Syllabus for 2018-19 Batch UG (CV)

Semester: I / II	
Course Title: Civil Engineering and Mechanics	
Course Code: **18CV14 / 24**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

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

UNIT – I	
Fundamental principles of mechanics: Introduction, basic principles and concepts of mechanics, laws of mechanics, idealization of mechanics **Basic principles of statics:** Force and its characteristics, equivalent system of forces, principles of transmissibility of a force, systems of forces, resultant of coplanar concurrent forces, component of a force, moment of a force with respect to a point, principles of moments (Varignon's theorem) Couples, effects of a force at another point, equations of static equilibrium, free body diagram. **Co-planar forces (forces in a plane):** Resultant of co-planar concurrent forces, equilibrium of co-planar concurrent forces and Numerical problems. **Co-planar non concurrent force system:** Resultant of co-planar non-concurrent forces, equilibrium of coplanar non concurrent forces and Numerical problems.	**12 Hrs**
UNIT – II	
Support reactions: Introduction, Beam, Classification of beam, types of loads and supports, support reactions in statically determinate beam- Numerical problems. **Friction:** Introduction, laws of dry friction, limiting friction, co-efficient of friction, angle of friction, angle of repose and cone of friction. Numerical problems on Blocks (horizontal and inclined plane), Ladder friction and Wedge friction.	**10 Hrs**
UNIT – III	
Centroid: Introduction, centroid and centre of gravity. Derivations of simple geometrical sections – rectangle, triangle, semicircle and quarter circle. Numericals on composite sections. **Moment of Inertia:** Introduction, Moments of Inertia of an area, Parallel axis theorem, Perpendicular axis theorem, Radius of gyration, Polar moments of inertia. Derivations of simple geometrical sections – Rectangle, Triangle, Circle, Semicircle and Quarter circle. Numericals on composite sections.	**10 Hrs**
UNIT – IV	

Basic Principles of Dynamics: Introduction, kinematics and kinetics, Definitions of Displacement, Speed, Velocity and Acceleration. D' Alembert's principle with Numerical problems. Newton's Laws of motion. Rectilinear motion with simple-numerical problems Differential relationship between displacement, velocity and accelerations. Projectile with numericals.	**7 Hrs**
UNIT – V (Blended Learning)	
Self-Study and Group activity Introduction to Civil engineering: Scope of different fields of civil engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering. **Infrastructure:** Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country. **Roads:** Types of roads, components and their function. **Bridges and Dams:** Different types with simple sketches.	**12 Hrs**

Course Outcomes: The students will be able to	
1	Determine the basics of Civil Engineering, Concept of Engineering Mechanics, Forces, and Force System and determine the resultant of co-planar force system.
2	Determine the geometrical property like, coordinates of the centroid and Moment of Inertia (with radius of gyration) of regular, irregular and composite sections.
3	Analyse the kinetics, kinematics and rectilinear motion of a body with numerical approach.

Question paper pattern:

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

Text Books:	
1	Irving H Shames, Engineering Mechanics, Prentice Hall.
2	F P Beer and E R Johnson, Vector Mechanics for Engineers, Vol-II-Dynamics, Tata McGraw Hill.
3	Engineering Mechanics by Timoshenko-Young and J V Rao, Mc Graw-Hills Book Company, New Delhi.
4	Elements of Civil Engineering (IV Edition) by S S Bhavikatti, Vikas Publishing House Pvt. Ltd. New Delhi.
5	Elements of Civil Engineering and Engineering Mechanics, by M N Shesha Prakash and G V Mogaveer, PHI Learning 2009.

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

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

Syllabus for 2018-19 Batch

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

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

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

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

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch

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

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

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

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

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

2	IS 10262: 2009 – Mix Design of Concrete

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

Question paper pattern:

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

Text Books:

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

Reference Books:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 batch UG (CV)

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

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

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

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

3	Develop runoff estimation and recharge.

Question paper pattern:

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

Text Books:

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

Reference Books:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch

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

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

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

Act, Air Pollution Standards.	

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

Question paper pattern:

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

continuous beams and Portal frames.	

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch

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

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

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

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2017-18 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Examination Pattern:

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

Note:

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

Question paper pattern:

PART A:

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

PART B:

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

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

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

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

Question paper pattern:

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

Text Books:

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

Reference Books:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

Question paper pattern:

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

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

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

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

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

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

4	Relevant IRC and BIS codes.

Reference Books:	
1	Design of Bridge Structures, Jagadish T. R & Jayaram M. A, Prentice Hall of India, New Delhi.
2	Concrete Bridge practices by Raina V.K., Tata Mc Graw Hill, New Delhi.
3	Bridge Engineering by Ponnuswamy, Tata McGraw Hill, New Delhi.

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: STRUCTURAL DYNAMICS	
Course Code: **18CV735**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To learn principles of structural dynamics and to evaluate the dynamic characteristics of the structure.
2	To analyse structures under time varying loads to find stresses, strains, displacements for all points of the structure.
3	To understand the response of a structures for dynamic loading.

UNIT – I	
Introduction to structural dynamics, Brief history of vibration and Earthquakes, Major earthquakes, Earthquakes zones, some basic definitions, Vibration of single degree of freedom system, undamped, damped, free vibrations, logarithmic decrement. Forced vibrations of single degree freedom systems, response of undamped and damped systems subjected to harmonic loading, rotation unbalance, reciprocating unbalance.	**8 Hrs**
UNIT – II	
Duhamel's integral, response due to general system of loading, dynamic load factor, response spectrum, response of SDOF subjected to harmonic base excitation, vibration isolation. Free vibration of multi degree of freedom systems, natural frequencies, normal modes, orthogonality property of normal modes, eigenvalues	**8 Hrs**
UNIT – III	
Shear buildings modelled as multi degree of freedom systems, free vibrations, natural frequencies. Forced vibration motion of shear buildings, modal super position method, response of shear buildings to base motion, harmonic forced excitation.	**8 Hrs**
UNIT – IV	
Damped motion of shear buildings, equations for damped shear buildings, uncoupled damped equations, conditions for damping uncoupling.	**8 Hrs**
UNIT – V (Blended Learning)	
Dynamic analysis of beams stiffness matrices, lumped mass and consistent mass formulation equations of motion.	**7 Hrs**

Course Outcomes: The students will be able to	
1	Apply the knowledge of mathematics and mechanics for solving problems on structural dynamics.
2	Develop the equation of motion of undamped and under damped single degree of freedom systems subjected to free and forced vibration.
3	Analyse multi-storied frames and draw mode shapes of vibrations
4	Explain the concepts of seismology and working principles of vibration measuring instruments.

Text Books:	
1	Structural dynamics: Vibrations and systems, 1st edition, madhujit mukophadyay, publisher: ANE Books ISBN: 9788180520907, 8180520900, 2008.
2	Structural dynamics: Theory and computation, Mario Paz, 2nd edition, CBS publisher, 2004.
3	Dynamics of structure. R.W.clough and J.Penzien, 2nd revised edition, McGraw-Hill education 1993.

Reference Books:	
1	Theory of Vibration with applications, William Thomson, 4th edition, CRC Press, 1996

2	Structural Dynamics- Anil Chopra: PHI Publishers.

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: CONSTRUCTION PROJECT MANAGEMENT	
Course Code: **18CV736**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the various management techniques for successful completion of construction projects.
2	To study the effect of management for project organization, design of construction process, labour, material and equipment utilization and cost estimation.
3	To study the cost estimation of a project.

UNIT – I	
THE OWNERS' PERSPECTIVE: Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers.	**7 Hrs**
UNIT – II (Blended Learning)	
ORGANIZING FOR PROJECT MANAGEMENT: Project Management – modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants - Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team.	**8 Hrs**
UNIT – III	
DESIGN AND CONSTRUCTION PROCESS: Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment.	**8 Hrs**
UNIT – IV	
LABOUR, MATERIAL AND EQUIPMENT UTILIZATION: Historical Perspective - Labour Productivity - Factors Affecting Job-Site Productivity - Labour Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management. - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks.	**8 Hrs**
UNIT – V	
COST ESTIMATION: Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Develop a project plan based on requirements and prepare schedule of a project by understanding the activities and their sequence.
2	Estimate the quantities and cost of a structure.
3	Explain labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety.

4	Establish as an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies.

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

Text Books:	
1	Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2	Choudhury S, Project Management, McGraw-Hill Publishing Company, New Delhi, 1988.

Reference Books:	
1	Dr. U.K. Shrivastava "Construction Planning and Management", Galgotia publications Pvt. Ltd. New Delhi.
2	P C Tripathi and P N Reddy, "Principles of Management", Tata McGraw-Hill Education

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: REINFORCED EARTH STRUCTURES	
Course Code: **18CV737**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

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

UNIT – I	
BASICS OF REINFORCED EARTH CONSTRUCTION: Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil. **GEOSYNTHETICS AND THEIR FUNCTIONS:** Historical developments, Recent developments, manufacturing process-woven & non-woven, Raw materials – polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Elastomers, Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geo-synthetics – Geo-textiles, Geo-grids, Geo-membranes, Geo-composites, Geo-nets, Geo-foam, Geo-mats, Geo-meshes, Geo-webs etc.	**8 Hrs**
UNIT – II	
PROPERTIES AND TESTS ON MATERIALS: Properties – Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties. **DESIGN OF REINFORCED EARTH RETAINING WALLS:** Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, typical design problems.	**8 Hrs**
UNIT – III	
DESIGN OF REINFORCED EARTH FOUNDATIONS AND EMBANKMENTS: **FOUNDATIONS:** Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, bearing capacity improvement in soft soils, General guidelines. **EMBANKMENTS:** Concept of Reinforced Embankments, Internal and external stability, Selection of materials, typical design problems.	**8 Hrs**
UNIT – IV	
SOIL NAILING TECHNIQUES: Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken. **GEO-SYNTHETICS FOR ROADS AND SLOPES:** **ROADS:** Applications to Temporary and Permanent roads, Role of Geo-synthetic in enhancing properties of road, control of mud pumping, Enhancing properties of subgrade, Design requirements. **SLOPES:** Causes for slope failure, Improvement of slope stability with Geo-synthetic, Drainage requirements, Construction technique.	**8 Hrs**

UNIT – V (Blended Learning)	
GEOSYNTHETICS – FILTER, DRAIN AND LANDFILLS: **FILTER AND DRAIN:** Conventional granular filter design criteria, Geo-synthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geo-synthetic permeability, anti-clogging, survivability and durability. **LANDFILLS:** Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps	**7 Hrs**

Course Outcomes: The students will be able to	
1	Interpret the type of soil in the field or in the laboratory
2	Predict the Suitability of soil for a particular project based on its Engineering properties
3	Calculate the rate and amount of settlement of foundation and compaction behaviour of soils
4	Evaluate the index and engineering properties and application to Civil engineering problems

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

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

Reference Books:	
1	Design with Geo-synthetics - Koerner. R.M. – Prince Hall Publication, 2005.
2	An introduction to Soil Reinforcement and Geosynthetics – Shivakumar Babu G. L., Universities Press, Hyderabad, 2006
3	Engineering with Geo-synthetics - Venkattappa Rao, G., & Suryanarayana Raju., G. V.S. – Tata Mc Graw Hill publishing Company Limited., New Delhi.

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: WATER RESOURCES ENGINEERING	
Course Code: **18CV741**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S-3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study various aspects of water resources, Surface and groundwater, design of hydraulic structures like dams, spillways and Canal systems.
2	To understand the concept of open wells, tube well and the site suitability for hydraulic structures.
3	To know the water quality aspects, water management and water supply, Surface and ground water flow modelling.

UNIT – I	
INTRODUCTION: Introduction, The world's fresh water resources, water use in the world, water management sectors, the water management community, the future of water resources. **HYDROLOGIC PROCESS:** Introduction to hydrology, hydrologic cycle, atmospheric and ocean circulation. **PRECIPITATION:** Formation and types, rainfall variability, disposal of rainfall on a watershed, design storms.	**7 Hrs**
UNIT – II (Blended Learning)	
SURFACE RUNOFF: Drainage basins, hydrologic losses and rainfall excess, rainfall-runoff analysis using unit hydrograph approach, SCS rainfall-runoff relation. **WATER USE DATA:** Classification of uses, water for energy. Water for agriculture: irrigation trends and needs, irrigation infrastructures, irrigation system selection and performance, water requirement for irrigation, impacts of irrigation Drought management: options, severity, economic aspects of water storage. **ANALYSIS OF SURFACE WATER SUPPLY:** Surface water reservoir systems, Storage-firm yield analysis for water supply reservoir simulation.	**8 Hrs**
UNIT – III	
FLOOD CONTROL: Introduction, flood plain management, flood plain definition, hydrologic and hydraulic analysis of floods, storm water management. **FLOOD CONTROL ALTERNATIVES:** Structural and non-structural measures. Flood damage and net benefit estimation: damage relationships, expected damages, risk based analysis. Operation of reservoir systems for flood control.	**8 Hrs**
UNIT – IV	
STORM WATER CONTROL: Storm water management, storm system: information needs and design criteria. Rational method design. Hydraulic analysis of design, storm sewer appurtenances. Storm detention: effects of urbanization, types of surface detention, subsurface disposal of storm water. **STORM WATER CONTROL STREET AND HIGHWAY DRAINAGE AND CULVERTS:** Drainage of street and highway pavements: design considerations, flow in gutters, pavement	**8 Hrs**

drainage inlets, inlet locations, median, and embankment and bridge culvert design. Hydraulic design of culverts: culvert hydraulics, culver design.	
UNIT – V	
DESIGN OF SPILLWAYS FOR FLOOD CONTROL, STORAGE AND CONVEYANCE SYSTEM: Hydrologic considerations, Dams: types, hazard classification, spillway capacity, criteria, safety of existing dams. **SPILLWAYS:** Functions, overflow and free overfall spillways, ogee spillways, baffled chute spillways, culvert spillways. Gates and valves: spillway crest gates, gates for outlet works, valves for outlet works.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the problems related to water resources engineering.
2	Analyse water supply aspects to rural and urban schemes and in designing of hydraulic structures.
3	Design hydraulic structures to control the flood and storm waters.

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

Text Books	
1	Water resources engineering: Ralph A Wurbs, Wesley P. James, PHI Learning pvt. Ltd. New Delhi (2009 Ed.)
2	Water resources engineering: Chin D.A., Prentice Hall (2009 Ed.).
3	Water resources engineering: Larry W. Mays, John Wiley & sons (2005).

Reference Books	
1	Water resources engineering, Sathya Narayana Murthy Challa, New Age International Publishers, New Delhi, (2002 Ed.).
2	Elements of water resources engineering, Duggal K.N., Soni J.P., New age international publishers, New Delhi.
3	Water resources engineering, David Chin, Pearson Educaion, NJ, (2006 Ed.).
4	Water resources engineering, lecture notes, IIT Kharagpur.

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ADVANCED FOUNDATION DESIGN	
Course Code: **18CV742**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs – L:T:P:S:3:0:0:0	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To gain knowledge on advanced topics of foundation design and analyses.
2	To understand the shallow and deep foundation analyses.
3	To develop the choice of foundation design parameters.
4	To learn the cause and effect of dynamic loads on foundation.

UNIT – I	
PROPORTIONING OF SHALLOW FOUNDATION: Proportion of shallow foundation for equal settlement, Computation of design loads, design of combined footings (rectangular and trapezoidal), strap footings and wall footings, Types of rafts, bearing capacity and settlements of raft foundation, Rigid methods, Flexible methods, coefficient of subgrade reaction, Problems.	**8 Hrs**
UNIT – II	
PILE FOUNDATIONS: Types of piles, Load Transfer mechanism, Static formulae, Dynamic formulae, Pile load Test, SPT and SCPT. Pile groups in clay: Efficiency, Bearing capacity and settlement, Negative skin friction, Problems. Underreamer piles.	**8 Hrs**
UNIT – III (Blended learning)	
FOUNDATIONS ON EXPANSIVE SOILS: Parameters of expansive soils, classification, causes of moisture changes in soils, effect of swelling on buildings, preventive measures for expansive soils, modification of expansive soil, Design of foundation in swelling soils.	**8 Hrs**
UNIT – IV	
DRILLED PIER AND CAISSONS: Construction of drilled pier, Construction of open caisson, Pneumatic caisson and floating caisson, Problems. **WELL FOUNDATIONS:** Different shapes of wells, Grip length, Forces acting on the well foundation, Terzaghi's analysis, Individual components of well, Sinking of wells, Measures for rectification of tilts and shifts, Problems.	**8 Hrs**
UNIT – V	
MACHINE FOUNDATIONS: Introduction, Types of machine foundations, Basic definitions, Degree of freedom of block foundation, General criteria for design of machine foundations, Free vibration, Forced Vibration, Vibration analysis of machine foundation, Determination of natural frequency, Design criteria of foundations of reciprocating machines, Reinforcement and construction details, Weight of foundation, Vibration Isolation and control. Problems.	**7 Hrs**

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

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

Course Outcomes: The students will be able to	
1	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.
2	Design the load carrying capacity and settlement of single and group of piles.
3	Analyse and design of well foundation, drilled piers and caissons.
4	Analyse and design of machine foundations.

Text Books:	
1	Soil Mechanics and Foundation Engineering, Punmia B C (2010), Laxmi Publications Co., New Delhi.
2	Basic and Applied Soil Mechanics - Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., New Delhi.
3	Geotechnical Engineering - Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4	Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

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

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: PAVEMENT DESIGN	
Course Code: **18CV743**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the process of collecting data required for pavement design and factors affecting on it and maintenance of the pavement.
2	To illustrate the design concepts of flexible pavement by various methods (CBR, IRC 37-2001, Mc loads, Kansas and also the same of rigid pavement by IRC 58-2002.
3	To understand the various causes leading to failure of pavements and remedies for the same.
4	To develop skills to perform functional and structural evaluation of pavement by suitable methods.

UNIT-I	
INTRODUCTION: Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement – Design strategies of variables – Functions of sub-grade, sub base – Base course – surface course – comparison between Rigid and flexible pavement. **FUNDAMENTALS OF DESIGN OF PAVEMENTS:** Design life – Traffic factors – climatic factors – Road geometry – Subgrade strength and drainage, Stresses and deflections, Boussinesq's theory – principle, Assumptions – Limitations and problems on above – Bermister's theory – Two layered analysis – Assumptions – problems on above.	**8 Hrs**
UNIT-II (Blended Learning)	
DESIGN FACTORS: Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EWL concept. **FLEXIBLE PAVEMENT DESIGN:** Assumptions – McLeod Method – Kansas method – Tri-axial method – CBR method – IRC Method (old) – CSA Method using IRC 37-2001, problems on above.	**8 Hrs**
UNIT-III	
STRESSES IN RIGID PAVEMENT: Principle – Factors – wheel load and its repetition – properties of sub grade – properties of concrete. External conditions – joints – Reinforcement – Analysis of stresses – Assumptions – Westergaard's Analysis – Modified Westergaard's equations – Critical stresses – Wheel load stresses, Warping stress – Frictional stress – combined stresses (using chart / equations) – problems on above. **DESIGN OF RIGID PAVEMENT:** Design of C.C. Pavement by IRC: 58 – 2002 for dual and Tandem axle load – Reinforcement in slabs – Requirements of joints – Types of joints – Expansion joint – contraction joint – warping joint – construction joint – longitudinal joint, Design of joints, Design of Dowel bars, Design of Tie bars – problems of the above.	**8 Hrs**
UNIT-IV	
FLEXIBLE PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial/maintenance measures in flexible pavements – Functional Evaluation by visual inspection and unevenness measurement by using different technics – Structural Evaluation by Benkelman Beam Deflection Method, Falling weight deflectometer, GPR Method. Design factors for Runway Pavements – Design methods for Airfield pavements and problems on above.	**8 Hrs**

UNIT-V	
RIGID PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial/maintenance measures in rigid pavements – Functional Evaluation by visual inspection and unevenness measurements. Design factors for Runway Pavements – Design methods for Airfield pavements.	**7 Hrs**

Course Outcomes: The students will be able to	
1	Explain the fundamentals and desirable characteristics of flexible pavement design as per standard IRC codes.
2	Illustrate the various stress components & design of rigid pavements as per standard IRC codes.
3	Explain the factual knowledge of failures, its causes and maintenance by structural and functional evaluation of flexible and rigid pavements.

Text Books:	
1	Highway Engineering – S K Khanna and C E G Justo, Nem Chand Bros, 10th edition, Roorkee.
2	Principle and practice of Highway Engineering - L R KADIYALI & N B LAL: Khanna publications, 2017 edition, New Delhi
3	Pavement Analysis & Design - Yang H. Huang- II edition, university of Kentucky, 2004.
4	Relevant IRC codes – IRC – 37 – 2001 & IRC – 58 -2002

Reference Books:	
1	Principles of Pavement Design- Yoder and Witzack - 2nd edition, John Wileys and Sons
2	Pavement Design and Materials by A.T. Papagiannaakis and E. A. Masad, 1st edition, John Wileys and Sons (2007).

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	
Course Code: **18CV744**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:3:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To Study the principle of Engineering Seismology and seismic zoning map of India.
2	To study the behaviour of buildings subjected to earthquake forces and the performance of Structures during past earthquakes.
3	The study of Seismic design philosophy, Determination of design lateral forces.

UNIT-I	
Earthquake ground Motion, Engineering Seismology, Theory of plate tectonics, seismic waves, Magnitude and intensity of earthquakes, local site effects and seismic zoning map of India. Seismic Design Parameters: Types of Earthquakes, earthquake ground motion characteristics, response spectra and design spectrum.	**8 Hrs**
UNIT-II	
Structural modelling, Code based seismic design methods. Response control concepts, seismic evaluation and retrofitting methods. Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity and plan configuration problems, Seismic resistant building architecture – lateral load resistant systems, building characteristics.	**8 Hrs**
UNIT-III (Blended Learning)	
Seismic design philosophy, Determination of design lateral forces - Equivalent lateral force procedure, dynamic analysis procedure.	**8 Hrs**
UNIT-IV	
Step by step procedure for seismic analysis of RC buildings (maximum of 4 storeys, without infills) - Equivalent static lateral force method, response spectrum methods.	**7 Hrs**
UNIT-V	
Earthquake resistant analysis and design of RC buildings – Preliminary data, loading data, load combinations, analysis and design of subframes. (Maximum of 4 storeys, without infills). Earthquake resistant design of masonry buildings - elastic properties of structural masonry, lateral load analysis, Design of two storied masonry buildings.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the dynamic loading system and how it is subjected and distributed for the safe working condition buildings, Bridges, Monumental structures, Assemblies and health centers.
2	Apply the seismic design philosophy and determination of lateral forces.
3	Explain Earthquake resistant analysis and design of RC and masonry buildings.

Text Books:	
1	Earthquake resistant design of structures - Pankaj Agarwal, Manish Shrikande - PHI India.
2	Earthquake Resistant Design of Structures - S.K. Duggal - Oxford University Press, 2007.

Reference Books:	
1	Earthquake Resistant Design- Anil Chopra
2	Earth Quake Engineering Damage Assessment and Structural design- S.F. Borg - (John Wiley and

	Sons. 1983).

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: SOLID WASTE MANAGEMENT	
Course Code: **18CV745**	Evaluation Procedure:
Credits: 03	CIE + Assignment + Group Activity + SEE = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

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

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

Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse. Energy production, By-Product recovery.	

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

Question paper pattern:

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

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

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: QUALITY MANAGEMENT SYSTEM IN CIVIL ENGINEERING	
Course Code: **18CV746**	Evaluation Procedure
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To study the various management techniques for successful completion of construction projects.
2	To study the effect of management for project organization, design of construction process, labour, material and equipment utilization, and cost estimation.
3	To study the cost estimation of project.

UNIT – I	
QUALITY MANAGEMENT SYSTEM – QMS: Introduction– Evolution of Quality Management System, Element of Quality, Quality Management System, Concept of Process and Network of Process, ISO 9000-Family, Applying, benefits and Importance, Total Quality Management, Comparison of ISO 9000 **IMPLEMENTING ISO 9001-2000 QUALITY MANAGEMENT SYSTEM:** ISO 9000 – Quality Management Principles, ISO 9000 Documents Content of ISO 9001 : 2000, Quality Management System Requirements, General Requirements, Documentation Requirements, Management Responsibilities, Resource Management, Product Realization, Measurement, analysis and Improvement Monitoring and Measurement, Non-conforming Product.	**8 Hrs**
UNIT – II	
PREPARING A ISO 9001-2000 QUALITY MANAGEMENT SYSTEM FOR CIVIL ENGINEERING: Quality Manual, Introduction, Scope of the Quality Manual, Applicability, Responsibility, Quality Management System, General Requirements, Management Responsibilities, Management Commitment, Planning Responsibility, Authority and Communication, Management Review, Resource Management, Provision of Resources, Human Resources Product Realization, Purchasing, Monitoring and Measurement.	**8 Hrs**
UNIT – III	
QUALITY MANAGEMENT SYSTEM PROCEDURES: Introduction, procedure for management review, Format for writing procedures, procedure for preparing Quality plans/ work instructions, Contract review, Document and data control, Document numbering system, Change request, procedure for purchasing, procedure for control of customer supplied product.	**8 Hrs**
UNIT – IV (Blended Learning)	
WORK INSTRUCTIONS: Introduction – Document and Data Control, Material Procurement, Material Handling, Tendering and Estimating, Planning, Design, Training, Plant and Equipment, Quality Assurance and Control, Patching and Transportation of Concrete. **METHOD STATEMENT:** Introduction, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair works, Concrete Demolition works, Road Works, Fencing works etc.	**7 Hrs**
UNIT – V	
JOB DESCRIPTION: Introduction, Job Description of Managing Director, Project Manager, Site Manager, Site	**8 Hrs**

Engineer, QA/QC Engineer, Foreman, Typist/Clerk, Design Engineer, Planning Engineer. **QUALITY CONTROL PLAN/INSPECTION AND TEST PLANS (ITPS):** Introduction-Preparation of Project Quality Plans, Inspection and Test plant. **QUALITY RECORD/FORMATS:** Preparation of Standard Formats: Revision Control form, Document Distribution List, Document Master List, Non-Conformance Report, Store Issue/Receipt Voucher, Local Purchase Order, Material Stock Card, Audit Notification, Quality Audit Report, Corrective Action Report, Calibration Record, Calibration Master Sheet, Work Instruction, Job Description, Contract/Tender Review Form, Accident Report Form, Quality Awareness Training Record.	

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

Text Books:	
1	Quality Management System in Civil Engineering – D.S. Rajendra Prasad – ISO 9001-2000, Sapna Book House, Bangalore.
2	Productivity and Quality Improvement – John L. Hardesky – McGraw Hill Book Company.
3	Quality Management – Kanishka Bedi – (Oxford university press).
4	Total Quality Management for Engineers – Mohamed Zairi – Aditya Books Private Limited.

Reference Books:	
1	ISO 9000 Concepts, Methods, Implementation- Bagchi – Wheeler Publishing.
2	IS: 456-2000: Indian Standard Specifications for Plain and Reinforced Concrete Code of Practice: 4th Revision, Bureau of Indian Standards.
3	IS: 383-1990: Indian Standard Specifications for Coarse and Fine Aggregates from Natural Sources for Concrete: Bureau of Indian Standards.
4	Data Book for Civil Engineers Field Practice – Elwyn E. Seelye – John Wiley & Sons, Inc.

Course Outcomes: The students will be able to	
1	Explain the quality management, conveyance and treatment.
2	Analyze the concept of Quality control plan / inspection and testing plans for various Civil Engineering works.
3	Apply the basic principles of ISO 9001-2000.

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: HYDRAULICS AND IRRIGATION STRUCTURES	
Course Code: **18CV747**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand the essentiality of water required for various purposes.
2	To plan and design of reservoirs.
3	To plan and construction of various hydraulic structures.

UNIT – I	
RESERVOIR PLANNING: Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, safe yield, problems, Reservoir sedimentation, life of a reservoir, economic height of a dam, Environmental effects of reservoirs.	**8 Hrs**
UNIT – II	
GRAVITY DAMS: Introduction, forces on a gravity dam, stress analysis in gravity dam, Problems, combination of forces for design. Elementary & practical profiles of a gravity dam, Arch dams, galleries in gravity dams.	**7 Hrs**
UNIT – III (Blended Learning)	
EARTH DAMS: Introduction, types of Earth dams, construction methods, Design criteria for Earth dams, causes of failure of earth dams, section of dam, control of seepage through earth dams, Safety measures.	**7 Hrs**
UNIT – IV	
SPILLWAYS: Introduction, essentials of a spillway, spillway components, factors affecting type & design of spillways. Ogee spillway. Energy dissipation below spillways.	**7 Hrs**
UNIT – V	
DRAWING NOT TO SCALE (To draw only sketch for the given design details without projected views on the working sheet) ✓ Surplus weir with stepped apron. ✓ Tank Plug sluice without tower head. ✓ Tank Plug sluice with tower head. ✓ Canal regulator. ✓ Earthen Bunds.	**10 Hrs**

Course Outcomes: The students will be able to	
1	Understand various aspects of Reservoir planning,
2	Data required for design, procedure of planning, designing the structures and preparing required drawings to execute the work.
3	Understand the design and construction of earthen dams.

Text Books:	
1	Text book of irrigation engineering & Hydraulic Structures- R.K. Sharma, Oxford & IBH publishing Co., New Delhi (2002)
2	Irrigation & Water resources engineering- G.L. Asawa, New Age International Publishers, New

	Delhi (2005)
3	Irrigation, Water Resources & Water power engineering- Modi. P.N., Standard Book House, New Delhi
4	Design of minor irrigation and Canal structures- C. Sathya Narayana Murthy, Wiley eastern limited, New Delhi (1990)

Reference Books:	
1	Irrigation engineering & Hydraulic structures- Garg. S.K., Khanna publishers, New Delhi
2	Hydraulic Structures & Irrigation Design Drawing - Dr. N. Balasubramanya, Tata McGraw-Hill Education Pvt. Ltd., New Delhi
3	Irrigation and Water Power Engineering- Madan Mohan Das & Mimi Das Saikia, PHI Learning Pvt. Ltd., New Delhi (2009)
4	A Text Book of Irrigation Engineering – Raghunath
5	Ground water engineering – Freez and Cherry

Question Paper Pattern:

- ✓ **Four** questions are to be set from Units 1, 2, 3 & 4 of which **Two** full questions are to be answered for 40 marks.
- ✓ **Two** questions are to be set from Unit 5 (excluding Earthen Bunds) of which **One** full question is to be answered for 45 marks (drawings to be drawn for the given Data on the Drawing sheet).
- ✓ **One** Question is to be set from Earthen Bunds which is compulsory for 15 marks (To draw sketches for the given details on the drawing sheet).

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ECOLOGY AND ENVIRONMENTAL IMPACT ASSESSMENT	
Course Code: **18CV751**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

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

UNIT – I	
INTRODUCTION TO EIA: Ecological Factors and Development Activity and, EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**8 Hrs**
UNIT – II	
METHODOLOGIES OF EIA: Frame work of Impact Assessment. Developmental Projects- Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.	**8 Hrs**
UNIT – III	
ENVIRONMENTAL ATTRIBUTES: Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.	**7 Hrs**
UNIT – IV (Blended Learning)	
PUBLIC PARTICIPATION PROGRAM : Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships - Matrices.	**8 Hrs**
UNIT – V	
EIA FOR PROJECTS: EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.	**8 Hrs**

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

Question paper pattern:
• The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks.

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: URBAN TRANSPORT PLANNING	
Course Code: **18CV752**	Evaluation Procedure:
Credits: **03**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

Course Learning Objectives:	
1	To understand and apply basic concepts and methods of urban transportation planning.
2	To explain the various methods of designing, conducting and administering surveys to provide the data required for transportation planning.
3	To understand the process of developing an organized mathematical modelling approach to solve select urban transportation planning problem.
4	To illustrate the various types of models used for travel forecasting, prediction of future travel patterns.

UNIT-I	
INTRODUCTION: Scope of Urban transport planning, Inter dependency of land use and traffic, System Approach to urban planning. **STAGES IN URBAN TRANSPORT PLANNING:** Trip generation, Trip production, Trip distribution, Modal split, Trip assignment.	**8 Hrs**
UNIT-II	
URBAN TRANSPORT SURVEY: Definition of study area, Zoning, Types of Surveys, Inventory of transportation facilities, Expansion of data from sample.	**7 Hrs**
UNIT-III	
TRIP GENERATION: Trip purpose, Factors governing trip generation and attraction, Category analysis, Problems. **TRIP DISTRIBUTION:** Methods, Growth factors methods, Synthetic methods, Fractor and Furness method and problems.	**8 Hrs**
UNIT-IV	
MODAL SPLIT: Factors affecting, characteristics of split, Model split in urban transport planning, problems. **TRIP ASSIGNMENT:** Assignment Techniques, Traffic fore casting, Land use transport models, Lowry Model, Garin Lowry model Applications in India.	**8 Hrs**
UNIT-V (Blended learning)	
URBAN TRANSPORT PLANNING FOR SMALL AND MEDIUM CITIES: Introduction, Difficulties in transport planning, Recent Case Studies.	**8 Hrs**

Course Outcomes: The students will be able to	
1	Explain the importance of urban transport planning and its relation between various surveys involved in urban transport for smooth flow of traffic.
2	Apply the fundamental principles of mathematical models for the trip generation and its assignment techniques for modal split and trip distribution methods.
3	Explain the basic elements and its related case studies with respect to urban transport planning for small and medium cities.

Text Books:	
1	Traffic Engineering and Transport Planning- L.R. Kadiyali - Khanna Publishers, New Delhi.
2	Principles of urban transport system planning - B.G. Hutchinson - Scripta Book Co., Washington D.C. & McGraw Hill Book Co.
3	Introduction to transportation engineering- Jotin Kristey and Kentlal - PHI, New Delhi.

Reference Books:	
1	Urban Transport planning- Black John - Croom Helm ltd, London.
2	Urban and Regional models in geography and planning- Hutchison B G – John Wiley and sons London.
3	Entropy in urban and regional modeling- Wilson A G - Pion ltd, London.

Question paper pattern:

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

CO-PO Mapping

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: PHOTO GEOLOGY AND REMOTE SENSING	
Course Code: **18CV753**	Evaluation Procedure: CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Credits: **03**	
Teaching Hours: 39 Hrs (L:T:P:S:3:0:0:0)	SEE Duration: 3 Hrs

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

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

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

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

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

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

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

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

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

Syllabus for 2018-19 Batch UG (CV)

Semester: VII	
Course Title: ENVIRONMENTAL ENGINEERING LABORATORY	
Course Code: **18CVL76**	Evaluation Procedure:
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, 10th edition, Roorkee.

Course Outcomes: The students will be able to	
1	Achieve knowledge of design and development of experimenting skills.
2	Analysis and interpretation of test results.
3	Summarize the testing methods.

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