

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 ANITHI, Asst Professor 

Dr. K. Hemant Kumar, Asst Professor 

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

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

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					✓		✓					✓

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	<p>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.</p> <p>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.</p>	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.

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

Text Book(s):

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

Reference Book(s):

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

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	<p>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.</p> <p>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.</p> <p>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</p>	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.
----------------------------------	--

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

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. Schmidt – 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	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.

SI 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 down 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	✓	✓					✓		✓		✓	✓

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	<p>INTRODUCTION: Water supply engineering, importance and necessity of planned w/s, water treatment, importance and reliability of water works.</p> <p>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.</p>	08
II	<p>SOURCES: Surface and subsurface sources – suitability with regard to quality and quantity.</p> <p>COLLECTION AND CONVEYANCE OF WATER: Intakes, types of intakes. Conveyance of water; open channel, aqueducts, tunnels, flumes, pipes of different types, joints.</p> <p>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.</p>	08
III	<p>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 –</p>	08

	<p>sand filters, pressurefilter-operational problem in filters.</p> <p>DISINFECTION OF WATER: Requirements of disinfectants, methods of disinfection; disinfection, chlorination, chlorine demand, breaking point chlorination, super chlorination, de-chlorination, residual chlorine, miscellaneous treatments.</p> <p>DISTRIBUTION: Methods of water distribution- gravity, pumping, combined gravity and pumping system. Dead end, radial, circular system, Hardy cross method, Hazen William formula.</p>	
IV	<p>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 carriage system 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.</p> <p>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.</p> <p>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.</p>	08
V	<p>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.</p> <p>DISPOSAL OF SEWAGE: Disposal by dilution, land disposal, sewage farming.</p>	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), 2 nd 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	<p>BASIC PROPERTIES OF FLUIDS: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension, Capillarity and vapour pressure, Numericals.</p> <p>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.</p>	08
II	<p>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 Bernoulli's equation (Venturimeter, Orificemeter). Problems on applications of Bernoulli's equation.</p> <p>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.</p>	08
III	<p>DEPTH AND VELOCITY MEASUREMENTS, NOTCHES AND WEIRS:</p> <p>Measurement of depth: Point and hook gauges, self-recording gauges. Staff gauge, Weight gauge, float gauge.</p> <p>Measurement of velocity: Pitot tube, Current meter.</p> <p>Discharge measurements: Small orifices, mouth pieces, Rectangular notch, Triangular notch, Cipolletti notch, Ogee weir and Broad crested weir, Numericals.</p>	08
IV	<p>UNIFORM FLOW OVER OPEN CHANNELS:</p>	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 5 th week of the semester and Second test at the end of the 10 th week of the semester. The Makeup test at the end of the 15 th 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 4 th week and Second assignment at the end of 9 th 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 13 th 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	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-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 ANITHI, Asst Professor 

Dr. K. Hemant Kumar, Asst Professor 

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.	6 Hrs
2. Compression test of Mild Steel, Cast iron and Wood.	
3. Torsion test on Mild Steel circular sections	

UNIT – II

4. Bending Test on Wood Under two point loading	6 Hrs
5. Shear Test on Mild steel	
6. Impact test on Mild Steel (Charpy and Izod)	
7. Test on Springs	

UNIT – III

8. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's	4 Hrs
9. Test on Bricks and Tiles	

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.	6 Hrs
12. Demonstration of Strain gauges and Strain indicators	

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.	06 Hrs
Exercise – 2 To determine the distance between two inaccessible points using compass.	

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.	09 Hrs
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.	

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.	06 Hrs
Exercise – 8 Measurement of horizontal angles by the method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite.	

UNIT – IV

Exercise – 9 To determine the elevation of an object by single plane method, when base is accessible and inaccessible.	08 Hrs
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.	

UNIT – V

<p>Exercise – 12 To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.</p> <p>Exercise – 13 To set out simple curves using Rankine’s deflection angles method.</p> <p>Exercise – 14 To set out compound curve with angular methods using theodolite only.</p>	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. Schmidt–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: 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.

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° 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:****10 Hrs**

Following drawings are to be prepared for the data given using AUTOCAD:

- Cross section of Foundation - masonry wall, RCC columns (isolated).
- Different types of staircases.
- Lintel and chejja.
- RCC slabs and beams.
- Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan.

UNIT – II**STRUCTURAL ANALYSIS SOFTWARE (STAAD)****08 Hrs**

Use of commercially available software for the analysis of

- Simple beams.
- Continuous beams.
- 2D Portal frames-single storied and multi-storeyed.
- 3D portal frame analysis.
- Analysis of trusses.

UNIT – III (Blended Learning)**USE OF EXCEL IN CIVIL ENGINEERING PROBLEMS****08 Hrs**

Use of spread sheet for the following civil engineering problems:

- SFD and BMD for Cantilever and simply supported beam subjected to uniformly distributed load and uniformly varying load acting throughout the span.
- Design of singly reinforced and doubly reinforced rectangular beams.
- Design of one way and two way slabs.
- Computation of earthwork.
- Design of horizontal curve by offset method.
- Design of super elevation.

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: 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.

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: Project presentation + Report + SEE= 20 + 30 + 50 = 100
Credits: 02	
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. Schmidt – 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: ENVIRONMENTAL ENGINEERING LABORATORY**

Course Code: 18CVL76	Evaluation Procedure:
Credits: 1	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 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:
Credits: 1	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 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, 10 th 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		✓			✓					✓		

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
<p>The students are informed to select a suitable company to carry out Internship in their respective field of specialization.</p> <p>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.</p> <p>The Department shall facilitate and monitor the student internship program.</p>

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

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 SATHI, Asst Professor 

Dr. K. Hemant Kumar, Asst Professor 

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.	6 Hrs
2. Compression test of Mild Steel, Cast iron and Wood.	
3. Torsion test on Mild Steel circular sections	

UNIT – II

4. Bending Test on Wood Under two point loading	6 Hrs
5. Shear Test on Mild steel	
6. Impact test on Mild Steel (Charpy and Izod)	
7. Test on Springs	

UNIT – III

8. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's	4 Hrs
9. Test on Bricks and Tiles	

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.	6 Hrs
12. Demonstration of Strain gauges and Strain indicators	

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.	06 Hrs
Exercise – 2 To determine the distance between two inaccessible points using compass.	

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.	09 Hrs
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.	

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.	06 Hrs
Exercise – 8 Measurement of horizontal angles by the method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite.	

UNIT – IV

Exercise – 9 To determine the elevation of an object by single plane method, when base is accessible and inaccessible.	08 Hrs
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.	

UNIT – V

<p>Exercise – 12 To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.</p> <p>Exercise – 13 To set out simple curves using Rankine’s deflection angles method.</p> <p>Exercise – 14 To set out compound curve with angular methods using theodolite only.</p>	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. Schmidt–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: 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.

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° 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: COMPUTER AIDED DRAWING OF RC AND STEEL STRUCTURES

Course Code: 18CVL66	Evaluation Procedure: CIE + Record + SEE = 20 + 30 + 50 = 100
Credits: 01	
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.

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. Schmidt – 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: ENVIRONMENTAL ENGINEERING LABORATORY**

Course Code: 18CVL76	Evaluation Procedure:
Credits: 1	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 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:
Credits: 1	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 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, 10 th 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		✓			✓					✓		

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

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 ANITHI, Asst Professor 

Dr. K. Hemant Kumar, Asst Professor 

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.	6 Hrs
2. Compression test of Mild Steel, Cast iron and Wood.	
3. Torsion test on Mild Steel circular sections	

UNIT – II

4. Bending Test on Wood Under two point loading	6 Hrs
5. Shear Test on Mild steel	
6. Impact test on Mild Steel (Charpy and Izod)	
7. Test on Springs	

UNIT – III

8. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's	4 Hrs
9. Test on Bricks and Tiles	

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.	6 Hrs
12. Demonstration of Strain gauges and Strain indicators	

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.	06 Hrs
Exercise – 2 To determine the distance between two inaccessible points using compass.	

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.	09 Hrs
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.	

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.	06 Hrs
Exercise – 8 Measurement of horizontal angles by the method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite.	

UNIT – IV

Exercise – 9 To determine the elevation of an object by single plane method, when base is accessible and inaccessible.	08 Hrs
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.	

UNIT – V

<p>Exercise – 12 To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.</p> <p>Exercise – 13 To set out simple curves using Rankine’s deflection angles method.</p> <p>Exercise – 14 To set out compound curve with angular methods using theodolite only.</p>	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. Schmidt–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: 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.

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° 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:

10 Hrs

Following drawings are to be prepared for the data given using AUTOCAD:

- Cross section of Foundation - masonry wall, RCC columns (isolated).
- Different types of staircases.
- Lintel and chejja.
- RCC slabs and beams.
- Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan.

UNIT – II

STRUCTURAL ANALYSIS SOFTWARE (STAAD)

08 Hrs

Use of commercially available software for the analysis of

- Simple beams.
- Continuous beams.
- 2D Portal frames-single storied and multi-storeyed.
- 3D portal frame analysis.
- Analysis of trusses.

UNIT – III (Blended Learning)

USE OF EXCEL IN CIVIL ENGINEERING PROBLEMS

08 Hrs

Use of spread sheet for the following civil engineering problems:

- SFD and BMD for Cantilever and simply supported beam subjected to uniformly distributed load and uniformly varying load acting throughout the span.
- Design of singly reinforced and doubly reinforced rectangular beams.
- Design of one way and two way slabs.
- Computation of earthwork.
- Design of horizontal curve by offset method.
- Design of super elevation.

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: 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.

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.

12 Hrs**Unit-II****CONNECTIONS:**

Bolted and welded, beam-beam, Beam column, seated, stiffened and un-stiffened.

COLUMNS:

Splices, Column-column of same and different sections. Lacing and battens.

COLUMN BASES:

Slab base and gusseted base, grillage foundation.

14 Hrs**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.

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: Project presentation + Report + SEE= 20 + 30 + 50 = 100
Credits: 02	
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. Schmidt – 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: ENVIRONMENTAL ENGINEERING LABORATORY**

Course Code: 18CVL76	Evaluation Procedure:
Credits: 1	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 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:
Credits: 1	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 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, 10 th 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		✓			✓					✓		

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
<p>The students are informed to select a suitable company to carry out Internship in their respective field of specialization.</p> <p>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.</p> <p>The Department shall facilitate and monitor the student internship program.</p>

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

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 ANITHI, Asst Professor 

Dr. K. Hemant Kumar, Asst Professor 

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.

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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

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

Dr. Ambedkar Institute of Technology, Benaluru -

	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. Schmidt – Wong, Thomson Learning.
3. **Surveying** Vol. I, S.K. Duggal

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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 possess 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

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 (Ground 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.

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

SCHEME OF EXAMINATION

Section-I Compulsory question from chapter No 3 for 60 Marks

Plan.....	25	} 60
Elevation.....	15	

Dr. Ambedkar Institute of Technology, Benaluru -

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

Dr. Ambedkar Institute of Technology, Benaluru -

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	<p>Exercise – 1 Measurement of horizontal angles with method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite.</p> <p>Exercise – 2 To determine the elevation of an object using single plane method when base is accessible and inaccessible.</p> <p>Exercise – 3 To determine the distance and difference in elevation between two inaccessible points using double plane method.</p>	9
2	<p>Exercise – 4(a) To determine the tachometric constants using horizontal and inclined line of sight.</p> <p>Exercise – 4(b) To Determine the gradients between the two points by Tacheo metric method.</p> <p>Exercise – 5 To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.</p>	9
3	<p>Exercise – 6 To set out simple curves using Rankine’s deflection angles method.</p> <p>Exercise – 7 To set out compound curve with angular methods with suing theodolite only.</p>	9
4	<p>Exercise – 8 To set out the center line of a simple rectangular room using offset from base line</p> <p>Exercise – 9 To set out center lines of columns of a building using two base lines at right angles</p>	9
5	<p>Exercise – 10 Exposure to use of total station: traversing, longitudinal section, block leveling, usage of relevant software’s for preparation of contour drawings.</p>	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. Schmidt – Wong, Thomson Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arther Bannister et al., Pearson Education, India

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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

Dr. Ambedkar Institute of Technology, Benaluru -

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 Verilog, New York.
- 7 Physical Geology by Arthur Holmes, Thomson Nelson and Sons, London.
- 8 Environmental Geology by K. S. Valdiya, Tata Mc Graw Hills.

Dr. Ambedkar Institute of Technology, Benaluru -

- 9 Ground water assessment, development and management by K.R.Karant, Tata Mc Graw Hills
- 10. Remote sensing and GIS by M.Anji Reddy

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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

HYDRAULICS AND HYDRAULIC 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.

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

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

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	<p>Unit 1. AUTOCAD Basics of AUTOCAD: DRAWING TOOLS: Lines, Circle, Arc, Polyline, Multiline, Polygon, Rectangle, Spline, Ellipse, <i>Modify tools:</i> Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet, <i>Using Text:</i> Single line text, Multiline text, Spelling, Edit text, <i>Special Features:</i> View tools, Layers concept, Dimension tools, Hatching, Customising toolbars, Working with multiple drawings</p>	03
1.2	<p>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.</p> <p>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</p>	18
	<p>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</p>	12

Dr. Ambedkar Institute of Technology, Benaluru -

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.

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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 -

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:

- A course on geotechnical engineering will expose the students to the importance of the usage of properties, characteristics and behavior of soil
- 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	

Dr. Ambedkar Institute of Technology, Benaluru -
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.

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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, PO2, PO3, 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 : 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:

Dr. Ambedkar Institute of Technology, Benaluru -

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 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

www.vtu.ac.in

www.iitg.ernet.in>rkbc>presentation

www.nptel.org.in

<http://books.google.co.in>

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.

Dr. Ambedkar Institute of Technology, Benaluru -

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

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

Dr. Ambedkar Institute of Technology, Benaluru -

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 behaviour of highway materials.

Cos	Mapping with POs
CO1	PO1, PO2, PO4
CO2	PO1, PO2, PO4
CO3	PO1, PO2, PO4

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

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:

.

Dr. Ambedkar Institute of Technology, Benaluru -

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

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 : <ol style="list-style-type: none"> 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:

Dr. Ambedkar Institute of Technology, Benaluru -

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