	**Total Hours : 52**

Objectives:

3. Training the students to undergo Research exposure and to gain knowledge in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
4. The students are exposed to innovative ideas to carry out the project work in the related area of project.

Sl. No.	Syllabus Contents	No. Of Hours
	Analysis of Structure for earthquake ground motion, Time history analysis, Pushover analysis, Wind load analysis. Structural behaviour of RC Structural elements, Health monitoring, Repair and Rehabilitation of Structural members. Study on the behaviour of Steel Structural Elements. Study on Special Concrete, Strength and durability properties of Concrete with mineral admixtures. Study of Engineering properties of different types of soil and their application. Soil Stabilization techniques, Soil Structure interaction and liquefaction of soil. Traffic Volume and design of automatic signal system, Pavement design, Study on Mono Rail. and Metro Rail. Water sheds management, Water sheds management using ARC GIS, De-siltation of tank, Rain water harvesting and Ground water recharge, Impact of Urbanization on ground water using Remote Sensing and GIS, River bank filtration study. Application of data mining techniques in the field of air pollution. Characterization of industrial effluents, Health risk analysis due to air pollution, Study on impact of various developmental activities on climate change, Solid waste management.	

An extensive Research/training involving investigation/design/ management of the above mentioned projects is to be conducted for 4 hours per week. The student shall submit the project (Phase-I in VII Sem BE and Phase-II in VIII Sem. BE) report consisting of Research work.

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CO5	PO1, PO2, PO5, PO10, PO11,PO12

Dr. Ambedkar Institute of Technology, Benaluru -

Sub Title : SEMINAR		
Sub Code: CVS85	**No of Credits** : 2 = 0**:0:2 (L:T:P)**	**No of contact hours/week : 02**
Exam Duration : 3 hours	CIE = 50	**Total Hours :**

Objectives:

1. Training the students to present a seminar on the current topics in the field of Structural / Construction Technology/Geotechnical/Environmental/Water resources and Highway engineering,
2. The students are exposed to innovative ideas to present a seminar in the related area of research.

Sl. No.	Syllabus Contents	No. Of Hours
	Area of seminar topics : 1. Structural engineering 2. Concrete technology 3. Construction technology 4. Transportation engineering 5. Water resource engineering 6. Geotechnical engineering 7. Environmental engineering 8. Bridge engineering 9. Irrigation engineering 10. Earthquake engineering	

Course Outcomes:

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CO5	PO1, PO2, PO5, PO10, PO11,PO12