

COURSE STRUCTURE FOR
B.TECH 3rd Semester Civil Engineering

Course Code	Course Title	Teaching periods per week			Credits
		L	T	P	
CVE-3117	Structural analysis-I	3	1	0	4
CVE-3217	Fluid mechanics-I	3	1	0	4
CVE-3317	Surveying-I	2	1	0	3
CVE—3417	Engineering Geology & Material	2	1	0	3
MTH-3517	Mathematics-I	3	1	0	4
HSS-3617	Humanities & Social Science	2	1	0	3
CVE-3117L	Structural analysis-I Lab	0	0	2	1
CVE-3217L	Fluid mechanics-I Lab	0	0	2	1
CVE-3317L	Surveying-I Lab	0	0	2	1
CVE—3417L	Engineering Geology & Material Lab	0	0	2	1
	TOTAL	15	6	8	25

COURSE STRUCTURE FOR
B.TECH 4th Semester Civil Engineering

Course Code	Course Title	Teaching periods per week			Credits
		L	T	P	
CVE-4117	Structural analysis-II	3	1	0	4
CVE-4217	Fluid mechanics-II	3	1	0	4
CVE-4317	Surveying-II	2	1	0	3
CVE-4417	Building Drawing	3	1	0	4
CVE-4517	Building Construction	2	1	0	3
MTH-4617	Mathematics-II	2	1	0	3
CVE-4217L	Fluid mechanics-II Lab	0	0	2	1
CVE-4317L	Surveying-II & Surveying Camp	0	0	2	3
	TOTAL	15	6	6	25

COURSE STRUCTURE FOR
B.TECH 5th Semester Civil Engineering

Course Code	Course Title	Teaching periods per week			Credits
		L	T	P	
CVE-5117	Design of Structure-I	3	1	0	4
CVE-5217	Concrete Technology	2	1	0	3
CVE-5317	Highway Engineering & PMS	2	1	0	3
CVE-5417	Geo Technical Engineering-I	3	1	0	4
CVE-5517	Water Resource Engineering	2	1	0	3
CVE-5617	Quantity Survey & Cost Evaluation	3	1	0	4
CVE-5217L	Concrete Technology Lab	0	0	2	1
CVE-5317L	Highway Engineering & PMS Lab	0	0	2	1
CVE-5417L	Geo Technical Engineering-I Lab	0	0	2	1
CVE-5717	Professional Development Activities	0	0	2	1
	TOTAL	15	6	8	25

COURSE STRUCTURE FOR
B.TECH 6th Semester Civil Engineering

Course Code	Course Title	Teaching periods per week			Credits
		L	T	P	
CVE-6117	Design of Structure-II	3	1	0	4
CVE-6217	Geo Technical Engineering-II	3	1	0	4
CVE-6317	Traffic Engineering	3	1	0	4
CVE-6417	Hydropower Engineering	3	1	0	4
CVE-6517	Water Supply Engineering	3	1	0	4
CVE-6217L	Geo Technical Engineering-II Lab	0	0	2	1
CVE-6317L	Traffic Engineering Lab	0	0	2	1
CVE-6517L	Water Supply Engineering Lab	0	0	2	1
CVE-6717	Professional Development Activities	0	0	2	2
	TOTAL	15	5	8	25

COURSE STRUCTURE FOR
B.TECH 7th Semester Civil Engineering

Course Code	Course Title	Teaching periods per week			Credits
		L	T	P	
CVE-7117	Design of Steel Structures	2	1	0	3
CVE-7217	Construction Technology & Management	2	1	0	3
CVE-7317	Environmental Engineering	2	1	0	3
CVE-7417EX		2	1	0	3
CVE-7417E1	Advance Structural Engineering				
CVE-7417E1	Auto Cad				
CVE-7517EX		2	1	0	3
CVE-7517E2	Railway and Airport Engineering				
CVE-7517E2	Advanced Geo Tech				
CVE-7617S	Seminar	0	0	6	3
CVE-7717PP	Pre-project	0	0	10	5
CVE-7817	Professional Development Activities	0	0	4	2
	TOTAL	10	5	20	25

COURSE STRUCTURE FOR
B.TECH 8th Semester Civil Engineering

Course Code	Course Title	Teaching periods per week			Credits
		L	T	P	
CVE-8117	Irrigation and flood control	2	1	0	3
CVE-8217	Bridge Engineering	2	1	0	3
CVE-8317EX		2	1	0	3
CVE-8317E1	Tunneling Technology				
CVE-8317E1	Numerical Methods in Civil Engineering				
CVE-8317E1	Green buildings				
CVE-8417EX		2	1	0	3
CVE-8417E2	Advanced Environmental Engineering				
CVE-8417E2	Advanced construction Technology				
CVE-8417E2	Structural Dynamics	0	0		

CVE-8517P	Project work	0	6	8	10
CVE-8617PT	Professional viva-voce/tour and training	0	0	4	2
CVE-8717	Professional Development Activities	0	0	2	1
	TOTAL	8	10	14	25

THIRD SEMESTER

Course no: CVE-3117
STRUCTURAL ANALYSIS-I

Unit 1

Structure; Structural Engineering; Structural Analysis; Types of Loads ; Evaluation of Gravity Loads On Various Components with Reference to IS : 875.

Forces ; Specification of a Force ; Free Body Diagrams ; Equations of Equilibrium ; Condition Equations ; Displacements ; Compatibility ; Boundary Conditions ; Principle of Superposition ; Stiffness & Flexibility

Introduction to Indeterminate structures; Types of Structural Supports. Degrees of Freedom, Kinematic & Static Indeterminacy of Structures.

Unit 11

Flexural formula, bending stress and shear stress diagrams for homogeneous beam sections of various shapes.

Principal stresses and strains, evaluation by analytical and graphical methods - Mohr's Circle.

Castigliano's 2nd Theorem of minimum energy & its application to Analysis of Internally & Externally Indeterminate Trusses.

Unit 111

Slope and deflection of determinate beams by differential equation, moment area, conjugate beam and energy methods, Castigliano's first energy theorem and its applications to deflection of simple determinate trusses.

Stresses in columns, short and long columns, buckling phenomenon. Euler's, Rankine's theory - Crippling loads evaluation, stresses in eccentrically loaded columns.

Books Recommended:

1. Structural Analysis: Jack C. McCormac.
2. Nash, William A. "Theory and Problems of Strength of materials 4/e". Tata McGraw Hill, New Delhi, 2004. .
3. Fundamentals of Structural Analysis: West.
4. Introduction to Structural Engineering: John M. Biggs.
5. Indeterminate Structures: C.K.Wang .
6. Determinate Structures: R.L.Jindal.
7. Reddy, C.S. "Basic Structural Analysis" , Tata McGraw Hill, New Delhi,2003.

Course no: CVE-3117 L
STRUCTURAL ANALYSIS LAB

List of Experiments

1. Tensile Test of Steel: To determine yield strength, ultimate tensile strength, percentage elongation and modulus of elasticity (Plot, stress strain curve).

2. Tensile and Compressive strength of Timber:

- i. Parallel to grains
- ii. Perpendicular to grains

3. Shear test of steel/timber: To measure ultimate shear strength, shear modulus, plot shear stress strain curve.

4. Torsion test of steel: To measure angle of twist, Ultimate torsional strength stress strain curve.

5. Buckling load of columns various end conditions: To determine crippling load of columns with different end conditions and compare theoretical values.

6. Verification of Maxwell's theorem: To verify the Principle of Maxwell's

7. Testing of Bricks and Stones as per IS Specifications:

Course no: CVE-3217
FLUID MECHANICS-I

UNIT-I

PROPERTIES & STATICS OF FLUID FLOW

Physical properties of fluids viz, mass density, viscosity, compressibility, vapour pressure, surface tension, capillarity, etc. Ideal Fluids and Real Fluids; Newtonian and Non-Newtonian Fluids.

Pressure Intensity, Pascal's law; Pressure- density- height relationships, manometers; pressure on plane and curved surfaces, centre of pressure; Buoyancy, Stability of immersed and floating bodies.

UNIT-II

KINEMATICS OF FLUID FLOW & BOUNDARY LAYER ANALYSIS:

Steady and unsteady, uniform and non uniform, laminar and turbulent flows; one, two and three dimensional flows; Stream lines, Streak lines and path lines; Continuity equation; Rotation and Circulation; Elementary explanation of stream function and velocity potential; Graphical and Experimental methods of drawing flow nets.

Momentum equation:its application to stationary and moving vanes, pipe bends.

Boundary layer analysis:Boundary layer thickness, Boundary layer over a flat plate, Laminar boundary layer, Application of momentum equation, Turbulent boundary layer, Laminar sub-layer, smooth and rough boundaries, local and Average friction coefficients, separation

UNIT-III

DYNAMICS OF FLUID FLOW & DIMENSIONAL ANALYSIS

Euler's equation of motion along a streamline and its integration to yield Bernoulli's equation; Flow measurement, flow through orificemeter, Venturimeter, orifices, mouth pieces, pitot and prandtl tubes, sluice gates under free and submerged conditions, Various types of Notches and weirs under free and submerged flow conditions, Aeration of nape.

Dimensional analysis and hydraulic similitude:Buckingham's theorem, Important dimensionless numbers and their significance, Geometric, kinematic and dynamic similarities; Model analysis

BOOKS RECOMMENDED:

1. Engg. Fluid Mechanics by R.J.Garde.
2. Kumar, K.L. " Engg. Fluid Mechanics", Eurasia Publishing House (P) Ltd. New Delhi, 1984.
3. Kumar, D.S. "Fluid Mechanics". S.K. Kataria & Sons Publishers, New Delhi, 1998.
4. Streeter, V.L., Wylie, E.B. and Bedford, K.W. "Fluid Mechanics" McGraw Hill , New York, 2001. Bansal, R.K. "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New, Delhi, 2000.

Course no: CVE-3217 1**FLUID MECHANICS LAB**

1	To determine experimentally the metacentric height of a ship model.
2	To verify the Bernoulli's equation experimentally.
3	To determine the coefficient of discharge, coefficient of velocity and coefficient of contraction of an orifice or a mouthpiece of a given shape.
4	To calibrate an orifice meter and to study the variation of coefficient of discharge with Reynold's number.
5	To calibrate a venturimeter and to study the variation of coefficient of discharge with Reynold's Number.
6	To calibrate sharp crested rectangular and triangular weir.
7	To verify momentum equation experimentally.

Course no: CVE-3317
SURVEYING-I

UNIT-I

Introduction: Definition, Application, Primary Divisions, Classification, importance, types and principles of Surveying, Units of Measurements, Linear and Angular Measurements, Phases of Works in Surveying, Error and Types of Errors in Surveying, Sources of Errors.

Chain Surveying: Approximate Methods of Distance Measurements, Measurement by chaining, Accessories used in Chain Surveying, Types of Chains, Types of Tapes, Testing and Adjustment of Chain, Principle of Chain Surveying, Operations in Chain Surveying their explanation and types, Errors in Chain Surveying, Chain and Tape Corrections with Numerical, Obstacles in Chain Surveying With Numerical, Setting Out of Right Angles by Tape and Chain Only, Setting out of Parallel Lines, Conventional Symbols and Colours.

UNIT-II

Plane Table Surveying; Plane table Surveying and its accessories, working operations of plane table, orientation and its types, Methods of plane tabling viz Radiation, Intersection, Traversing, Resection, Two point and Three point problem with methods, errors in plane table surveying, its advantages and disadvantages

Areas and Volumes: General methods of determining areas by dividing into number of triangles, by offset to base line viz Mid-ordinate rule, by average ordinate rule, by trapezoidal rule, by Simpson's one-third rule, by Graphical method, by Instrumental method, by determining volumes viz., Borrow - pits.

UNIT-III

Leveling: Leveling and its principle, bench marks and its types, types of levels, parts of dumpy Level, Introduction to tilting and auto level, Leveling Staff and its types, adjustments of level, types of Leveling, booking and reducing the levels with Numerical, missing data Numerical, Field Book Recording, Difficulties and errors in Leveling, Curvature and Refraction.

Prismatic compass surveying: Compass, its types and parts, adjustments and errors in Compass Surveying, difference between Prismatic and Surveyor's Compass, Bearing of a Line, Designation of Bearings, Conversion of Bearings from One System to other, Fore and Back Bearings with numerical, Declination with Numerical, Computations of Angles from Bearings, Computations of Bearings from Angles, Local Attraction, Sources of Local Attraction, Detection of Local Attraction, Solution through Numerical, Traverse and its Types

Books recommended

- Surveying Vols. I & II by Dr. K.R.Arora
- Duggal, S.K.” Surveying” Vols. I & II, Tata McGraw Hill, New Delhi,2004.
- Basak “Surveying & Levelling” Tata McGraw Hill, New Delhi
- Kanetkar, T.P. and Kulkarni, S.V.”Surveying & Levelling” Vols. I & II PVG Prakashan, Pune, 1994..
- Surveying by S.S Bhavikatti
- Surveying & Levelling by P.B. Shahni
- Punmia, B.C.”Surveying” Vol. 1&2, Laxmi Publications Pvt. Ltd, New Delhi,2002.
- C. L Kochher Vol. I & II Dhanpat rajpulishing co.

Course no: CVE-3317L

SURVEYING-I LAB

CHAIN SURVEYING:

1. Laying out the Chain.
2. Ranging a line by Direct Ranging.
3. Ranging a line by Reciprocal Ranging.
4. Chaining a line by Direct Chaining.
5. Chaining a line on slope (Stepping method).
6. Chaining a line by Indirect Chaining. (Using Instruments).
7. Setting-out Right Angles using Tape and Chain when the point is on the Chain.
8. Setting-out Right Angles using Tape and Chain when the point is outside the Chain.
9. Taking offsets and setting-out Right Angles using:-
 - (i) Cross Staffs
 - (ii) Optical Squares.
10. Finding out the area using field book method by offsetting.
11. Obstacles in Chain Survey when Chaining round the obstacle is possible
12. Obstacles in Chain Survey when Chaining round the obstacle is not possible.
13. Obstacles in Chain Survey when both Chaining & Ranging obstructed.
14. Testing and Adjustment of Chain.

COMPASS SURVEYING:

1. Study of Prismatic Compass
2. Setting out Compass.
3. To find out Fore & back Bearing of a Line.
4. Measurement of Angles between two lines meeting at a point.
5. Compass Traversing (a) Closed Traverse for Pentagon, Hexagon, Rectangle etc.
(b) Open traverse of Roads / Canals / Railway, etc

PLANE TABLE SURVEYING:

1. Study of Equipment
2. Setting-up the plane table- Temporary Adjustments.
3. Marking North Direction and Orientation by :
 - (i) Magnetic Needle/Trough Compass
 - (ii) Back- sighting.
4. Plotting a few points by Radiation Method.
5. Plotting a few points by Intersection Method.
6. Two point and three point problem.

LEVELLING:

1. Study of Equipment and levelling staff.
2. Temporary adjustment of levelling Instruments.
3. Field work using levelling Instrument:-
 - (i) Taking Staff readings From signal instrument station
 - (ii) Taking Staff readings From two instrument station and Recording the field book.

4. Longitudinal Section of Road/Railway/Canal/Dam
5. Cross Section of a Road/Railway/Canal/Dam.
6. Taking Staff readings on different stations / finding difference of level between them by Levelling.

Course no: CVE-3417

ENGINEERING GEOLOGY & MATERIALS

UNIT-I

- **GEOLOGY:** Physical Geology;
- Geology and its relevance to civil engineering,
- Geological work of wind, rivers, glaciers and seas.

- **B.MATERIALS:** Stones, characteristics, classification, quarrying, and its methods Their properties and Tests on stones.

- **UNIT-II**

GEOLOGY: Earthquakes; basic definitions, types and causes, distribution in the world seismic zones.

- Geological considerations : Tunnels, Dams, bridges, building sites, landslides

- **B.MATERIALS:** Lime and its types, slacking of lime, Manufacturing of lime, Properties of lime and its Tests.

UNIT-III

- **GEOLOGY:** Petrology: Formation of rocks, Types and field classification.
- Weathering of Rocks,
- Origin of Soils.
- Structural Geology: Folds, faults, Joints, Unconformities

- **B.MATERIALS:** Bricks, Raw material for brick earth, classification .Tests and manufacturing of bricks.
- Timber;classification, identification of timber. Market forms of converted timber properties, defects, seasoning and its methods,decay and prevention. Tests of timber.
- Tiles properties and their uses .
- Other materials : Metals (Ferrous and Non ferrous like zinc ,copper, tin, lead ,aluminium, nickel, cast iron ,wrought iron, mild steel. Their properties and uses
- Asphalt , Tar and Bitumin . Their properties and uses.

Books recommended

Building Materials by Parbin Singh
Civil Engineering Material by Gurbachan Singh
Building Material by Dutta.
Building Materials by Duggal S. K., New Age International (P) Ltd. Publishers, New Delhi, 2006 .
Engineering Geology by Parbin Singh.
Physical Geology by Arthur Holmes.
Engineering Geology by F. G. Bell

Course no: CVE-3417L**ENGINEERING GEOLOGY & MATERIALS LAB**

- 1 The study of Physical Properties of Minerals.
- 2 Determination of Specific Gravity by:
 - a) Jolly's Spring Balance
 - b) Walkers Steel Yard Balance
 - c) Beam Balance
- 3 Study of Rocks and their Characteristics.
- 4 Study and Sketching of various types of Geological Structures.
- 5 Determination of Dip and Strike with a Clinometer Compass.

Course no: MTH-3517
MATHEMATICS-I

UNIT-I

Statistics and probability Measures of Central tendency and Measures of Variations (Dispersions), Moments, Measures of Skewness and kurtosis
Random experiment, sample space, events, classical, statistical and Axiomatic definitions of probability. Statements and proof of theorems on addition and multiplication of probabilities. Simple problems. Baye's theorem on conditional probability

UNIT-II

Random variables, Derivation of formulae for mean, variance and moments of random variables for discrete and continuous cases. Laws of expectation
Binomial, poisson and Normal distributions. Method of least squares, Fitting a straight line and parabola of degree 'p'. Regression and correlation.

UNIT-III

Fourier transforms

Fourier series, harmonic analysis, definition of fourier transform, fourier sine and cosine transform, fourier integral formula, application to solutions of boundary value problems.

BOOKS RECOMMENDED:

1. Integral I. Gupta, S.C. and Kapoor, V.K. "Fundamentals of mathematical statistics" Sultan Chand & Sons..
2. Rownlee, "Statistical theory and methodology in Science and Engineering", John Wiley & Sons.
3. Walpole, R.E. "Introduction to mathematical statistics" 3rd edition, Macmillan Publications, New York..
4. Meyer. "Data analysis for scientists and Engineers" John Wiley and Sons.
5. Snedden, Ian. N. "The Use of Integral transform", Tata McGraw Hill.
6. Loknath Debnath Transform" C.R.C. Press, New York..

Course no: HSS-3617
HUMANITIES & SOCIAL SCIENCE

UNIT-I

Introduction to industry: Meaning and importance of industrialization , social and economic benefits of industrialization , Problems of industrialization in a developing country like India- Industrial policy in India- 1948-1956 and recent economic reforms.

Forms of industrial organisation:

Single proprietorship, partnership, Joint stock companies, Cooperatives, state enterprises.

UNIT II

Pricing policy – price determination under perfect completion and monopoly – features of various other markets, situations and determination of price- cost analysis – various concepts short term and long term costs.

UNIT III

Management: Concepts , meaning and principles of Management.

Areas of management: Various functions of management , Administrative and operational management , span of control.

Management objectives: Management objectives, Classification of management objectives, Primary, secondary and social objectives , Testing of objectives , objectives and performance.

Management control: Techniques of management control, Budgetary control , supervision , inspection and feedback.

Books recommended

Elementary Economic Theory by K.K. Dewett

Elementary Economic Theory by M.L. Seth

Principles of Management by S.A. Sherlaker

Industrial Organisation and Management by Y.K.

Bhushan

Principles of Management by Tara- Chand, Vols. I & II

FOURTH SEMESTER

Course no: CVE-4117
STRUCTURAL ANALYSIS-II

UNIT-I

Influence lines & travelling loads: Principles of Influence Lines and their Application to Determinate Structures; Beams, Arches & Bridge Trusses. Criteria for maximum moment & shear under series of moving concentrated loads in beams. Absolute maximum forces in beams under moving udl. Muller Breslau's principle with application to indeterminate structures-beams.

UNIT-II

Cables bridges: Statics of a suspension cable. Analysis of cable bridges with & without stiffening girders. Analysis for static loads

Elements of plastic analysis beams and frames:

Plastic section modulus, shape factor and moment of resistance. Mechanism method and statistical method of analysis

UNIT-III

Analysis of beams by force method: Analysis of Moment area method. Three moment theorem and its application to analysis of continuous beams.

Introduction to displacement method of analysis: Analysis of Indeterminate Beams & Frames (with & without Sway) by Classical Displacement Methods viz; Slope Deflection Method , Moment Distribution Method..

Analysis of approximate 2d frames: Portal and cantilever methods for analysis of frames under lateral loads..

Books Recommended

Indeterminate Structural Analysis by C.K.Wang
Indeterminate Structural Analysis by R.L.Jindal
Structural Mechanics by Norris & Wilbur

Course no: CVE-4217
FLUID MECHANICS-II

UNIT-I

Hydraulic machines-Types of Turbines, Description and principles of Impulse and reaction Turbines, Unit quantities and specific speed, Runaway speed, Turbine characteristics , Selection of Turbines, Cavitations; Draft Tube, Draft Tube Dimensions, Types of draft tubes; Governing of Turbines; Centrifugal pumps, specific speed, power, requirements, Reciprocating pumps.

UNIT-II

Water hammer and surge tanks-Sequence of events after sudden valve closure, pressure diagrams, Gradual closure or opening of the valve, Instantaneous closure of valve in a rigid pipe, Instantaneous closure of valve in an Elastic pipe and Compressible fluid, Methods of Analysis; Surge Tanks, Location of Surge Tanks, Types, Design of surge Tanks

Fluid flow past submerged bodies- Drag and lift, Drag on a sphere, cylinder and disc: Lift, Magnus effect and Circulation

UNIT-III

Flow in open channels -Uniform flow, Critical depth, Normal depth, Specific energy, Resistance formulae, Gradually varied flow equations, Classification of water surface profiles, Computation of water surface profiles, step by step method and graphical integration method. Hydraulic Jump, Momentum Principle for open channels, Evaluation of the jump elements. Venturiflumes.

Flow through pipes- Nature of turbulent flow in pipes , Hydraulic and energy grade lines. Equation for velocity distribution over smooth and rough pipes, Resistance coefficient and its variation, Nikuradse experiments, Moody diagram, Flow in sudden expansion, Contraction, diffusers, Bends, Valves and Siphons; Concept of equivalent length, branched pipes in series and parallels, Simple networks, Transmission of power.

S.No	Name of Books/authors/Publishers	Year of Publication
1.	Kumar, D.S. "Fluid Mechanics and Fluid Power Engineering". Seventh Ed. S.K. Kataria & Sons Publishers, New Delhi,	2008-2009
2.	K.Subramanaya "Open channel Flow" ^{3rd} .Tata McGraw Hill Pub.Co.New Delhi	1999
3.	RangaRaju, K.G., "Flow Through Open Channels", 2 nd .Tata McGraw Hill Publishing Company Ltd., New Delhi,1986	1999

4.	Nigam “Handbook of Hydro Electric Engg.”	2001
5.	Garde R.J “ Engg. Engineering Fluid Mechanics”	1988
6.	Deshmukh,M.M, “ Water Power Engineering”DanpatRai&Sons,NaiSarak New Delhi	1978
7.	Bansal, R.k “ Fluid Mechanics and Hydraulic Machines” Laxmi Publication	

Course no: CVE-4217L
FLUID MECHANICS-II LAB

1	To study the variation of friction factor “f” for turbulent flow in different commercial pipes.
2	To determine the loss coefficient for various pipe fittings.
3	To determine Manning's coefficient of roughness “n” for the bed of a given flume.
4	To calibrate a broad crested weir.
5	To study the formation of hydraulic jump.
6	To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
7	To study the velocity distribution in an open channel and to determine the energy and momentum correction factors.

Course no: CVE-4317
SURVEYING-II

UNIT-I

Contouring, Permanent adjustments, Sensitivity: Contour, Contouring, Contour Intervals, Horizontal Equivalent, Contour Gradient, Grade Contour, Ghat Tracer and its working, Land features and their forms, Characteristics of Contour lines, Methods of Contouring, Direct method, Indirect method, Interpolation Of Contours, Drawing Contours, Uses of Contour Maps, Calculation of Reservoir Capacity. Permanent Adjustments of Dumpy Level, Object, Necessity, Test and Adjustment, with Numerical, Sensitivity, Sensitiveness of Bubble tube, Methods of Measuring Sensitiveness with Numerical.

Setting out Works: Introduction, marking a control station, marking building corner , marking a line, controls for setting out, reference grids, definitions viz. stake, post, batter board, cross head, sight rail, boning rod, travelling rod, Setting out of Trenches of a Buildings, setting out of culvert, drain, setting out of tunnels and transferring level Under Ground.

UNIT-II

Tachometry: Tachometry, Advantages of Tachometry, Instruments used in Tachometry ,Different Systems of Tachometry Measurements, General Principles of Stadia Tachometry, Methods of determination of Stadia Constants of Tachometer, along with the Numerical, Errors in Tachometric Surveying, Degree of Accuracy, Method of holding Staff, Advantages of Holding the Staff Vertical and Normal, Method of Reading the Staff.

Trigonometrical levelling: Cases involved in trigonometrical levelling, bases of the Object being accessible and inaccessible, with derivations and necessary Numerical, Minor Instruments viz. Hand level, Abney Level, Indian Pattern, Clinometer, Ceylon, Ghat Tracer, Planimeter, Pantagraph , Box Sextant.

UNIT-III

Theodolite: Classification, main parts, technical definitions and terms, fundamental axis of theodolite, reading a theodolite, adjustments of theodolite, vernier scales and its types, methods of measuring of horizontal , vertical angles, and bearing of a line, laying of horizontal and vertical Angle, Least Count of theodolite, Methods of prolongation of straight lines, theodolite traversing and its methods, uses of theodolite, Good practice in theodolite Survey, traverse computations and numerical,, Errors in theodolite.

Curves: Curve, Classification of Curves, Simple, Compound, Reverse, Transition curve and its types, Combined, Broken-back , Vertical curve and its types, Elements of simple curve, Designation, Numerical, Relation between Degree and Radius of Curve, Necessities of Curves, Sources of Errors and mistakes, Definitions and Notations, Sight distance, Numerical on Simple and Compound Curves.

Books recommended,

Surveying Vols. I & II by Dr. K.R.Arora

Duggal, S.K.” Surveying” Vols. I & II, Tata McGraw Hill, New Delhi,2004.

Basak “Surveying & Levelling” Tata McGraw Hill, New Delhi

Kanetkar,T.P. and Kulkarni, S.V.”Surveying & Levelling” Vols. I & II PVG Prakashan, Pune,

Surveying by S.S Bhavikatti ,Surveying & Levelling by P.B. Shahni
Punmia, B.C.”Surveying” Vol. 1&2, Laxmi Publications Pvt. Ltd, New Delhi,2002.

Course no: CVE-4317L
SURVEYING-II LAB & SURVEYING CAMP

1. THEODOLITE SURVEYING:

1. Study about the Theodolite.
2. Setting out of Theodolite.
3. To find out the Horizontal angles by Ordinary Method.
- 4 To find out the Horizontal angles by Repetition Method.
5. To find out the Horizontal angles by Reiteration Method.
6. To find out the Vertical Angle.
7. To find out the Bearing of a line.
8. To lay out the Horizontal Angle.
9. To lay out the Vertical Angle.
10. Prolongation of line by Backsight method.
11. Prolongation of line by Foresight method.
12. Prolongation of line by Doublesight method.
13. Traversing with a Theodolite.
14. To find out the Height of a Building / object

2. Contouring, Permanent. Adj, Sensitivity:

1. Contouring of a given area by Spot Leveling. (Squaring Method)
2. Interpolation of Contours by Arthmetical method.
3. To find out the Gradient of a road by Cylon Ghat Tracer.
4. To lay out the Gradient of a road by Cylon Gath Tracer.
5. Permanent adjustments of a dumpy level by two methods.
6. Sensitiveness of Bubble tube by two methods.

3. TACHOMETRIC SURVEYING:

1. Study about the Equipment and graduated staff.
2. Temporary adjustments of Tachometer.
3. Determination of constants."K&C" (f + d & f/i)
4. To find out the distance of a line using (KS + C).

4 .SURVEYING CAMP

1. Surveying of Roads ,Dams,Building , Hydel projects ,Colonies using Total-Station & GPS

2. Preparation of Site Plan , Contour Map ,L- Section & X –Section of the above works using CAD

Note:- Attending the Survey Camp is compulsory for all students. The student who will not attend the Survey Camp during the course of session will be deemed as backlog student for the next session and no attendance will be compensated in the up-semester.

**Course no: CVE-4417
BUILDING DRAWING**

UNIT-I

Standard conventions in Drawing; Basic principles of planning and design in buildings.

Foundations Details of spread footing foundations; load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.

Bonds Plans of 'T' and corner junction of walls of 1 Brick, 1-1/2 Brick and 2 Brick thick in English bond

Steel Work Drawing of elementary structural steel work for columns ,footings & roofs

UNIT-II

Joinery Drawing of Typical Doors, Windows, and Ventilators..

Floors Detailed Drawing of basement, single wooden floor, double wooden floor.

Staircase Detailed Drawing of R.C.C staircase

UNIT-III

Building plans Drawings of plans, Elevations and sections giving construction details of important building components including foundation, plinth, DPC, Lintels, Slabs and roofs; Full Specifications for each component.

RCC works Drawing of R.C.C. Slabs & Beams (including cantilevers) Columns and Footings

Services Simple Drawing exercises on layouts of building services such as Electrical, Water supply and plumbing, Sanitation etc.

Roof trusses Drawings of various timber roof trusses with joint details.

Books Recommended

1. Building Drawing by M.G. Shah
2. Civil Engineering drawing by Chakorobarty
3. Civil Engineering drawing by J.B Mc. Kay
4. Building Construction by Sharma & Koul
5. Properties of Concrete by A.M.Nevile

Course no: CVE-4517
BUILDING CONSTRUCTION

UNIT-I

Foundations: Principles of foundation; types and suitability of foundation including strip, pad, raft, pile and pier foundation; timbering for excavation of foundation. Shuttering, scaffolding and centring;

Masonry: Principles and significance of brick Masonry; Terms used and types of Brick Bonds; Principles and significance of stone masonry; types of stone masonry walls; Building uses of common types of stones

UNIT-II

Walls: Different types, Thickness considerations, partition walls; Brief introduction to cavity walls, plastering, pointing, white washing, colour washing and distempering. Prefabricated construction;

Doors, Windows, Ventilators and Lintels: Location, size and different types including steel and aluminium; Types of Lintels and their construction details.

Stairs and Staircase: Various types and materials; Proportions of staircases; Brief introduction to Ramps, Lifts and escalators.

UNIT-III

Floors: Consideration for choice in ground and upper floors; various types of floors and their suitability; flooring materials and their construction details.

Damp proofing; causes, effects ,parts of building likely to be effected most ,methods of damp proofing ,materials of damp proofing

Roofs and Roof Coverings: Classifications of roofs with special reference to pitched roofs; Different roof coverings and details of rain proofing at top wall.

Miscellaneous topics: Principles of sound proof construction and fire proof construction; Expansions and construction joints; Earth quake resistant construction; Thermal Insulation

Books Recommended

1. Building construction by Sharma & Koul.
2. Building Construction by B.C.Punmia
3. Building Construction by Sushil Kumar
4. Building Construction by Gurcharan Singh

Course no: MTH-4617
MATHEMATICS-II

UNIT-I

Complex Variables

Analytic functions, Cauchy Riemann equations, complex integration, Cauchy's fundamental theorem, Cauchy's integral formula, Cauchy's inequality and Liouville's theorem on integral function

UNIT-II

Taylor's and Laurent's expansions, zeroes and poles of analytic functions, residues and contour integration, conformal mappings, bilinear transformation.

UNIT-III

Special Functions

Legendre's functions, Rodrigues formula, generating functions for Legendre's polynomials and recurrence formulae and Bessel's functions of integral order.

Books Recommended

Complex variables and applications by R.V. Churchill.

Theory of functions of complex variables by E.T. Copson, Oxford University Press.

Advanced Engineering Mathematics by R.K. Jain and S.R.K. Iyengar, Narosa Publishing House, 2001

FIFTH SEMESTER

Course no: CVE-5117

DESIGN OF STRUCTURES-I

UNIT-I

Properties Of Concrete & Reinforcing Steel, Characteristic Strength, Stress Strain Curves, Shrinkage & Creep Phenomenon. General design Philosophies: Working Stress, Ultimate Load & Limit State Method Of Design. Analysis & Design Of Structures In Flexure/Torsion By Limit State Method. Design of single reinforced beam.

UNIT-II

Design of doubly reinforced sections: rectangular sections & T sections; codal provisions. Behaviour of beam in shear & bond, design for shear, anchorage & slipping of reinforcement. Detailing of reinforcement as per codal provisions with reference to IS 456-2000. Serviceability limits state of deflection and cracking. Calculation of deflection, codal requirements. Design of columns: short column, eccentrically loaded columns.

UNIT-III

Design of one-way and two-way slabs with and without corners held down. Introduction to design by moment coefficients. Design of Timber structures, Introduction, Structural timbers and their properties. Design of members in tension, compression and flexure. Bolted and nailed joints

Books Recommended

Design of reinforced Concrete and Pre-stressed Concrete Structures. By Kong and Evans.

Design of Reinforced Concrete: Limit State Design. By A.K. Jain.

Design of R.C.C Structures By Sinha

Design of R.C.C Structures By Karve and Shah

Course no: CVE-5217
CONCRETE TECHNOLOGY

UNIT-I

Introduction: Cement: Its Basic Chemistry, Types of Portland cement, Normal aggregates and their properties

UNIT -II

Principles of concrete mix design: concrete materials, mix proportioning

Properties and techniques of construction for concrete

Concreting operations - practices and equipment, batching; mixing; transporting; shuttering and staging; placing and compacting; curing, accelerated curing; finishing and jointing.
, admixtures, polymers, epoxy resins, pozzolanic materials and fly ash, fibre reinforced concrete, light weight concrete, heavy weight concrete, foam concrete, high performance concrete.

UNIT-III

Properties of concrete Early age properties, properties of hardened concrete

Special concrete operations, shotcrete, grouting, g uniting, under water concreting, hot and cold weather concrete, pumpable concrete, ready mixed concrete.

Admixtures; polymers, epoxy resins, pozzolanic materials and fly ash

Special concretes, fibre reinforced concrete, light weight concrete, heavy weight concrete, foam concrete, high performance concrete.

Books Recommended:

1. Gambhir, M.L. , Concrete Technology, Tata McGraw Hill, New Delhi
2. Orchard, Concrete Technology, Applied Science Publishers Ltd. London
3. Neville, Brooks, Concrete Technology, Addison – Wesley, England
4. Neville A.M., Properties of Concrete, The English Language Book Society and India Publishing , London
5. Raina V.K., Concrete for Construction , Tata-McGraw Hill Publishing Co. Ltd. New Delhi.
4. Swamy, . New Concrete Materials, Surrly University Press, London
5. Young, Concrete, Prentice Hall Inc. New Jersey.
6. Waddell, et.al: Concrete Construction Handbook, McGraw Hill Inc.

7. Sood, Hemant et al.; Laboratory manual in Concrete technology M/S CBS
8. Publications and Distributors, New Delhi.
9. Sood, Hemant; Jyoti P.M. ; Software on Concrete Mix Design ConMD – 2000,
10. NITTTR, Chandigarh.
11. Shetty, M.S.’ Concrete Technology, M/S S. Chand & Co. Ltd. New Delhi

Course no: CVE-5217L
CONCRETE TECHNOLOGY LAB

A) CEMENT: Standard Consistency and setting times
To determine: i) Standard consistency ii) Initial setting time iii) Final setting time in conformity with IS code 4031.
<u>Tensile and Compressive strength</u>
i) To determine the tensile strength and compressive strength of Cement in accordance with IS code - 4031.
B) AGGREGATES:
<u>Particle size distribution and fineness modulus</u>
To determine the particle size distribution and fineness modulus of coarse and fine aggregates (IS - 460). All the relevant tests for aggregates as per I.S. codes.
C) CONCRETE:
<u>Workability test</u>
i) To determine the consistency of fresh concrete by slump test.
ii) To determine the workability of freshly mixed concrete by the compaction factor test
<u>Compressive strength of Cement Concrete (Nominal mix)</u>
i) To determine the cube strength of concrete for different mixes and different W/C ratios.
<u>Flexural Strength of Concrete</u>
i) To determine the flexural strength (Modulus of Rupture) of concrete (Nominal Mix)
<u>Ultimate strength of Beams</u>
To determine the flexural ultimate strength of
i) an under reinforced beam
ii) an over reinforced beam
<u>Bond strength</u>
To determine the bond strength between
i) Mild steel plain bars & concrete
ii). Tor Steel/cold twisted bars and concrete
Concrete Mix Design using IS code procedure

Course no: CVE-5317
HIGHWAY ENGINEERING & PMS

UNIT-I

Scope, History, classification of roads. Comparison with other modes of transportation.

Alignment design: route survey and highway Location

UNIT-II

Highway materials and construction: Properties and tests for road aggregates and bituminous materials, design of bituminous concrete mix, methods of preparing sub grade, base course and construction of various types of surface covers, joints in cement concrete roads

Pavement management system: basic concept, data requirements & collection methods, maintenance and rehab treatments, priority programming, implementation of PMS.

UNIT-III.

Geometric design: cross-section elements; sight distances, horizontal and vertical alignment

Pavement design: factors affecting pavement design, types of pavements, Empirical methods of flexible pavement design (e.g. C.B.R, group index and Burmister's layer theory), stresses due to load and temperature in rigid pavements, introduction to design methods of rigid pavements

Books Recommended:

- 1 Khanna, S.K. and Justo, C.E.G. 2002. "Highway Engineering". Nem Chand Brothers, Roorkee.
- 2 Bhanot, K.L.1990. " Highway Engineering", S. Chand and Company (P) Ltd., New Delhi.
- 3 Rao, G.V. 1996. "Principles of Transportation and Highway Engineering", Tata McGraw Hill, New Delhi.
- 4 Pavement Design and Management Guide by Transportation Association of Canada, Ottawa, Ontario, Edn. Dr. Ralph Haas, University of Waterloo.

Course no: CVE-5317L

HIGHWAY ENGINEERING & PMS LAB

1	Tests on aggregates Aggregate grading; Sp. Gravity; crushing; Abrasion; impact; soundness; flakiness; shape; fineness modules, silica content, silt content, Alkalinity.
2	Tests on bitumen: Viscosity, penetration, softening point, flash and fire point.
3	Tests on sub-grade: Sub-grade modulus; CBR.

Course no: CVE-5417

GEOTECHNICAL ENGINEERING-I

UNIT-I

Introduction: Soil and its formation , various processes and agencies for formation. Types of soils. Three phase soil model, Index properties and classification of soils

Soil investigation. Laboratory and Field Investigation . Sub soil exploration , penetration methods,Geo physical methods electromagnetic method, electric resistivity method and Seismic method

UNIT-II

Soil hydraulics- Flow through soils, Darcy's Law. Permeability , factors and determination in the lab/Field. Steady state flow , seepage force, laplace equation for steady state flow, flow nets. for homogeneous embankments with and without toe filters.

Effective stress. Total and effective stresses ,pore water pressure

UNIT-III

Soil compressibility One dimensional consolidation, Terzaghi's equation , Consolidation test e log p curves. Consolidation settlement, Time required for settlement.

Compaction, laboratory compaction tests, proctor compaction , compaction curve and control on field compaction

Clay mineralogy- Minerals present in clay, dependence of behaviour of clay on type of mineral.

Stress distribution. Stress distribution under concentrated load . Westergard's and Boussineq's method.

Books Recommended

Soil Mechanics by Alam Singh
Principles of soil Mechanics by D.W.Taylor
Theoretical Soil Mechanics by Terzaghi.
Soil Mechanics by Terzaghi & Peck
Soil Mechanics by Witman & Lamb.
Soil Mechanics by S.B.Saighal
Soil Mechanics by Jumikis
Geotechnical Engg. by Purushothama Raj
Geotechnical Engg. by C. Venkatramaiah

Course no: CVE-5417L**GEOTECHNICAL ENGINEERING-I LAB**

1	Determination of water content; bulk density and specific gravity
2	Soil gradation by sieve analysis and hydrometer analysis.
3	Consistency limits; Determination of plastic; liquid and shrinkage limits.
4	Determination of permeability by falling head and constant head method.
5	Conduct of 1-dimensional consolidation
6	Conduct of standard proctor compaction test.
7	Rapid control Compaction test as per USBR.

Course no: CVE-5517

WATER RESOURCES ENGINEERING

UNIT-I

Definition and scope of hydrology, hydrological cycle, water balance equation

Precipitation, its mechanism, forms, weather systems, Indian scenario, measurement, average precipitation, gauge network adequacy, missing data determination, and consistency

Evaporation: factors affecting, measurement, empirical equations, analytical methods, reservoir evaporation; Evapotranspiration, its measurement, ET equations, potential evapotranspiration

Interception and depression storage

infiltration, infiltration capacity, measurement, indirect determination, infiltration indices

UNIT-II

Streamflow measurement: Direct and indirect methods, depth measurement, velocity measurement, stage-discharge relationship

Runoff: Factors affecting, runoff characteristics of streams, rainfall-runoff relationships

Fluvial Hydraulics: Introduction, properties of sediment particles, brief description of incipient motion, bed load, and suspended load

Water Resources Planning and Development: National water policy, Single and multi-purpose development, Integrated water resources development and management, inter-state and international aspects of river basin development

UNIT-III

Groundwater: Introduction, types of aquifers, aquifer properties, Darcy's law, Dupuit assumptions, steady one-dimensional aquifer flow, Well Hydraulics : Steady flow to wells in confined and unconfined aquifers

Hydrographs: Definition, components, base flow separation, effective rainfall, unit hydrograph, its derivation, applications, and limitations.

Floods: Rational method, empirical methods, U.H. method, Design flood definition

Flood routing: Reservoir and channel routing

Reservoir Design Studies: Types of reservoirs, storage capacity, fixation of capacity, safe yield, reservoir sedimentation: trap efficiency, capacity-inflow ratio, life of reservoirs

BOOKSRECOMMENDED

Subramanaya, K. "Engineering Hydrology" Tata McGraw Hill, New Delhi, 2001.

Wilson, E.M. "Engineering Hydrology" ELBS, English Language book Society/ Macmillam Education Ltd., London, 1999.

Linsely, K., Kohler, A. and Paulhus L.H. "Hydrology for Engineers" McGraw Hill Book Company Inc. New York, 1975.

Linsely, K., Kohler, A. and Paulhus L.H. "Applied Hydrology" McGraw Hill Book Company Inc. New York, 1949.

Ragunath, H.M. "Hydrology Principles Analysis and Design" New Age International (P) Ltd Publishers., New Delhi, 2005.

Garde, R.J. and Ranga Raju K.G. "Mechanics of sediment transportation and alluvial stream

problems". New Age International (P) Ltd. Publishers, New Delhi. 1994
Arora, K.R. "Irrigation Water power and water Resources Engineering". Standard Publishers

Course no: CVE-5617

QUANTITY SURVEYING & COST EVALUATION

UNIT-I

Estimate: Importance, Items of a work and their units. Types of estimates, viz. preliminary; approximate; Abstract estimate; Plinth area estimate; detailed estimate; revised estimate; supplementary estimate, bill of quantities and abstract of cost.

Analysis of Rates: Preparing analysis of rates, Labour schedule, material schedule & rate schedule. Analysis of rates- of lime concrete in foundation; Brickwork in foundation in super structure; stone masonry; R.C.C. work; R.B.work; Plastering; pointing; white washing; colour washing; painting; wood work, earth work in foundation; earth work in road; D.P.C. ; Steel work for reinforcement; steel work in trusses; wood work in frames, shutters etc.

UNIT-II

Estimate of Road: Methods of estimating; materials for different items of work and labour; methods of estimating earth work; estimate of a metalled road.

Valuation & Rent Fixation: Valuation of building-various methods; Rent fixation, plinth area requirement.

UNIT-III

Specifications: General specifications and detailed specifications, Book of specifications, specifications for earth work in foundation; L.C. in foundation; R.C.C. work; Brick work; R. B. work; Wood work in doors, windows etc. D.P.C. centering and shuttering; earthwork in canal and road.

Works Estimate: Estimates of building; Estimates of walls; methods of building estimate; Longwall-shortwall and centreline methods; Estimate of masonry platform, estimate of a masonry tank, estimate of roof trusses (wooden/steel) Estimate of a single roomed building; estimate of a two roomed building with C.G.I roof over wooden trusses and over steel truss. estimate of a R.C.C. beam, R.C.C. Slab.

BOOKS RECOMMENDED

Estimating and Costing by Datta

Hand Book of Civil Engineering by Khanna
Estimating and Costing by Mahajan

Course no: CVE-5717

PROFESSIONAL DEVELOPEMENT ACTIVITIES

The student is required to attend the seminars, workshops , field visits and other co-curricular activities during the semester period and shall have to obtain a proper certificate of participation from the organisers

SIXTH SEM

Course no: CVE-6117

DESIGN OF STRUCTURES-II

UNIT-I

Design underground rectangular and circular water tanks with reference to IS:3370.

UNIT-II

Design of Foundations:

Various types of RCC footings, Design of Isolated footings and various types of combined footings. Introduction to Raft foundations and design procedure.

UNIT-III

Design of Retaining walls:

Stability analysis of retaining walls, design of cantilever and counter-fort type RCC retaining walls.

Books Recommended

Design of Footings By Kurien

Design of R.C.C. Structures By Jain and Jai Krishan.

Pre-stressed Concrete Structures By Krishna Raju.

Design of masonry, timber Structures By Arya.

Design of reinforced and Pre-stressed Concrete Structures by Kong and Evans.

Course no: CVE-6217

GEOTECHNICAL ENGINEERING-II

UNIT-I

SHEAR STRENGTH: shear strength concept. Mohr's Coulomb equation. Laboratory determination. Triaxial compression test under different Drainage conditions, viz undrained, drained and consolidated, direct shear test. Unconfined compression test. Strength envelope.

UNIT-II

BEARING CAPACITY AND FOUNDATIONS: Basic definitions and methods of determination, Prandtl's solution. Terzaghi's solution for ultimate bearing capacity. Size effects. Effects of rigidity of footings. Plate load test. Design principles for footing and rafts. Foundations on clays and sands Foundations - types and applications, **Piles.** Pile foundation types, classifications and determination of load carrying capacity, dynamic and static methods. Pile load test, pile groups efficiency of pile groups.

UNIT-III

EARTH PRESSURE: Lateral earth pressure. Rankine's theory Active and Passive States. Lateral earth pressure under various conditions, like surcharge, sloping backfill and high water table behind the wall. Earth pressure diagrams. total thrust. Tension Cracks.

Stability of slopes: Infinite slopes, conjugate stresses, stability number Swedish and Friction circle methods. Submergence case, complete draw down case, Steady seepage case.

Stabilisation: methods of stabilization. Brief introduction to each of the methods of stabilization such as shot-creting, geo-reinforcement

Books Recommended

1. Soil Mechanics by Alam Singh
2. Principles of Soil Mechanics by D.W.Taylor
3. Theoretical Soil Mechanics by Terzaghi
4. Soil Mechanics by Terzaghi & Peek
5. Soil Mechanics by Witman & Lamb
6. Soil Mechanics by S.B.Saighal
7. Soil Mechanics by Jumikis

Course no: CVE-6217L

GEOTECHNICAL ENGINEERING-II LAB

1	1. Shear Strength tests: Unconfined compression test; Direct Shear test; Triaxial compression test (UU) and vane shear test. Conduct and determination of shear parameters.
2	2. Conduct of Plate load test (exposure only)
3	3. Conduct of S P T (Exposure only)
4	4. Sub-soil exploration by electric resistivity method (Exposure only).

Course no: CVE-6317

TRAFFIC ENGINEERING & ROAD FACILITIES

UNIT-I

Intersections- unsignalized intersections, channelization and roundabouts, interchanges-requirement & design.

UNIT-II

Traffic signs- role and types, signalized intersections, signal timing design; signal coordination, Parking facilities- parking demand, on-street parking, off-street parking

UNIT-III

Components of traffic system- vehicle characteristics; human characteristics, road characteristics & traffic-control devices

Traffic flow theory-flow parameters; fundamental relation of traffic flow, road capacity and level of service concept.

Reference Books

1	Transport Planning and Traffic Engineering by CA O'Flaherty, John Wiley & Sons, Inc., New York; Toronto.
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2	Traffic Engineering by McShane & Roess, Prentice-Hall of India Private Ltd, New Delhi-110001.
3	Principles and Practices of Highway Engineering by Kadiyali & Lal, Khanna Publishers, Delhi-6
4	Principles of Transportation Engineering by Chakarborty & Das, Prentice-Hall of India Private Ltd, New Delhi-110001
5	Traffic Engineering and Transport Planning by L. R. Kadiyali, Khanna Publishers, 2-B , Nai Sarak, Delhi-110006

Course no: CVE-6317L

TRAFFIC ENGINEERING-LAB

Field Study/lab work: Study of Road user characteristics in lab; traffic volume studies- intersection volume studies; small-network volume studies; OD volume studies, study of traffic speed & delay- speed studies; travel-time studies & delay studies, accident studies, pedestrian and parking studies

Data collection, analysis and presentation.

Course no: CVE-6417

HYDROPOWER ENGINEERING

UNIT-I

Introduction: Hydropower development, power equation, assessment of potential, comparison of hydro thermal and nuclear power plants

Classification -

High, Medium and Low Head schemes - Run off river plants - Storage power station - Tidal power plant -Recent experiences in wave power development - Underground power plants - Pumped storage schemes - Small and mini Hydropower systems - Power demand - Role of Hydropower in a grid.

UNIT-II

Water conveyance system

Power Canals, Alignment, Design of Power canals, Flumes, Covered conduits and Tunnels, Penstocks- Alignment, types of penstocks, Economic Diameter of penstocks, Anchor blocks. **Power house details**- Forebay, Intakes, General layout of power house and arrangement of hydropower units; underground Power stations.

UNIT-III

Dams

Selection of site, Preliminary Investigations, Final Investigations, Types of Dams- Rigid Dams :- Gravity dams, Arch and buttress dams, Basic principles of design and details of construction. Embankment dams- Earthen dams, rockfill dams, Design considerations. **Spillways**- Types, Spillway gates, Design of stilling basins.

Transmission system: General introduction, Economic & Financial feasibility of hydropower plants

BOOKS RECOMMENDED:

1. Barrows, H.K. "Water Power Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi.
- 2 Nigam, P.S. "Handbook of Hydroelectric Engineering" Nem Chand & Brothers, India.
- 3 Dandekar, M.M. "Water Power Engineering", Vikas Publishing House, Gaziabad, U.P. India.
- 4 Deshmukh, M.M. "Water Power Engineering", Danpat Rai & Sons, Nai Sarak, Delhi.
- 5 Varshney, R.S. "Hydropower Structures", Nem Chand Brothers, Roorkee,.
- 6 Arora, K.R. "Irrigation water power and Water Resources engineering", Standard Publishers Distributors, Delhi.

Course no: CVE-6517

WATER SUPPLY & SANITARY ENGINEERING

UNIT-I

Introduction: Scope, Various sources of water, Water Quality Parameters, significance and codal recommendations of limits for various uses Water demand for various purposes, Population forecast, Variation in demand, storage capacities of reservoirs

UNIT-II

System Of distribution-Systems of distribution, Location of reservoirs, distribution

patterns, Water supply in buildings, Plumbing and fixtures Sanitation of buildings

UNIT-III

Water treatment: - Conventional treatments like screening, sedimentation, Coagulation, Filtration, Disinfection. Advanced treatments like Micro Filtration, Reverse osmosis, Activated carbon, etc, Design of water treatment plant.

Pipe designs, network analysis by various methods, pipe materials and joints, leakage prevention, types of pumps , Pump Design

Books Recommended

Water supply Engineering by P.N.Modi

Water supply and sewerage by E Steel.

Water supply Engg. By Punmia

Water supply and sanitary Engg by S K Hussain

Course no: CVE-6517L

WATER QUALITY-LAB

- 1. To determine the total solids, suspended solids and dissolved solids for a given sample of water..**
- 2. To determine the alkalinity of a given sample of water.**
- 3. To determine the total hardness and carbonate hardness for a given sample of water.**
- 4. To determine the turbidity of a given sample of water**
- 5. To find out the colour and odour of a given sample of water**
- 6. To determine the percentage of Magnesium, Calcium,Iron,silica and Aluminium in a given sample of water**
- 7. To determine the percentage of sulphates, chlorides, Iodide, Fluoride.**
- 8. To determine the percentage of Sodium and Potassium in a given sample of water**
- 9. To determine the concentration of dissolved oxygen in a given sample of water and find out the oxygen consumed.**
- 10. To determine the percentage of Ammonia and Nitrogen present in a given sample of water**

Course no: CVE-6717

PROFESSIONAL DEVELOPEMENT ACTIVITIES

The student is required to attend the seminars, workshops , field visits and other co-curricular activities during the semester period and shall have to obtain a proper certificate of participation from the organisers

SEVENTH SEM

Course no: CVE-7117

DESIGN OF STRUCTURES-III

UNIT-I

Introduction to Limit State of designing and application to following : introduction to structural steel and their properties, rolled sections. Design philosophies. Introduction to IS-800-2007.

Design of bolted connections; concentric and eccentric.

Design of welded connections; concentric and eccentric.

UNIT-II

Design of tension members; Rolled and Built-up sections.

Design of compression members; Rolled and Built-up sec. design of column bases.

UNIT-III

Design of flexural member, laterally supported, laterally unsupported and built-up beams.

Design of Plate Girders.

BOOKS RECOMMENDED

Design of footings By Kurien.

Design of reinforced and Pre-stressed Concrete Structures By Kong and Evans.

Design of R.C.C. Structures By Jain and Jai Krishan.

Pre-stressed Concrete Structures By Krishna Raju.

Design of masonry, timber Structures By Arya.

Course no: CVE-7217

CONSTRUCTION TECHNOLOGY & MANAGEMENT

UNIT-I

Construction Management, its necessity; objectives & functions

Construction methods and plant important equipments only

Organization of Leadership: Function of project organization. Principles and advantages of good organization. Leadership and motivation

UNIT-II

Engineering economics of projects; Depreciation; Sinking Fund; compound interest factors, Selection of most economical alternative by variable cost method/Cost benefit ratio. Owning and Operating cost.

UNIT-III

Project scheduling:

Various techniques namely Bar chart; CPM and PERT

Works accounting. Cashbook, Imprest cash, contractors bills, store accounts. Materials at site account. Indent, invoice, Debit & Credit note, suspense head stock, Engineering Statements, Form of agreement

Books Recommended

Construction Methods Plant and Equipment by R . L. Purifoy

Building Construction by S.P. Arora & S. P. Bindra

Project Management by B.M. Naik

The practice of construction Management by Barry Fayer

Course no: CVE-7317

ENVIRONMENTAL ENGINEERING

UNIT-I

Environmental pollution:

Air pollution and its effects on human health, Factors responsible for air pollution, Air quality standards, Engineering interventions to reduce the environmental stress out of air pollution, Water pollution, its causes and effects, pollution of water resources with special reference to J&K State.

UNIT-II

Sewage & its disposal:-

Pollution by sewage, domestic and industrial sewages, Calculation of Storm water and sewage, Methods of sewage disposal in water and on land, Self purification of rivers and streams, BOD and COD calculations, Sewers and its types with designs.

UNIT-III**Sewage Treatments:**

Applications of physical unit operation and chemical unit process in Sewage treatment, Standard dilution (dilution factor), wetland compartment treatment technique for sewages, Septic and Imhoff tanks, Soakage for isolated systems, Design of sewage treatment plant.

Solid Waste Management:

Sources and classification of solid waste, collection and disposal of solid waste, Waste utilization

REFERENCES:

Environmental Engineering and management by Suresh K Dhameja
Environmental Engg,(A Design Approach) by Sincero and Sincero
Water supply and sanitary Engg. By B C Punmia
Waste water treatment by P.N.modi

Course no: CVE-7417E1

AGVANCED STRUCTURAL ANALYSIS**UNIT-I****STRUCTURAL DYNAMICS**

Force vibration analysis of SDOFS. Free and Forced vibration under simple harmonic loads and arbitrary impact loads.

UNIT-II**Finite Element Method:**

Introduction to Finite Element Method of Structural Analysis. Review of Principle of Virtual work. Formulation of element stiffness matrix for one dimensional bar element. Application to bar elements with varying areas of cross sections and beams with varying moment of inertia. Plane stress and plane strain problems.

UNIT-III**Matrix Methods of Structural Analysis:**

Introduction to matrix stiffness method. Formulation of stiffness matrix for Simple Planar Elements, Trusses and beams. Analysis of Planar Trusses and Beams using – Direct Stiffness method..

Books Recommended:

1. Matrix Structural Analysis by Livesly,
2. Finite Element Method by Desai & Abel,
3. Dynamics of by Clough & Penzine,
4. Theory of vibrations by William T. Thomson

Course no: CVE-7417E2

COMPUTER AIDED DESIGN

UNIT-I

Introduction :-

Basic concepts of CAD. Digital computer systems, number systems, Hardware, System and application software, Hardware for CAD Systems, Management of storage devices

Files and their management, management commands.

UNIT-II

Introduction to CAD Softwares :-

Concept and examples of programming languages, user friendly(Menu Driven) softwares, basic programming techniques, Development of Algorithms, Applications of CAD

CAD packages for Civil Engineers :-

Introduction to Menu Driven softwares i.e. Stadd, Stadd pro, Autocad, AutoCivil, 2D and 3D modeling of structures, Design of beam, column and slab

UNIT-III

MET lab- Solution of Eigen Value Problems etc

Applications in Civil Engineering :-

Application of CAD in various fields of Civil Engineering.

Formation of Computer aided programmes for design of simply supported beams carrying udl and point loads, design of columns, Retaining walls, slope analysis, Design of Pipes , Sedimentation Tank Design, Filter Designs, application to survey and other Civil Engineering related subjects..

Recommended Books :

1..Computer Aided Design ---M.N.Shesha Prakash , G.S.Suresh

2 .Computer Applications-----Gautam Roy

3 .Programming in C-----E.Balaguruswamy

4 .Fortran77/90-----R.K.Jain, R.P.Suri

5. Autocad Fundamentals-----Micheal E.Beall , Howard M.Fuller

*For examination purpose it will be treated similar to a laboratory course.

Course no: CVE-7517E2

ADVANCED GEOTECHNICAL ENGINEERING

UNIT-I

Pile foundation Analysis and design pile foundations, ms detailed, Raft foundations; analysis and design

UNIT-II

Environmental Geotechniques: Introduction, importance and scope.

UNIT-III

Earth Retaining Structures: Analysis for earth pressures by other methods for sloping backfill, proportioning and stability checks

Vibro-floatation Brief Introduction

SOIL Dynamics-Brief Introduction

Landfills-Basics and design and development, clay liners etc

References

1. Earth Retaining Structures by Shamsheer Prakash.
2. Design Aids in Geotechnical Engineering by Kani Raj.
3. Foundation Engineering by Bowels
4. Foundation Engg. by Teng

Course no: CVE-7517E1
RAILWAY & AIRPORT ENGINEERING

UNIT I

- Importance of transportation systems, history of railways and its development, development of Indian railways.
- Permanent way and its component parts, formation, ballast,
- sleepers, rails. creep and tilt in rails.

UNIT II

- Track resistance and tractive effort, gauge problem,
- super-elevation near branching of curves, gradients.
- Track fittings and fastenings, points and crossings, station

UNIT III

- Platforms, yards and sidings.
- Classification of airports; planning, surveys and site selection of airports.
- Airport geometrics: runway length and patterns & orientation, wind rose diagram, width and grades of runway, taxiways and aprons.
- Airport pavement design: difference between highway and airport pavements, introduction to various design methods, airport drainage.

BOOKS RECOMMENDED:-

1	Rangawala, S.C. 2002. "Railway Engineering", Charotar Publishers, Anand
2	Arora, S.P. and Saxena. 2001. "Railway Engineering", Dhanpat Rai Publishers, New Delhi.
3	Khanna, Arora and Jain. 2002. "Airport Planning and Design", Nem Chand and Brothers, Roorkee.

Course no: CVE-7617S

SEMINAR

A seminar is organised during the 7th semester of civil engineering curriculum leading to the degree of Bachelors of Engineering. The purpose of the seminar is to induce the students to do the research on a topic of their choice. This may be either library research or laboratory research. The students are guided in the work by the faculty members of the department. The students are required to give a presentation of 15-20 minutes duration on the work done by them to their fellow students under the supervision of faculty members particularly the HOD concerned.

Course no: CVE-7717PP

PRE-PROJECT WORK

A project will be assigned to the students and the students shall start work on the project assigned to them & at the end of the semester a preliminary report on the project shall be submitted by the students to the department for assessment.

The students are required to appear for viva voce which shall be conducted in the department in presence of the faculty members under the supervision of the HOD concerned.

Course no: CVE-7817

PROFESSIONAL DEVELOPMENT ACTIVITIES

The student is required to attend the seminars, workshops , field visits and other co-curricular activities during the semester period and shall have to obtain a proper certificate of participation from the organisers

EIGHT SEM

Course no: CVE-8117

IRRIGATION & HYDRAULICS STRUCTURES

UNIT-I

Introduction:

Present status of irrigation in India, Advantages of irrigation, brief description of Gravity, Lift and sprinkler irrigation.

Soil -water-plant relationship crop.water requirements:

Soil moisture and crop water relationships, Duty, Delta, Consumptive use, Irrigation requirements, Principal Indian crops, Multiple cropping, etc

UNIT-II

Diversion headworks

Selection of site and layout, Parts of diversion head-works, types of Weirs and Barrages, Design of weirs on permeable foundations, Control of silt entry into canal, Silt excluders and different types of silt ejectors

Canal falls introduction

UNIT-III

Canal irrigation:Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, Design of Channels, Regime and semi-theoretical approaches; Canal lining, factors affecting choice of various types of canal linings.

Cross drainage works:

Necessity of cross drainage works, their types and selection; Design of various types of cross drainage works-Aqueduct, siphon, aquaduct, Super passage, Syphon, Level crossing

BOOKS RECOMMENDED:

Singh Bharat.” Fundamentals of Irrigation Engineering”, Nem Chand & Brothers, Roorkee.

,Varshney Gupta and Gupta,” Irrigation Engineering And Hydraulic Structures”.Nem Chand & Brothers, Roorkee.

Arora, K.R. “Irrigation water power and Water Resources Engineering”,
Standard Publishers Distributors, Delhi.

Asawa, G.L.”Elementary Irrigation Engineering” New Age International (P) Ltd.
Publishers,

Course no: CVE-8217
BRIDGE ENGINEERING

UNIT-I

Introduction to Bridges: types of Bridges, standard loads on Bridges. Scour depth, Afflux. Criteria for maximum forces under series of moving loads (Standard I.R.C Loading). Design of Foot bridges, Slab bridge subjected to Standard IRC loading (Class-A, Class-AA and Class-70R).

UNIT-II

Design of Trussed Bridges subjected to Standard IRC loading (Class-A, Class-AA and Class-70R). Design of Bridge Slabs subjected to IRC loading.

UNIT-III

Design of steel bridges: Plate Girder Bridge and Composite Bridges (Steel Plate Girder and R.C.C Slab Type) subjected to Standard IRC loading (Class-A and Class-AA).

Reference Books:

Victor, D.J. “Essentials of Bridge Engineering”, Oxford and IBH Publishers, New Delhi.

Ponnuswamy, S.” Bridge Engineering”, Tata McGraw Hill, New

Design of Steel Structures

By Vizrani and Ratwani

Design of Bridges

By Krishna Raju

Design of Bridges

By Rakshit.

Course no: CVE-8317E1
TUNNELLING TECHNOLOGY

UNIT I

INTRODUCTION:

General aspects, Purpose and history of tunnels,
Classification of tunnels
Size and Shape of tunnels

ALIGNMENT OF TUNNELS

Tunnel surveying, tunnel alignment and grade, transferring centre line

UNIT II

DRILLING

Different types of drills, selection of Drilling pattern, depth of hole

BLASTING

Method of blasting, types of explosives, operations of blasting

UNIT III

TUNNELLING

Methods of tunneling in hard rock, sequence of operations, driving of tunnels,
Tunneling in soft grounds

VENTILATION. Objects of tunnel ventilation, methods of ventilation in tunnels,
lighting of tunnels , drainage of tunnels

LIGHTING in Tunnels .

Drainage of tunnels.

TUNNEL LINING

Types of lining, objects of lining

BOOKS RECOMMENDED:

[Design and Construction of Tunnels: Analysis of Controlled Deformations in Rock and Soils \(ADECO-RS\) by Pietro Lunardi](#)

[Tunneling and Tunnel Mechanics: A Rational Approach to Tunneling](#) by [D. Kolymbas.](#)

[Introduction to Tunnel Construction \(Applied Geotechnics\)](#) by David Chapman, Nicole Metje and Alfred Stärk.

[Tunneling to the Center of the Earth: Stories \(P.S.\)](#) by [Kevin Wilson.](#)

[Quantum Theory of Tunneling](#) by [Mohsen Razavy.](#)

Course no: CVE-8317E2

NUMERICAL METHODS IN CIVIL ENGINEERING

UNIT-I

Finite Difference

Difference table and its usage, the difference operator Δ , ∇ and the operator E.

Interpolation

Interpolation with equal intervals, Newton's forward difference formula, Newton's backward difference formula, interpolation with unequal intervals, Newton's divided difference formula, and Lagrange's interpolation formula.

UNIT-II

Central Differences

The central difference operator δ and the averaging operator μ . Relations between the operators, Gauss's backward and forward interpolation formula, Sterling's, Bessel's, Laplace and Everett's formulae.

Inverse Interpolation

The central difference operator δ and the averaging operator μ . Relations between the operators Δ , ∇ , δ and μ .

Gauss's, Sterling's and Evett's formulae and their applications

Numerical Solutions of Algebraic and Transcendental Equations

Regula-Falsi method, Bolzano's process of bisection of intervals, Newton-Raphson method

UNIT-III

Numerical Differentiation and Integration

Numerical differentiation of a function, differential coefficients of a function in terms of its difference, numerical integration of a function, trapezoidal rule, Simpson's rule, Weddle's rule, The Euler-Maclaurin expansion formula.

Difference Equations

Linear homogeneous and non-homogeneous difference equations of order n with constant coefficients and their solutions, method of undetermined coefficients.

Numerical Solutions of Ordinary Differential Equations

Picard's method, Taylor series method, Euler's method and Runge-Kutta method.

Numerical Solution of Simultaneous Equations and Eigen Value Problems

Gauss elimination method, Gauss-Jordan method, Gauss-Jacobi and Gauss-Seidel iteration methods, power methods for solving Eigen value problems.

Books Recommended :

1. Mathematical numerical analysis by S.C. Scarborough
2. Numerical methods for scientific and Engineering computation by M.K. Jain, S.R.K. Iyenger & R.K. Jain.
3. Numerical solution of differential equations by M.K. Jain.
4. Numerical methods for Scientists and Engineers by R.G. Stanton.
5. Numerical methods by P.K. Kandasamy, K. Thilagavathy, & K. Gunavathi.
6. Numerical methods by E. Balagurusamy.

Course no: CVE-8317E3

GREEN BUILDINGS

UNIT-I

Introduction to Green Buildings

Definition of Green Building, Benefits of Green Building, Components/features of Green Building – Site selection, Energy Efficiency, Water Efficiency, Material Efficiency, Indoor . **Indoor Air Quality**

Natural air ventilation systems, different types of low VOC materials, day lighting.

UNIT-II

Water and Waste Water Management

Compliance, fixtures, rainwater harvesting and techniques, water and waste water management, solid waste management.

Energy Management

Appliances, compliance energy performance, solar water heating system, use of renewable energy options. High performance glass, other energy saving options, provisions of ECBC,

UNIT-III

Design Features for Green Building Construction

Site selection strategies, landscaping, building form, orientation, building envelope and fenestration – material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, Waste reduction during construction.

aluminium and renewable materials, agrifibre, linoleum, salvaged material – properties and

Eco-friendly Materials

Various types of eco-friendly materials, use of recycled materials like: flyash bricks, recycled ceramic tiles, recycled glass tiles, porcelain tiles, natural terracotta tile, wood, steel, aluminium and renewable materials, agrifibre, linoleum, salvaged material – properties and Application

Reference Books

1. Pradeep Kumar and Amit Kumar Tyagi; Managing Energy Efficiently in Hotels and Commercial Buildings, TERI Publications.
2. M K Halpeth, T Senthil Kumar and G Harikumar; Light Right – A Practising Engineer's Manual on Energy Efficient Lighting, TERI Publications
3. R K Pachauri and Shyamala Abeyratne; From Sunlight to Electricity – Solar Photovoltaic Applications, TERI Publications.

Course no: CVE-8417E1

ADVANCED ENVIRONMENTAL ENGINEERING

UNIT-I

Type of Pollutants and Protection of Environment

Sources of pollution to Land, Water and Air. General effects of pollution. Pollution by sewage. Nature and types of sewages (domestic, Industrial etc). Calculation of storm water and sewage.

UNIT-II

Environment & Ecology

Definition and understanding of concepts, ecosystem, energy flow in ecosystem, water, carbon and nitrogen cycle, community's inter-relationships in an ecosystem. Importance of clean environment

UNIT-III

Cleaner Production Technologies

Need and benefits, cleaner production techniques and options, zero impact manufacturing initiatives CDM and carbon credits.

Degradation of Land Resources :

Deforestation and Wetlands : Forest land, deforestation and its effects on land use and environmental quality, wetland and their importance in environment, causes and extent of wasteland

Noise pollution:-

Definition, sources of noise and its units, adverse effects of noise pollution, sound pressure level and its measurement, noise pollution control measures.

Reference Books:

1. Peavy, Rowe, Techobanoglous, Environmental Engg. Tata McGrawHill.
2. Mackenzie L Davis, Environmental Engg. Tata McGrawHill.
3. Baljeet S. Kapoor; Environmental Engg. An overview, Khanna Publishers.
4. Gilbert H. Masters, Environmental Engineering and Science, Prentice Hall of India Pvt.Ltd.
5. GN Panday, GC Carney Environmental Engineering, Tata McGrawHill.
6. P.D. Sharma, Ecology and Environment Rastogi Publications.
7. Ray P.A Lcances Environmental Impact Assessment Hand Book, National Environmental Protection Council Manila.
8. P Venugopala Rao ; Text Book of Environmental engineering, PHI
8. Duggal AK, Sharma S, Water & Waste Water Analysis, Galgotia Publication

Course no: CVE-8417E2

ADVANCED CONSTRUCTION TECHNOLOGY

T-1

SPECIAL FOUNDATION

Foundations for chimney, cooling towers, telecommunication/transmission towers, foundations for underground structures, coastal and off shore structures in different soil conditions, foundations in expansive soils. dewatering and its various methods

UNIT-II

Prefabricated Construction:

Advantages of pre fabricated construction; selection of structural elements; design aspects; assembly of precast elements; jointing, modular co-ordination and tolerances; structural systems for buildings; single and multi-storey building systems; methods and equipments. For handling and placement

UNIT-III

High Rise Construction

High rise buildings; architectural & structural aspects; special features of construction; tall chimneys, components, design aspects; slip form method, lift slab method; special problems of high rise construction

Advanced Construction Materials:

Geo-synthetics: Various, types; geo-textiles, geo-grids, geo-membranes, geo-composites, functions and general applications, advantages, properties of geo-textiles, epoxy resins, polymers, grouts and anchors, special flooring materials, sealants and adhesives, protective coatings.

Reference Books :

Naiman P Kurian, Modern Foundations - Introduction to Advanced Techniques
Tata McGraw Hill

CBRI Roorkee-Application Potential of Geosynthetics in Civil engineering,
Proceedings of workshop January 4-6,1989 Tata McGraw Hill.

Engineering with Geosynthetics-Proceedings of Workshop May20-24,1996
Chandigarh Edited by Verma and Dr.G V Rao. organised by-CBIP and
committee for international geo-synthetics society. New Delhi.

Bungale S Taranath; Structural Analysis and Design of Tall Buildings, Tata McGraw Hill
Monohar SN; Tall Chimneys-Design and Construction Tata McGraw Hill.

Cast in place concrete in tall Building Design and construction Council on Tall
Buildings and Urban Habitate Committee 21 D Tata McGraw Hill.

CBRI Roorkee, Advances in Building Materials and Construction.

Bohdan Lewicki Building with large Prefabricates, Elsevier Publishing Company

ASG Bruggeling GF Hugghe Prefabrication with Concrete, AA Balkema/

Course no: CVE-8417E3
STRUCTURAL DYNAMICS

1	Nature of dynamic loading: Harmonic, earthquake loading, Single degree of freedom systems, free vibrations and forced vibrations: Harmonic force, Periodic force, Impulse, and General type of loading.
2	Multi-degree of freedom systems, numerical techniques for finding natural frequencies and mode shapes, orthogonality relationships of principal modes, Rayleighs Principal and its application for determination of fundamental frequency. Evaluation of dynamic response by mode superposition method.
3	Discussion on Indian standards, codal provisions for earthquake resistant design. Design of buildings (Plane frames only) based on Codal provisions

Books Recommended:

1. Dynamics of Structures By Anil K. Chopra
2. Dynamics of Structures By Clough and Penzien
3. Structural Dynamics By Mario Paz

Course no: CVE-8517P

FINAL PROJECT WORK

On the basis of pre-project report of 7th semester, which may require field survey a design & calculative of various structures associated with the project, comparative economic studies, preparation of estimates, laboratory/experimental work etc. On completion of project work a detailed technical report is to be submitted by every student in accordance with the standards adopted for technical reports. This assignment will test the student's capacity to prepare a complete technical report for civil engineering project/laboratory study requiring of him a complete understanding of the applications for the various courses studied by him during the 8th & earlier semesters. There will be a viva-voce examination after the submission of technical report. This will be conducted by the external examiner fixed by the university & also equally by the concerned HOD besides the supervision of any faculty member of the civil engineering department duly registered in the 7th semester. The student is required to submit at least two copies of the project report in the department.

Course no: CVE-8617PT

PROFESSIONAL VIVA/TOUR & TRAINING

The student is required to go for tour & training to inspect & study any ongoing project work in the state or outside & to acquaint with the latest technologies in engineering. The students are required to submit a detailed tour report & shall submit the same to evaluation board to be constituted by the concerned HOD. The weight age will be as follows: Guide/supervisor=40% of marks, HOD/Board/Viva-voce=40% of marks, Project Report= 20% of marks

Course no: CVE-8717

PROFESSIONAL DEVELOPMENT ACTIVITIES

The student is required to attend the seminars, workshops, field visits and other co-curricular activities during the semester period and shall have to obtain a proper certificate of participation from the organisers