Sub Code	:	10 CV 33	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART – A

UNIT 1:
Simple Stress and Strain
1.1 Introduction, 1.2 Properties of Materials, 1.3 Stress, Strain, Hook's law, Stress – Strain Diagram for structural steel and non ferrous materials, 1.4 Volumetric strain, expression for volumetric strain, 1.5 Elastic Constants: Relationship among elastic constants, 1.6 Total elongation of tapering bars of circular and rectangular cross sections. Elongation due to self weight.

7 Hours

UNIT 2:
Simple Stress and Strain continued...
2.1 Composite section, 2.3 Thermal stresses (including thermal stresses in compound bars).

6 Hours

UNIT 3:
Compound stresses
3.1 Introduction, 3.2 Stress components on inclined planes, 3.3 General two-dimensional stress system, 3.4 Principal planes and stresses, 3.5 Mohr's circle of stresses.

8 Hours

UNIT 4:
Bending moment and shear force in beams
4.1 Introduction, 4.2 Shearing force and Bending moment in beam, 4.3 Sign convention, 4.4 Relationship between loading, shear force and bending moment, 4.5 Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering gravity loads(point, udl and uvl) and Couple.

7 Hours

PART – B

UNIT 5:
Bending stress, shear stress in beams
5.1 Introduction – Bending stress in beam, 5.2 Assumptions in pure bending theory, 5.3 Derivation of Pure bending equation, 5.4 Modulus of rupture, section modulus, 5.5 Flexural rigidity, 5.6 Expression for horizontal shear

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stress in beam, 5.7 Shear stress diagram for rectangular, 'I' and 'T' section (Flitched beams not included).

6 Hours

UNIT 6:
Deflection of beams
6.1 Introduction – Definitions of slope, deflection, 6.2 Elastic curve-derivation of differential equation of flexure, 6.3 Sign convention 6.4 Slope and deflection for standard loading classes using Macaulay's method for prismatic beams and overhanging beams subjected to point loads, UDL and Couple.

6 Hours

UNIT 7:
Torsion of circular shafts
7.1 Introduction – Pure torsion-torsion equation of circular shafts, 7.2 Strength and stiffness, 7.3 Torsional rigidity and polar modulus, 7.4 Power transmitted by shaft of solid and hollow circular sections.

6 Hours

UNIT 8:
Elastic stability of columns
8.1 Introduction – Short and long columns, 8.2 Euler's theory on columns, 8.3 Effective length slenderness ratio, 8.4 Radius of gyration, buckling load, 8.5 Assumptions, derivations of Euler's Buckling load for different end conditions, 8.6 Limitations of Euler's theory, 8.7 Rankine's formula, problems.

6 Hours

TEXT BOOKS:
1. **Strength of Materials,** Subramanyam, Oxford University Press, Edition 2008
2. **Mechanics of Materials,** B.C Punmia Ashok Jain, Arun Jain, Lakshmi Publications, New Delhi.
3. **Strength of Materials;** Basavarajaiah and Mahadevappa Universities Press (2009).

REFERENCE BOOKS:
1. **Strength of Materials,** Singer Harper and Row Publications.
2. **Elements of Strength of Materials,** Timoshenko and Young Affliated East-West Press.
3. **Mechanics of Materials,** James M. Gere, Barry J.Goodno (India Edition), Cengage Learning.

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SURVEYING – I
(COMMON TO CV/TR/EV/CTM)

Sub Code	:	10 CV 34	IA Marks :	25
Hrs/ Week	:	04	Exam Hours :	03
Total Hrs.	:	52	Exam Marks :	100

PART – A

UNIT 1:
Introduction

1.1 Definition of Surveying, 1.2 Classification of Surveys, 1.3 Uses of Surveying Units of Measurements, 1.4 Map & Classification, 1.5 Survey of India topographical Maps and their numbering., 1.6 Basic principles of surveying, 1.7 Errors, Classification, 1.8 Precision and accuracy.

04 Hours

UNIT 2:
Measurement of horizontal distances.

2.1 Chain and types, 2.2 Tape and types, 2.3 EDM devices, 2.3 Ranging of lines 2.4 Direct and Indirect, 2.5 Measurement of distances over sloping grounds, 2.6 Chain and Tape corrections - Numerical problems.

5 Hours

UNIT 3:
Chain Surveying

3.1 Accessories required, 3.2 Selection of stations and lines, 3.3 Offsets and types 3.4 Setting out of right angles, 3.5 Working principle and use of optical square, prism square, cross staff., 3.6 Linear methods of setting out right angles, 3.7 Booking of chain survey work, 3.8 Field book, entries, conventional symbols, 3.9 Obstacles in chain survey, Numerical problems, 3.10 Errors in chain survey and precautions to be taken.

7 Hours

UNIT 4:
Compass Surveying

4.1 Meridians and bearings, 4.2 Principle, working and use of - Prismatic compass 4.3 Surveyor's compass, 4.4 Magnetic bearing, true bearings, 4.5 WCB and Reduced bearing. 4.6 Dip and Declination

4.7 Accessories required for compass surveying, 4.8 Traverse - closed and open traverse 4.9 Computation of bearings of legs of closed traverse given the bearing of one of the legs, 4.10 Computation of included angles given the

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bearings of legs of a closed traverse.

6 Hours

PART – B

UNIT 5:
Compass Traversing continued....
5.1 Local attraction, determination and corrections, 5.2 Dependent and independent co-ordinates, 5.3 Checks for closed traverse and determination of closing error and its direction 5.4 Bowditch's graphical method of adjustment of closed traverse, 5.5 Bowditch's rule and transit rule, 5.6 Omitted measurements (Only Length and corresponding bearing of one line).

8 Hours

UNIT 6:
Introduction to Levelling
6.1 Principles and basic definitions, 6.2 Fundamental axes and part of a dumpy level, 6.3 Types of adjustments and objectives, 6.4 Temporary and Permanent adjustments of a dumpy level, 6.5 Sensitiveness of bubble tube, 6.6 Curvature and refraction correction, 6.7 Type of leveling, 6.8 Simple leveling, 6.9 Reciprocal leveling, 6.10 Profile leveling, 6.11 Cross sectioning, 6.12 Fly leveling,

7 Hours

UNIT 7:
Reduction of Levelling continued....
7.1 Booking of levels 7.2 Rise and fall method and Height of instrument method 7.3 comparison Arithmetic checks 7.4 Fly back leveling., 7.5 Errors and precautions.

6 Hours

Contouring
7.6 Contours and their characteristics, 7.7 Methods of contouring, 7.8 direct and indirect methods, 7.9 Interpolation techniques, 7.10 Uses of contours 7.11 Numerical problems on determining intervisibility, 7.12 Grade contours and uses.

4 Hours

UNIT 8:
Plane Table Surveying
8.1 Plane table and accessories, 8.2 Advantages and limitations of plane table survey, 8.3 Orientation and methods of orientation, 8.4 Methods of plotting – Radiation, Intersection, Traversing, 8.5 Resection method, 8.6 Two point and three point problems, 8.7 Solution to two point problem by graphical method,

8.8 Solution to three point problem Bessel's graphical method, 8.9 Errors in plane table survey.

5 Hours

TEXT BOOKS:
1. 'Surveying' Vol–1 – B.C. Punmia , Laxmi Publications, New Delhi.
2. Surveying and Levelling – R Subramanian. Oxford University Press (2007)

Text Book of Surveying – C. Venkataramiah. Universities Press.(2009 Reprint)

REFERENCE BOOKS:
1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Cengage Learning.
2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India.
3. Surveying Vol. I, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.
* Survey of India Publication on maps.

FLUID MECHANICS
(COMMON TO CV/TR/EV)

Sub Code	:	10 CV 35	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART-A

UNIT-1: BASIC PROPERTIES OF FLUIDS

Introduction, Definiton of Fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension,& Capillarity. Newton's law of viscosity (theory & problems).Capillary rise in a vertical tube and between two plane surfaces (theory & problems).   **06 Hrs.**

8.8 Solution to three point problem Bessel's graphical method, 8.9 Errors in plane table survey.

<div align="right">**5 Hours**</div>

TEXT BOOKS:
1. 'Surveying' Vol–1 – B.C. Punmia , Laxmi Publications, New Delhi.
2. Surveying and Levelling – R Subramanian. Oxford University Press (2007)

Text Book of Surveying – C. Venkataramiah. Universities Press.(2009 Reprint)

REFERENCE BOOKS:
1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Cengage Learning.
2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India.
3. Surveying Vol. I, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.
* Survey of India Publication on maps.

FLUID MECHANICS
(COMMON TO CV/TR/EV)

Sub Code	:	10 CV 35	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART-A

UNIT-1: BASIC PROPERTIES OF FLUIDS

Introduction, Definiton of Fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension,& Capillarity. Newton's law of viscosity (theory & problems).Capillary rise in a vertical tube and between two plane surfaces (theory & problems).   **06 Hrs.**

UNIT-2: PRESSURE AND ITS MEASUREMENT

Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure. Vapour pressre. Measurement of pressure using a simple, differential & inclined manometers (theory & problems). Introduction to Mechanical and electronic pressure measuring devices.
07 Hrs.

UNIT-3: 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. **06 Hrs**

UNIT-4: KINEMATICS OF FLOW

Introduction, methods of describing fluid motion, definitions of types of fluid flow, streamline, pathline, streakline and streamtube. One and Three dimensional continuity equation in Cartesian Coordinates (derivation and problems). Velocity potential, Stream function, Equipotential line, Stream line-problems, Physical concepts of Streamfunction. Introduction to flow net. **07 Hrs**

PART-B

UNIT-5: 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). Introduction to kinetic energy correction factor. Momentum equation problems on pipe bends.

UNIT-6: PIPE FLOW

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- problems. Water hammer in pipes, equation for pressure rise due to gradual valve closure & sudden closure for rigid and elastic pipes- problems.

07 Hrs

UNIT-7: DEPTH AND VELOCITY MEASUREMENTS

Introduction, Measurement of depth, point & hook gauges, self recording gauges. Staff gauge, Weight gauge, float gauge. Measurement of velocity- single and double gauges, pitot tube, Current meter- Problems.

06 Hrs

UNIT-8: DISCHARGE MEASUREMENTS

Introduction, Venturimeter, Orificemeter, Rotometer, Venturiflume, Triangular notch, Rectangular notch, Cipolletti notch, Ogee weir and Broad crested weir, Small orifices- Problems.

06 Hrs

TEXT BOOKS:

1. 'A TextBook 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. ' Fluid Mechanics and Turbomachines'- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition.

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.
' Text Book Of Fluid Mechanics& Hydralic Machines'- R.K.Bansal, Laxmi Publications, New Delhi, 2008 Edition.

APPLIED ENGINEERING GEOLOGY

Sub Code	:	10 CV-36	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART – A

Unit: 1 - INTRODUCTION:
Geology and its role in the field of civil engineering. Earth: Its internal structure and composition. – 2 hours

MINERALOGY:
Description and identification of Rock forming minerals and Ores, based on physical and special properties;
Quartz and its varieties; Feldspar group; Mica group; carbonate group;
Hornblende, Augite, Olivine, Asbestos, Kaolin, Talc, Gypsum, Garnet, Corundum.

V SEMESTER

MANAGEMENT & ENTREPRENEURSHIP

Subject Code	**: 10AL51**	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

MANAGEMENT

UNIT - 1

MANAGEMENT: Introduction – Meaning – nature and characteristics of Management, Scope and functional areas of management – Management as a science, art or profession – Management & Administration – Roles of Management, Levels of Management, Development of Management Thought – early management approaches – Modern management approaches.

7 Hours

UNIT - 2

PLANNING: Nature, importance and purpose of planning process - objectives - Types of plans (Meaning only) - Decision making - Importance of planning - steps in planning & planning premises - Hierarchy of plans.

6 Hours

UNIT - 3

ORGANIZING AND STAFFING: Nature and purpose of organization – principles of organization – Types of organization – Departmentation – Committees – Centralisation Vs Decentralisation of authority and responsibility – Span of control – MBO and MBE (Meaning only) Nature and importance of Staffing – Process of Selection & Recruitment (in brief).

6 Hours

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UNIT - 4

DIRECTING & CONTROLLING: Meaning and nature of directing – Leadership styles, Motivation Theories, Communication – Meaning and importance – Coordination, meaning and importance and Techniques of Co-ordination. Meaning and steps in controlling – Essentials of a sound control system – Methods of establishing control (in brief).

7 Hours

PART - B

ENTREPRENEURSHIP

UNIT - 5

ENTREPRENEUR: Meaning of Entrepreneur, Evolution of Concept, Functions of Entrepreneur, Types of Entrepreneur, Entrepreneur – An emerging class. Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process, Role of Entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

7 Hours

UNIT - 6

SMALL SCALE INDUSTRY: Definition; Characteristics; Need and rationale: Objectives, Scope, role of SSI in Economic Development. Advantages of SSI. Steps to start an SSI – Government policy towards SSI, Different Policies of SSI., Government Support on SSI., during 5 year plans. Impact of Liberalization, Privatisation, Globalization on SSI. Effect of WTO / GATT Supporting Agencies of Government for SSI Meaning. Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition only).

7 Hours

UNIT - 7

INSTITUTIONAL SUPPORT: Different Schemes, TECKSOK, KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI, NSIC, SIDBI, KSFC.

6 Hours

UNIT - 8

PREPARATION OF PROJECT: Meaning of Project, Project Identification, Project Selection, Project Report, Need and significance of Project, Contents, formulation, Guidelines by Planning Commission for Project Report, Network Analysis, Errors of Project Report, Project Appraisal. Identification of Business Opportunities. Market Feasibility Study: Technical Feasibility Study, Financial Feasibility Study & Social Feasibility Study.

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Civil Engineering MATERIAL TESTING LAB
(COMMON TO CV/TR)

Sub Code	:	**10 CVL 37**	**IA Marks** :	**25**
Hrs/ Week	:	**03**	**Exam Hours** :	**03**
Total Hrs.	:	**42**	**Exam Marks** :	**50**

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
4. Bending Test on Wood Under two point loading
5. Shear Test on Mild steel.
6. Impact test on Mild Steel (Charpy & Izod)
7. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's
8. Test on Bricks and Tiles
9. Tests on Fine aggregates – Moisture content, Specific gravity, Bulk density, Sieve analysis and Bulking
10. Tests on Coarse aggregates – Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis
11. Demonstration of Strain gauges and Strain indicators

NOTE: All tests to be carried out as per relevant BIS Codes

REFERENCE BOOKS:

1. **Testing of Engineering Materials**, Davis, Troxell and Hawk, International Student Edition – McGraw Hill Book Co. New Delhi.
2. **Mechanical Testing of Materials**", Fenner, George Newnes Ltd. London.
3. "**Experimental Strength of Materials**", Holes K A, English Universities Press Ltd. London.
4. "**Testing of Metallic Materials**", Suryanarayana A K, Prentice Hall of India Pvt. Ltd. New Delhi.
5. **Relevant IS Codes**
6. "**Material Testing Laboratory Manual**", Kukreja C B- Kishore K. Ravi Chawla Standard Publishers & Distributors 1996.
7. **Concrete Manual**, M.L.Gambhir –Dhanpat Rai & Sons- New Delhi.

Scheme of Examination:
Group Experiments: Tension, Compression Torsion and Bending Tests
Individual Experiments: Remaining tests

Two questions are to be set – one from group experiments and the other as individual experiment.

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SURVEYING PRACTICE – I
(COMMON TO CV/TR/EV/CTM)

Sub Code	:	10 CVL 38	**IA Marks**	:	25
Hrs/ Week	:	03	**Exam Hours**	:	03
Total Hrs.	:	42	**Exam Marks**	:	50

Exercise – 1
a) To measure distance between two points using direct ranging
b) To set out perpendiculars at various points on given line using cross staff, optical square and tape.

Exercise – 2
Setting out of rectangle, hexagon using tape/chain and other accessories

Exercise – 3
Measurement of bearing of the sides of a closed traverse & adjustment of closing error by Bowdich method and Transit method

Exercise – 4
To set out rectangles, pentagon, hexagon, using tape /chain and compass.

Exercise – 5
To determine the distance between two inaccessible points using chain/tape & compass.

Exercise – 6
To locate points using radiation and intersection method of plane tabling

Exercise – 7
To solve 3-point problem in plane tabling using Bessel's graphical solution

Exercise –8
To determine difference in elevation between two points using fly leveling technique & to conduct fly back leveling. Booking of levels using both HI and Rise & Fall methods.

Exercise – 9
To determine difference in elevation between two points using reciprocal leveling and to determine the collimation error

Exercise – 10

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ENGINEERING MATHEMATICS – IV

CODE: 10 MAT 41
Hrs/Week: 04
Total Hrs: 52

IA Marks: 25
Exam Hrs: 03
Exam Marks:100

PART-A

Unit-I: NUMERICAL METHODS - 1

Numerical solution of ordinary differential equations of first order and first degree; Picard's method, Taylor's series method, modified Euler's method, Runge-kutta method of fourth-order. Milne's and Adams - Bashforth predictor and corrector methods (No derivations of formulae).

[6 hours]

Unit-II: NUMERICAL METHODS – 2

Numerical solution of simultaneous first order ordinary differential equations: Picard's method, Runge-Kutta method of fourth-order. Numerical solution of second order ordinary differential equations: Picard's method, Runge-Kutta method and Milne's method.

[6 hours]

Unit-III: Complex variables – 1

Function of a complex variable, Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties of analytic functions. Application to flow problems- complex potential, velocity potential, equipotential lines, stream functions, stream lines.

[7 hours]

Unit-IV: Complex variables – 2

Conformal Transformations: Bilinear Transformations. Discussion of Transformations: $w = z^2$, $w = e^z$, $w = z + (a^2 / z)$. Complex line integrals- Cauchy's theorem and Cauchy's integral formula.

[7 hours]

SURVEYING PRACTICE – II LABORATORY
(COMMON TO CV/TR/CTM)

Sub Code	:	10 CVL 47	**IA Marks** :	25
Hrs/ Week	:	03	**Exam Hours** :	03
Total Hrs.	:	42	**Exam Marks** :	50

Exercise – 1
Measurement of horizontal angles with method of repetition and reiteration using theodolite, Measurement of vertical angles using theodolite.

Exercise – 2
To determine the elevation of an object using single plane method when base is accessible and inaccessible.

Exercise – 3
To determine the distance and difference in elevation between two inaccessible points using double plane method.

Exercise – 4
To determine the tachemetric constants using horizontal and inclined line of sight.

Exercise – 5
To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.

Exercise – 6
To set out simple curves using Rankine's deflection angles method.

Exercise – 7
To set out compound curve with angular methods with suing theodolite only.

Exercise – 8
To set out the center line of a simple rectangular room suing offset from base line

Exercise – 9
To set out center lines of columns of a building using two base lines at right angles

Demonstration

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Exposure to use of Total Station. Traversing, Longitudinal sections, Block levelling, Usage of relevant softwares for preparation of the contour drawings.

Scheme of Examination:
Any one of the above exercise is to be conducted in the examination by the student.

APPLIED ENGINEERING GEOLOGY LABORATORY
(COMMON TO CV/TR)

Sub Code	:	10 CVL 48	IA Marks	:	25
Hrs/ Week	:	03	Exam Hours	:	03
Total Hrs.	:	42	Exam Marks	:	50

1. Describe and identify the minerals based on their physical, special properties, chemical composition and uses. Study of important rock forming minerals, ores and other important industrial minerals. (As per the III semester theory syllabus) – 2 practicals

2. Describe and identify the rocks as per the theory syllabus by giving their physical properties and engineering uses. – 2 practicals

3. Study of Geological maps and their sections: interpreting them in terms of selecting the sites for various civil engineering structures. - 3 practicals

4. Dip and strike (surface method) problems: To find out the dip and strike of the geological formation to select suitable site for civil engineering structures. – 2 practicals

5. Borehole problems (sub surface dip and strike): three point level ground methods: - 2 practicals

6. Thickness of strata (out crops) problems: To determine the true thickness, vertical thickness and the width of the out crops on different topographical terrain. – 1 practical

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CONCRETE TECHNOLOGY
(COMMON TO CV/TR/CTM)

Sub Code	:	10 CV 42	**IA Marks**	:	25
Hrs/ Week	:	04	**Exam Hours**	:	03
Total Hrs.	:	52	**Exam Marks**	:	100

PART – A

Unit- 1

Cement, Chemical composition, hydration of cement, Types of cement, manufacture of OPC by wet and dry, process (flow charts only) Testing of cement - Field testing, Fineness by sieve test and Blaine's air permeability test, Normal consistency, testing time, soundness, Compression strength of cement and grades of cement, Quality of mixing water. –7 Hours

Unit-2

Fine aggregate - grading, analysis, Specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – Importance of size, shape and texture.Grading of aggregates - Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. - 6 Hours

Unit-3

Workability - factors affecting workability, Measurement of workability - slump, flow tests, Compaction factor and vee-bee consistometer tests, Segregation and bleeding, Process of manufactures of concrete : Batching, Mixing, Transporting, Placing, Compaction, Curing. -7 Hours

Unit-4

Chemical admixtures - plasticizers, accelerators, retarders and air entraining agents, Mineral admixtures - Fly ash, Silica fumes, rice husk ash and GGBS.
-6 Hours

Part-B

Unit-5

Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, Effect of aggregate properties, relation between compressive strength, and tensile strength, bond strength, modulus of rupture, Accelerated curing, aggregate - cement bond strength, Testing of hardened concrete - compressive strength, split tensile strength, Flexural strength, factors influencing strength test results. - 6Hours

Unit-6

Elasticity - Relation between modulus of elasticity and Strength, factors affecting modulus of elasticity, Poisson , Ratio, Shrinkage - plastic shrinkage

and drying shrinkage, Factors affecting shrinkage, Creep - Measurement of creep, factors affecting creep, effect of creep,   - 7 Hours

Unit-7

Durability - definition, significance, permeability, Sulphate attack, Chloride attack, carbonation, freezing and thawing – remedial measures. - 6 Hours

Unit-8

Concept of Concrete Mix design, variables in proportioning , exposure conditions, Procedure of mix design as per IS 10262-2009, Numerical examples of Mix Design   - 7 Hours

TEXT BOOKS:

1. "Concrete Technology" - Theory and Practice, M.S.Shetty, S.Chand and Company, New Delhi, 2002.
2. "Concrete Technology" – M.L.Gambhir, TATA McGRAW HILL, New Delhi.

REFERENCES :

1. "Properties of Concrete"Neville, A.M. : , ELBS, London
2. "Concrete Technology" – A.R.Santakumar. Oxford University Press (2007)'
3. "Concrete Mix Design" - N.Krishna Raju, Sehgal - publishers.
4. "Recommended guidelines for concrete mix design" - IS:10262,BIS Publication

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STRUCTURAL ANALYSIS –I
(COMMON TO CV/TR)

Sub Code	:	10 CV 43	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART – A

UNIT 1:
STRUCTURAL SYSTEMS AND ENERGY CONCEPT

1.1 Introduction, 1.2 Forms of structures – One, Two & Three dimensional structural systems, 1.3 Degrees of Freedom, 1.2 Conditions of equilibrium,1.3 Degree of freedom (Kinematic indeterminacy) 1.4 Determinate and indeterminate structures-Static indeterminacy, 1.5 Linear and Non linear structures, 1.6 Strain energy and complimentary strain energy, 1.8 Strain energy due to axial load, bending and shear, 1.9 Theorem of minimum potential energy, 1.10 Law of conservation of energy, 1.11 Principle of virtual work,

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and drying shrinkage, Factors affecting shrinkage, Creep - Measurement of creep, factors affecting creep, effect of creep,   - 7 Hours

Unit-7

Durability - definition, significance, permeability, Sulphate attack, Chloride attack, carbonation, freezing and thawing – remedial measures. - 6 Hours

Unit-8

Concept of Concrete Mix design, variables in proportioning , exposure conditions, Procedure of mix design as per IS 10262-2009, Numerical examples of Mix Design
                                                                - 7 Hours

TEXT BOOKS:

1. "Concrete Technology" - Theory and Practice, M.S.Shetty, S.Chand and Company, New Delhi, 2002.
2. "Concrete Technology" – M.L.Gambhir, TATA McGRAW HILL, New Delhi.

REFERENCES :

1. "Properties of Concrete"Neville, A.M. : , ELBS, London
2. "Concrete Technology" – A.R.Santakumar. Oxford University Press (2007)'
3. "Concrete Mix Design" - N.Krishna Raju, Sehgal - publishers.
4. "Recommended guidelines for concrete mix design" - IS:10262,BIS Publication

STRUCTURAL ANALYSIS –I
(COMMON TO CV/TR)

Sub Code	:	10 CV 43	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART – A

UNIT 1:

STRUCTURAL SYSTEMS AND ENERGY CONCEPT

1.1 Introduction, 1.2 Forms of structures – One, Two & Three dimensional structural systems, 1.3 Degrees of Freedom, 1.2 Conditions of equilibrium,1.3 Degree of freedom (Kinematic indeterminacy) 1.4 Determinate and indeterminate structures-Static indeterminacy, 1.5 Linear and Non linear structures, 1.6 Strain energy and complimentary strain energy, 1.8 Strain energy due to axial load, bending and shear, 1.9 Theorem of minimum potential energy, 1.10 Law of conservation of energy, 1.11 Principle of virtual work,

UNIT 2:
DEFLECTION OF BEAMS
2.1 Moment area method, 2.2 Conjugate beam method

UNIT 3:

DEFLECTION OF BEAMS AND TRUSSES BY STRAIN ENERGY
3.1 The first and second theorem of Castigliano's, problems on beams, bents and trusses, 3.2 Betti's law, 3.3 Clarke - Maxwell's theorem of reciprocal deflection(Static and Kinematic indeterminacy less than/equal to 2).

UNIT 4:

ANALYSIS OF BEAMS AND PLANE FRAMES BY STRAIN ENERGY
4.1 Analysis of beams (Propped cantilever and Fixed beams) and trusses using strain energy and unit load methods (Static and Kinematic indeterminacy less than/equal to 2)

PART – B

UNIT 5:
ARCHES AND CABLES
5.1 Introduction, 5.2 Three hinged circular and parabolic arches with supports at same levels and different levels, 5.3 Determination of thrust, shear and bending moment, 5.4 Analysis of cables under point loads and UDL, length of cables (Supports at same levels and at different levels).

UNIT 6:
ANALYSIS OF BEAMS
6.1 Consistent deformation method – Propped cantilever and fixed beams

UNIT 7:
7.1 Clapeyron's theorem of three moments – Derivation of equation, continuous beams and fixed beams-related problems.

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UNIT 8:
ANALYSIS OF ARCHES

8.1 Two hinged parabolic arch, 8.2 Two hinged Circular Arch.

7 Hours

TEXT BOOKS:

1. **Theory of Structures,** Pandit and Guptha, Vol. – I, Tata McGraw Hill, New Delhi.
2. **Basic Structural Analysis** Reddy C. S., Tata McGraw Hill, New Delhi.
3. **Strength of Materials and theory of structures** Vol I & II, B.C. Pumia, R.K., Jain Laxmi Publication 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, Cengage Learning.
3. **Analysis of Structures,** Thandava Murthy, Oxford University Press, Edition 2005.

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SURVEYING – II
(COMMON TO CV/TR/EV/CTM)

Sub Code	:	**10 CV 44**	**IA Marks**	:	**25**
Hrs/ Week	:	**04**	**Exam Hours**	:	**03**
Total Hrs.	:	**52**	**Exam Marks**	:	**100**

PART – A

UNIT 1:
THEODOLITE SURVEY .

1.1 Thedolite and types, 1.2 Fundamental axes and parts of a transit theodolite, 1.3 Uses of theodolite, 1.4 Temperary adjustments of a transit thedolite, 1.5 Measurement of horizontal angles – Method of repetitions and reiterations, 1.6 Measurements of vertical angles, 1.7 Prolonging a straight line by a theodolite in adjustment and theodolite not in adjustment

6 Hours

UNIT 2:
PERMANENT ADJUSTMENT OF DUMPY LEVEL AND TRANSIT THEODOLITE

2.1 Interrelationship between fundamental axes for instrument to be in adjustment and step by step procedure of obtaining permanent adjustments

7 Hours

UNIT 3:
TRIGONOMETRIC LEVELING

3.1 Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method, 3.2 Distance and difference in elevation between two inaccessible objects by double plane method. Salient features of Total Station, Advantages of Total Station over conventional instruments, Application of Total Station.

8 Hours

UNIT 4:
TACHEOMETRY

4.1 Basic principle, 4.2 Types of tacheometric survey, 4.3 Tacheometric equation for horizontal line of sight and inclined line of sight in fixed hair method, 4.4 Anallactic lens in external focusing telescopes, 4.5 Reducing the

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constants in internal focusing telescope, 4.6 Moving hair method and tangential method, 4.7 Substance bar, 4.8 Beaman stadia arc.

7 Hours

PART – B

UNIT 5:
CURVE SETTING (Simple curves)
5.1 Curves – Necessity – Types, 5.2 Simple curves, 5.3 Elements, 5.4 Designation of curves, 5.5 Setting out simple curves by linear methods, 5.6 Setting out curves by Rankine's deflection angle method.
CURVE SETTING (Compound and Reverse curves)
5.2 Compound curves 5.2 Elements 5.3 Design of compound curves 5.4 Setting out of compound curves 5.5 Reverse curve between two parallel straights (Equal radius and unequal radius).

10 Hours

UNIT 6:
6.1 Triangulation Survey: Figures and systems, system of framework, baseline measurement, base measurement by rigid bar and flexible apparatus, tape correction, Measurement of angles, satellite station and reduction to centre and field checks in triangulation and principle of least squares, triangulation adjustment- angle and station

Hours   **6**

UNIT 7:
CURVE SETTING (Transition and Vertical curves)
7.1 Transition curves 7.2 Characteristics 7.3 Length of Transition curve 7.4 Setting out cubic Parabola and Bernoulli's Lemniscates, 7.5 Vertical curves – Types – Simple numerical problems.

6 Hours

UNIT 8:
AREAS AND VOLUMES
8.1 Calculation of area from cross staff surveying, 8.2 Calculation of area of a closed traverse by coordinates method. 8.3 Planimeter – principle of working and use of planimeter to measure areas, digital planimter, 8.4 Computations of volumes by trapezoidal and prismoidal rule, 8.5 Capacity contours

6 Hours

TEXT BOOKS:

1.'Surveying' Vol 2 and Vol 3 - B. C. Punmia, Laxmi Publications
2.'Plane Surveying' A. M. Chandra – New age international (P) Ltd
3.'Higher Surveying' A.M. Chandra New age international (P) Ltd

REFERENCE BOOKS:
1. **Fundamentals of Surveying** - Milton O. Schimidt – Wong, Cengage Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arther Bannister et al., Pearson Education, India

HYDRAULICS & HYDRAULIC MACHINES
(COMMON TO CV/TR/EV)

Sub Code	:	10 CV 45	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART-A

UNIT-1: 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   **07 hrs**

UNIT-2: UNIFORM FLOW IN OPEN CHANNELS

Introduction, Geometric properties of Rectangular, Triangular, Trapezoidal and Circular channels. Chezy's equation, Manning's equation-problems.

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1. 'Surveying' Vol 2 and Vol 3 - B. C. Punmia, Laxmi Publications
2. 'Plane Surveying' A. M. Chandra – New age international (P) Ltd
3. 'Higher Surveying' A.M. Chandra New age international (P) Ltd

REFERENCE BOOKS:
1. **Fundamentals of Surveying** - Milton O. Schimidt – Wong, Cengage Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arther Bannister et al., Pearson Education, India

HYDRAULICS & HYDRAULIC MACHINES
(COMMON TO CV/TR/EV)

Sub Code	:	10 CV 45	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART-A

UNIT-1: 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   **07 hrs**

UNIT-2: UNIFORM FLOW IN OPEN CHANNELS

Introduction, Geometric properties of Rectangular, Triangular, Trapezoidal and Circular channels. Chezy's equation, Manning's equation-problems.

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Most economical open channels-Rectangular, Triangular, Trapezoidal and Circular channeles- problems.

06 Hrs

UNIT-3: 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.

07 Hrs

UNIT-4: IMPACT OF JET ON FLAT 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 a hinged flat plate- problems.

06 Hrs

PART-B

UNIT-5: 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.

06 Hrs

UNIT-6: PELTON WHEEL

Introduction to Turbines, Classification of Turbines. Pelton wheel- components, working and velocity triangles. Maximum power, efficiency, working proportions- problems.

07 Hrs

UNIT-7: KAPLAN TURBINES

Introduction, Components, Working and Velocity triangles, Properties of the Turbine, Discharge of the Turbines, Number of Blades-Problems. Draft Tube: Types, efficiency of a Draft tube. Introduction to Cavitation in Turbines.

07 Hrs

UNIT-8: CENTRIFUGAL PUMPS

Introduction, Classification, Priming, methods of priming. Heads and Efficiencies. Equation for work done, minimum starting speed, velocity triangles. Multistage Centrifugal Pumps (Pumos in Series and Pumps in parallel). Characteristic Curves for a Single stage Centrifugal Pumps- problems.

06 Hrs

TEXT BOOKS:

4. 'A TextBook of Fluid mechanics & Hydraulic Machines'- R.K.Rajput, S.Chand & Co, New Delhi, 2006 Edition.

5. ' Text Book Of Fluid Mechanics& Hydralic Machines'-R.K.Bansal, Laxmi Publications, New Delhi, 2008 Edition.
3. ' Fluid Mechanics and Turbomachines'- Madan Mohan Das, PHI Learning Pvt. Limited, New Delhi. 2009 Edition.

REFERENCE BOOKS:

3. ' Introduction to Fluid Mechanics' – Robert w. Fox: Philip j. Pritchard: Alan t. McDonald, Wiley India, New Delhi, 2009 Edition.
4. 'Introduction To Fluid Mechanics' – Edward j. Shaughnessy,jr; Ira m. Katz:; James p Schaffer, Oxford University Press, New Delhi, 2005 Edition.
5. 'Hydraulics and Fluid Mrchanics' – Dr. P.N. Modi& Dr S.M. Seth, Standard Book House- New Delhi. 2009 Edition..

BUILDING PLANNING AND DRAWING
(COMMON TO CV/TR)

Sub Code	:	10 CV 46	IA Marks	:	25
Hrs/ Week	:	06 (3 x 2 = 6) Practical	Exam Hours	:	04
		01 Theory	Exam Marks	:	100

1. To prepare geomatrical drawing of component of buildings i) Stepped wall footing and isolated RCC column footing, ii) Fully paneled and flush doors, iii) Half paneled and half-glazed window, iv) RCC dog legged and open well stairs, v) Steel truss.

15 Hours

2. Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio.

9 Hours

3. Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Two bed

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V SEMESTER

MANAGEMENT & ENTREPRENEURSHIP

Subject Code	: 10AL51	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

MANAGEMENT

UNIT - 1

MANAGEMENT: Introduction – Meaning – nature and characteristics of Management, Scope and functional areas of management – Management as a science, art or profession – Management & Administration – Roles of Management, Levels of Management, Development of Management Thought – early management approaches – Modern management approaches.

7 Hours

UNIT - 2

PLANNING: Nature, importance and purpose of planning process - objectives - Types of plans (Meaning only) - Decision making - Importance of planning - steps in planning & planning premises - Hierarchy of plans.

6 Hours

UNIT - 3

ORGANIZING AND STAFFING: Nature and purpose of organization – principles of organization – Types of organization – Departmentation – Committees – Centralisation Vs Decentralisation of authority and responsibility – Span of control – MBO and MBE (Meaning only) Nature and importance of Staffing – Process of Selection & Recruitment (in brief).

6 Hours

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UNIT - 4

DIRECTING & CONTROLLING: Meaning and nature of directing – Leadership styles, Motivation Theories, Communication – Meaning and importance – Coordination, meaning and importance and Techniques of Co-ordination. Meaning and steps in controlling – Essentials of a sound control system – Methods of establishing control (in brief).

7 Hours

PART - B

ENTREPRENEURSHIP

UNIT - 5

ENTREPRENEUR: Meaning of Entrepreneur, Evolution of Concept, Functions of Entrepreneur, Types of Entrepreneur, Entrepreneur – An emerging class. Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process, Role of Entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

7 Hours

UNIT - 6

SMALL SCALE INDUSTRY: Definition; Characteristics; Need and rationale: Objectives, Scope, role of SSI in Economic Development. Advantages of SSI. Steps to start an SSI – Government policy towards SSI, Different Policies of SSI., Government Support on SSI., during 5 year plans. Impact of Liberalization, Privatisation, Globalization on SSI. Effect of WTO / GATT Supporting Agencies of Government for SSI Meaning. Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition only).

7 Hours

UNIT - 7

INSTITUTIONAL SUPPORT: Different Schemes, TECKSOK, KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI, NSIC, SIDBI, KSFC.

6 Hours

UNIT - 8

PREPARATION OF PROJECT: Meaning of Project, Project Identification, Project Selection, Project Report, Need and significance of Project, Contents, formulation, Guidelines by Planning Commission for Project Report, Network Analysis, Errors of Project Report, Project Appraisal. Identification of Business Opportunities. Market Feasibility Study: Technical Feasibility Study, Financial Feasibility Study & Social Feasibility Study.

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TEXT BOOKS:
1. **Principles of Management** – P.C. Tripathi, P.N. Reddy, 4th Edition, Tata McGraw Hill, New Delhi.
2. **Dynamics of Entrepreneurial Development & Management** – Vasant Desai – Himalaya Publishing House
3. **Entrepreneurship Development** – Small Business Enterprises – Poornima M. Charantimath – Pearson Education – 2006.

REFERENCE BOOKS:
1. **Management Fundamentals** – Concepts, Application, Skill Development – Robert Lusier – Thomson.
2. **Entrepreneurship Development** – SS Khanka – S Chand & Co.
3. **Management** – Stephen Robbins – Pearson Education / PHI – 17th Edition, 2003.
4. **Management & Entrepreneurship** by N V R Naidu & T Krishna Rao – I K International Publishing House Pvt. Ltd. 1st edition

DESIGN OF RCC STRUCTURAL ELEMENTS

Subject Code	: 10CV52	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1

GENERAL FEATURES OF REINFORCED CONCRETE: Introduction, Design Loads, Materials for Reinforced Concrete and Code requirements. Design Philosophy – Limit State Design principles. Philosophy of limit state design, Principles of limit states, Factor of Safety, Characteristic and design loads, Characteristic and design strength.

6 Hours

UNIT - 2

PRINCIPLES OF LIMIT STATE DESIGN AND ULTIMATE STRENGTH OF R.C. SECTION: General aspects of Ultimate strength, Stress block parameters for limit state of collapse, Ultimate flexural strength of singly reinforced rectangular sections, Ultimate flexural strength of doubly reinforced rectangular sections, Ultimate flexural strength of flanged sections, Ultimate shear strength of RC sections, Ultimate torsional strength of RC sections, Concepts of development length and anchorage, Analysis examples of singly reinforced, doubly reinforced, flanged sections, shear strength and development length.

7 Hours

UNIT - 3

FLEXURE AND SERVICEABILITY LIMIT STATES: General Specification for flexure design of beams-practical requirements, size of beam, cover to reinforcement-spacing of bars. General aspects of serviceability-Deflection limits in IS: 456 – 2000-Calculation of deflection (Theoretical method), Cracking in structural concrete members, Calculation of deflections and crack width.

6 Hours

UNIT - 4

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.

8 Hours

PART - B

UNIT - 5

DESIGN OF SLABS: General consideration of design of slabs, Rectangular slabs spanning one direction, Rectangular slabs spanning in two directions for various boundary conditions. Design of simply supported, cantilever and continuous slabs as per IS: 456 – 2000.

8 Hours

UNIT - 6

DESIGN OF COLUMNS: General aspects, effective length of column, loads on columns, slenderness ratio for columns, minimum eccentricity, design of short axially loaded columns, design of column subject to combined axial load and uniaxial moment and biaxial moment using SP – 16 charts.

5 Hours

UNIT - 7

DESIGN OF FOOTINGS: Introduction, load for footing, Design basis for limit state method, Design of isolated rectangular footing for axial load and uniaxial moment, design of pedestal.

6 Hours

UNIT - 8

DESIGN OF STAIR CASES: General features, types of stair case, loads on stair cases, effective span as per IS code provisions, distribution of loading on stairs, Design of stair cases. With waistslabs.

6 Hours

REFERENCE BOOKS:

1. **Limit State Design of Reinforced concrete-**by P.C. Varghese, PHI Learning Private Limited 2008-2009

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2. **Fundamentals of Reinforced concrete Design**-by M.L.Gambhir, PHI Learning Private Limited 2008-2009.
3. **Reinforced concrete Design**-by Pallai and Menon, TMH Education Private Limited,
4. **Reinforced concrete Design**-by S.N.Shinha, TMH Education Private Limited,
5. **Reinforced concrete Design**-by Karve & Shaha, Structures Publishers Pune.
6. **Design of RCC Structural Elements** S. S. Bhavikatti, Vol-I, New Age International Publications, New Delhi.
7. **IS-456-2000 and SP-16**

STRUCTURAL ANALYSIS – II

Subject Code	: 10CV53	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
ROLLING LOAD AND INFLUENCE LINES: Introduction to Rolling loads on Simply Supported Beams. Influence line diagram for reaction, SF and BM in simply supported beams subjected several point loads and udl.

6 Hours

UNIT - 2
SLOPE DEFLECTION METHOD: Introduction, Sign convention, Development of slope-deflection equations and Analysis of Beams and Orthogonal Rigid jointed plane frames (non-sway) with kinematic redundancy less than/equal to three. (Members to be axially rigid)

8 Hours

UNIT - 3
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) with kinematic redundancy less than/equal to three. (Members to be axially rigid)

8 Hours

UNIT - 4

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SWAY ANALYSIS: Analysis of rigid jointed plane frames (sway, members assumed to be axially rigid and kinematic redundancy ≤ 3) by slope deflection and moment distribution methods.

4 Hours

PART - B

UNIT - 5

KANI'S METHOD: Introduction, Basic Concept, Analysis of Continuous beams and Analysis of rigid jointed non-sway plane frames.

6 Hours

UNIT - 6

FLEXIBILITY MATRIX METHOD OF ANALYSIS: Introduction, Development of flexibility matrix for plane truss element and axially rigid plane framed structural elements and Analysis of plane truss and axially rigid plane frames by flexibility method with static indeterminacy ≤ 3(System Approach).

7 Hours

UNIT - 7

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(System Approach).

7 Hours

UNIT - 8

BASIC PRINCIPLES OF DYNAMICS: Basic principles of Vibrations and causes, periodic and aperiodic motion, harmonic and non-harmonic motion. Period, frequency and damping. Forced and Free Vibrations - Equations of Single Degree of Freedom System with and without damping: related problems.

6 Hours

REFERENCE 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 Dynamics**-by M.Mukhopadhyay,
4. **Structural Analysis-II** -S. S. Bhavikatti – Vikas Publishers, New Delhi.

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5. **Basics of Structural Dynamics and Aseismic Design** By Damodhar Swamy and Kavita PHI Learning Private Limited
6. **Structural Analysis-** D.S. Prakash Rao,, A Unified Approach, University Press
7. **Structural Analysis,** 4th SI Edition by Amit Prasanth & Aslam Kassimali, Cengage Learning.

GEOTECHNICAL ENGINEERING – I

Subject Code	: 10CV54	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT- 1

INTRODUCTION: History of soil mechanics, Definition, origin and formation of soil. Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Water content, Specific Gravity of soil solids and soil mass, Densities and Unit weights - Bulk, Dry, Saturated & Submerged and their inter relationships.

6 Hours

UNIT - 2

INDEX PROPERTIES OF SOIL AND THEIR DETERMINATION: Index Properties of soil- Water content , Specific Gravity, Particle size distribution, Relative Density, Consistency limits and indices, in-situ density, Activity of Clay, Laboratory methods of determination of index properties of soil: Water content (Oven Drying method & Rapid Moisture method), Specific gravity of soil solids (Pycnometer and density bottle method), Particle size distribution (Sieve analysis and Hydrometer analysis only), Liquid Limit- (Casagrande and Cone penetration methods), Plastic limit and shrinkage limit.

7 Hours

UNIT - 3

CLASSIFICATION OF SOILS: Purpose of soil classification, Particle size classification – MIT classification and IS classification, Textural classification. IS classification - Plasticity chart and its importance, Field identification of soils.

CLAY MINERALOGY AND SOIL STUCTURE: Single grained, honey combed, flocculent and dispersed structures, 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.

UNIT - 4
FLOW OF WATER THROUGH SOILS: Darcy's law- assumption and validity, coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation, quick sand phenomena, Capillary Phenomena.

6 Hours

PART - B

UNIT - 5
SHEAR STRENGTH OF SOIL: Concept of shear strength, Mohr-coulomb theory, conventional and modified failure envelops, Effective stress concept- total stress, effective stress and Neutral stress, Concept of pore pressure, Total and effective shear strength parameters, factors affecting shear strength of soils, Sensitivity and Thixotropy of clay.

7 Hours

UNIT - 6
COMPACTION OF SOIL: Definition, Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control – compactive effort & method, lift thickness and number of passes, Proctor's needle, Compacting equipment.

6 Hours

UNIT - 7
CONSOLIDATION OF SOIL: Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation theory-assumption and limitations (no derivation), Normally consolidated, under consolidated and over consolidated soils, pre-consolidation pressure and its determination by Casagrande's method. Consolidation characteristics of soil (C_c, a_v, m_v and C_v).

6 Hours

UNIT- 8
DETERMINATION OF SHEAR STRENGTH AND CONSOLIDATION OF SOIL: Measurement of shear parameters- Direct shear test, unconfined compression test, Triaxial compression test and vane shear test, Test under different drainage conditions.

Laboratory one dimensional consolidation test, Determination of consolidation characteristics of soils-compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method).

6 Hours

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TEXT BOOKS:

1. **Soil Mechanics and Foundation Engg.**- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.
2. **Principles of Soil Mechanics and Foundation Engineering**- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.
3. **Geotechnical Engineering**; Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India

REFERENCES BOOKS:

1. **Foundation Analysis and Design**- Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. Co. New York.
2. **Soil Engineering in Theory and Practice**- Alam Singh and Chowdhary G.R. (1994), CBS Publishers and Distributors Ltd., New Delhi.
3. **Basic and Applied Soil Mechanics**- Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., Newe Delhi.
4. **Geotechnical Engineering**- Donold P Coduto Phi Learning Private Limited, New Delhi
5. **Geotechnical Engineering**- Shashi K. Gulathi & Manoj Datta. (2009), " Tata Mc Graw Hill.
6. **Text Book of Geotechnical Engineering**- Iqbal H. Khan (2005),, 2nd Edition, PHI, India.

Numerical Problems, Examples and objective questions in Geotechnical Engineering- **Narasimha Rao A. V. & Venkatrahmaiah C. (2000), Universities Press., Hyderabad**

7.

Hydrology and Irrigation Engineering

Sub Code	:	10CV55	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART-A
HYDROLOGY

UNIT 1: INTRODUCTION & PRECIPITATION

Introduction ,Hydrologic cycle (Horton's representation). Water budget equation

Precipitation: introduction, forms of precipitation, types of precipitation, measurement of precipitation (Simon's gauge & Syphon gauge only), selection of rain gauge station. Adequacy

5. Irrigation and Water Power Engineering-Madan Mohan Das & Mimi Das Saikia; PHILearning pvy. 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.

TRANSPORTATION ENGINEERING I

Subject Code : 10CV56

I A Marks	:25	
No. of lecture Hours/week		:04
Exam Hours	:03	
Total No. of Lecture Hours		:52
Exam Marks	:100	

PART – A

UNIT – 1

PRINCIPLES OF TRANSPORTATION ENGINEERING: Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute

04 Hrs

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UNIT – 2

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.

06 Hrs

UNIT – 3

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 **04 Hrs**

HIGHWAY GEOMETRIC DESIGN – I: Importance, Terrain classification, Design speed, Factors affecting geometric design, **Cross sectional elements**-Camber- width of pavement-Shoulders-, Width of formation- Right of way, Typical cross sections **Sight Distance**-Restrictions to sight distance- Stopping sight distance- Overtaking sight distance- overtaking zones-Examples on SSD and OSD- Sight distance at intersections.

07 Hrs

UNIT – 4

HIGHWAY GEOMETRIC DESIGN – II: Horizontal alignment-Radius of Curve- Superelevation – Extra widening-Transition curve and its length, setback distance – Examples, **Vertical alignment**-Gradient-summit and valley curves with examples. **05 Hrs**

PART - B

UNIT – 5

PAVEMENT MATERIALS: Subgrade soil - desirable properties-HRB soil classification-determination of CBR and modulus of subgrade reaction-Examples on CBR and Modulus of subgrade reaction, **Aggregates-** Desirable properties and list of tests, **Bituminous materials**-Explanation on Tar, bitumen, cutback and emulsion-List of tests on bituminous materials 06 Hrs

UNIT – 6

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

06 Hrs

UNIT – 7

PAVEMENT CONSTRUCTION: Earthwork –cutting-Filling, Preparation of subgrade, Specification and construction of i) Granular Subbase, ii) WBM Base, iii) WMM base, iv) Bituminous Macadam, v) Dense Bituminous Macadam vi) Bituminous Concrete, vii) Dry Lean Concrete sub base and PQC viii) concrete roads

Hrs   05

HIGHWAY DRAINAGE: Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, design of filter materials

03 Hrs

UNIT – 8

HIGHWAY ECONOMICS: Highway user benefits, VOC using charts only-Examples, Economic analysis - annual cost

method-Benefit Cost Ratio method-NPV-IRR methods-Examples, Highway financing-BOT-BOOT concepts

06 Hrs

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

REFERENCE BOOKS:
1. **Relevant IRC Codes**
2. **Specifications for Roads and Bridges-MoRT&H, IRC, New Delhi.**
3. **Transportation Engineering** – C. Jotin Khisty, B. Kent lal, PHI Learning Pvt. Ltd. New Delhi.

HYDRAULICS AND HYDRAULICS MACHINERY LABORATORY

Sub Code	:	10CV 57	IA Marks	:	25
Hrs/ Week	:	03	Exam Hours	:	03
Total Hrs.	:	42	Exam Marks	:	100

1. Calibration of collecting tank (gravimetric method)
2. Calibration of pressure gauge (dead weight method)
3. Verification of Bernoulli's equation
4. Calibration of 90^0 V-notch
5. Calibration of Rectangular and Cipolletti notch
6. Calibration of Broad- crested weir
7. Calibration of Venturiflume
8. Calibration of Venturimeter

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9. Determination of Darcy's friction factor for a straight pipe

10. Determination of Hydraulic coefficients of a vertical orifice

11. Determination of vane coefficients for a flat vane & semicircular vane

12. Performance characteristics of a single stage centrifugal pump

13. Performance characteristics of a Pelton wheel

14. Performance characteristics of a Kaplan turbine

Reference:

Experiments in Fluid Mechanics – Sarbjit Singh- PHI Pvt. Ltd.- NewDelhi- 2009-12-30
Hydraulics and Hydraulic Mechines Laboratory Manual – Dr. N. Balasubramanya

COMPUTER AIDED DESIGN LABORATORY

Subject Code	: 10CVL58	IA Marks	: 25
No. of Practical Hours/Week	: 03	Exam Hours	: 03
Total No. of Practical Hours	: 42	Exam Marks	: 50

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

3 Hours

1.2 Use of AUTOCAD in Civil Engineering Drawings:
Following drawings are to be prepared for the data given using AUTOCAD
i) Cross section of Foundation - masonry wall, RCC columns (isolated)
ii) Different types of staircases
iii) Lintel and chajja

iv) RCC slabs and beams

v) Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan.

18 Hours

2. STRUCTURAL ANALYSIS SOFTWARE

Use of commercially available software for the analysis of

i) Plane Trusses

ii) Continuous beams

iii) 2D Portal frames-single storied and multistoried

9Hours

3. 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 and uniformly varying load acting throughout the span

ii) Design of singly reinforced and doubly reinforced rectangular beams

iii) Computation of earthwork

iv) Design of horizontal curve by offset method

v) Design of super elevation

12 Hours

REFERENCE BOOKS:

1. **Computer Aided Design Laborator-** Dr M.N.Shesha Prakash, Dr.G.S.Suresh, Lakshmi Publications
2. **CAD Laboratory-** M.A.Jayaram, D.S.Rajendra Prasad- Sapna Publications
3. **AUTOCAD 2002-** Roberts JT, -BPB publications
4. **AUTOCAD 2004-** Sham Tickoo, A beginner's Guide, Wiley Dreamtech India Pvt Ltd.,
5. **Learning Excel 2002-** Ramesh Bangia, -Khanna Book Publishing Co (P) Ltd.,
6. **Microsoft Excel-** Mathieson SA, Starfire publishers

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GEOTECHNICAL ENGINEERING LABORATORY

Subject Code			: 10CVL67	IA Marks	: 25
No. of Practical Hours/Week			: 03	Exam Hours	: 03
Total No. of Practical Hours			: 42	Exam Marks	: 50

1. Identification of gravel type, sand type, silt type and clay types soils,

    3 Hours

2. Tests for determination of Specific gravity (for coarse and fine grained soils) and Water content (Oven drying method).

    3 Hours

3. Grain size analysis of soil sample (sieve analysis).

    3 Hours

4. In situ density by core cutter and sand replacement methods.

    3 Hours

5. Consistency Limits – Liquid Limit (Casagrande and Cone Penetration Methods), plastic limit and shrinkage limit.

    6 Hours

6. Standard Proctor Compaction Test and Modified Proctor Compaction Test.

    3 Hours

7. Coefficient of permeability by constant head and variable head methods.
    3 Hours

8. Strength Tests
    a. Unconfined Compression Test   **3 Hours**
    b. Direct Shear Test   **3 Hours**
    c. Triaxial Compression Test (undrained)   **3 Hours**

9. Consolidation Test- Determination of compression index and coefficient of consolidation.
    3 Hours

10. Laboratory vane shear test   **3 Hours**

11. a) Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor's needle.
    b) Demonstration of Hydrometer Test.

    c) Demonstration of Free Swell Index and Swell Pressure Test
    d) Demonstration of determination of relative density of sands.

    3 Hours

12. Preparing a consolidated report of index properties and strength properties of soil

                                                                    3 Hours

REFERENCE BOOKS:

1. **Soil Mechanics and Foundation Engg**- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.
2. **BIS Codes of Practice**: IS 2720(Part-3/Sec. 1) – 1987; IS 2720 (Part – 2)- 1973; IS 2720 (Part – 4) – 1985; IS 2720 (Part – 5) – 1985; IS 2720 (Part – 6) – 1972; IS 2720 (Part – 7) – 1980; IS 2720 (Part – 8) – 1983; IS 2720 (Part – 17) – 1986; IS 2720 (Part - 10) – 1973; IS 2720 (Part – 13) – 1986; IS2720 (Part 11) – 1971; IS2720 (Part 15) – 1986; IS 2720 (Part 30) – 1987; IS 2720 (Part 14) – 1977; IS 2720 (Part – 14) – 1983; IS 2720 (Part – 28) – 1974; IS 2720 (Part – 29) – 1966, IS 2720 (Part-60) 1965.
3. **Mittal**
4. **Soil Testing for Engineers**- Lambe T.W., Wiley Eastern Ltd., New Delhi.
5. **Manual of Soil Laboratory Testing**- Head K.H., (1986)- Vol. I, II, III, Princeton Press, London.
6. **Engineering Properties of Soil and Their Measurements**- Bowles J.E. (1988), - McGraw Hill Book Co. New York.

EXTENSIVE SURVEY VIVA - VOCE

Subject Code	: 10CVL68	IA Marks	: 25
No. of Practical Hours/Week	: 03	Exam Hours	: 03
Total No. of Practical Hours	: 42	Exam Marks	: 50

(To be conducted between 5th & 6th Semester for a period of 2 weeks, Viva voce conducted along with 6th semester exams)

An extensive survey training involving investigation and design of the following projects is to be conducted for 2 weeks (14 days). The student shall submit a project report consisting of designs and drawings. **(Drawings should be done using AutoCAD)**

1. General instructions, Reconnaissance of the sites and fly leveling to establish bench marks.

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 surveys.
   iii) Details at Waste weir and sluice points.
   iv) Canal alignment.
   (At least one of the above new tank projects should be done by using TOTAL STATION)

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.

4. **HIGHWAY PROJECT:** Preliminary and detailed investigations to align a new road (min. 1 to max 2.0 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

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sections of road. (The Highway project should be done by using TOTAL STATION)

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 surveys to explore the quantity.
   iii) Details at existing Waste weir and sluice points.

VII SEMESTER
ENVIRONMENTAL ENGINEERING – II

Subject Code	: 10CV71	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
INTRODUCTION: Necessity for sanitation, methods of domestic waste water disposal, types of sewerage systems and their suitability.

Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration.

6 Hours

UNIT - 2
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 flowing partially full (No derivations).
MATERIALS OF SEWERS: Sewer materials, shapes of sewers, laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers.

6 Hours

UNIT - 3
SEWER APPURTENANCES: Catch basins, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage.

6 Hours

UNIT - 4

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VI SEMESTER

ENVIRONMENTAL ENGINEERING-I

Subject Code	: 10CV61	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

Part - A

Unit - 1

INTRODUCTION: Human activities and environmental pollution. Water for various beneficial uses and quality requirement. Need for protected water supply.

2 Hours

DEMAND OF WATER: Types of water demands- domestic demand in detail, institutional and commercial, public uses, fire demand. Per capita consumption –factors affecting per capita demand, population forecasting, different methods with merits &demerits- variations in demand of water. Fire demand – estimation by Kuichling's formula, Freeman formula & national board of fire underwriters formula, peak factors, design periods & factors governing the design periods

6 Hours

Unit - 2

SOURCES: Surface and subsurface sources – suitability with regard to quality and quantity.

3 Hours

COLLECTION AND CONVEYANCE OF WATER: Intake structures – different types of intakes; factor of selection and location of intakes. Pumps- Necessity, types – power of pumps; factors for the selection of a pump. Pipes – Design of the economical diameter for the rising main; Nomograms – use; Pipe appurtenances.

6 Hours

Unit - 3

QUALITY OF WATER: Objectives of water quality management. wholesomeness & palatability, water borne diseases. Water quality parameters – Physical, chemical and Microbiological. Sampling of water for examination. Water quality analysis (BIS:10500) using analytical and instrumental techniques. Drinking water standards BIS & WHO guidelines. Health significance of Fluoride, Nitrates and heavy

metals like Mercury, Cadmium, Arsenic etc.

Unit - 4   **6 Hours**

WATER TREATMENT: Objectives – Treatment flow-chart. Aeration-Principles, types of Aerators.

Hours   2

SEDIMENTATION: Theory, settling tanks, types, design. Coagulant aided sedimentation, jar test, chemical feeding, flash mixing, and clari-flocculator.

Hours   4

Part - B

Unit - 5

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.

                                                               6 Hours

Unit - 6

DISINFECTION: Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. UV irradiation treatment – treatment of swimming pool water

Hours   4

SOFTENING – definition, methods of removal of hardness by lime soda process and zeolite process RO & Membrane technique.

3 Hours

Unit - 7

MISCELLANEOUS TREATMENT: Removal of color, odor, taste, use of copper sulfate, adsorption technique, fluoridation and defluoridation.

              4 Hours

DISTRIBUTION SYSTEMS: System of supply, service reservoirs and their capacity determination, methods of layout of distribution systems.

                                                               4

                                        Hours

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Unit - 8

MISCELLANEOUS: Pipe appurtenances, various valves, type of fire hydrants, pipefitting, Layout of water supply pipes in buildings.

2

Hours

TEXT BOOKS:
1. Water supply Engineering –S.K.Garg, Khanna Publishers
2. Environmental Engineering I –B C Punima and Ashok Jain
3. Manual on Water supply and treatment –CPHEEO, Minstry of Urban Development, New Delhi

REFERENCES

1. Hammer, M.J., (1986), **Water and Wastewater Technology –SI** Version, 2nd
   Edition, John Wiley and Sons.

2. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986),**Environmental Engineering–Mc Graw Hill Book Co.**

3. Raju, B.S.N., (1995), **Water Supply** and **Wastewater Engineering, Tata** McGraw Hill Pvt. Ltd., New Delhi.

4. Sincero, A.P., and Sincero, G.A., (1999), **Environmental Engineering – A Design Approach–**Prentice Hall of India Pvt. Ltd., New Delhi.

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DESIGN & DRAWING OF RC STRUCTURES

Subject Code	: 10CV62	IA Marks	: 25
No. of Lecture Hours/Week	: 02 (T) +03 (D)	Exam Hours	: 04
Total No. of Lecture Hours	: 26 (T) + 39 (D)	Exam Marks	: 100

PART - A

UNIT-1
Layout Drawing: General layout of building showing, position of columns, footings, beams and slabs with standard notations.
UNIT-2
Detailing of Beam and Slab floor system, continuous beams.
UNIT-3
Detailing of Staircases: Dog legged and Open well.
UNIT-4
Detailing of Column footings: Column and footing (Square and Rectangle).

13 (T) + 18 (D)

PART - B

UNIT-5
Design and detailing of Rectangular Combined footing slab and beam type.
UNIT-6
Design and detailing of Retaining walls (Cantilever and counter fort type).
UNIT-7
Design and detailing of Circular and Rectangular water tanks resting on ground and free at top(Flexible base and Rigid base), using IS: 3370 (Part IV) only.
UNIT-8
Design and detailing of Simple Portal Frames subjected to gravity loads.(Single bay & Single storey)

13 (T) + 21 (D)

REFERENCE BOOKS:

1. **Structural Design & Drawing Reinforced Concrete & Steel**- N. Krishnaraju, University Press.

2. **Structural Design and Drawing-** Krishnamurthy -, (Concrete Structures), CBS publishers, New Delhi. Tata Mc-Graw publishers.
3. **Reinforced Concrete Structures** - B.C. Punmia – Laxmi Publishing Co.
4. **Reinforced Concrete Design** – S.N.Sinha, McGrawHill Education,

SCHEME OF QUESTION PAPER:

Part A : Three questions each carrying 20 marks is to be set. Student has to answer two questions out of three.

Part B: Two questions each carrying 60 marks is to be set. Student has to answer one question out of two.

TRANSPORTATION ENGINEERING II

Subject Code : 10CV63
I A Marks :25
No. of lecture Hours/week :04
Exam Hours :03
Total No. of Lecture Hours :52
Exam Marks :100

PART – A
RAILWAY ENGINEERING

UNIT – 1

INTRODUCTION: Role of railways in transportation, Indian Railways, Selection of Routes, Permanent way and its requirements, Gauges and types, Typical cross sections-single and double line B G track in cutting, embankment and electrified tracks, Coning of wheels and tilting of rails, **Rails**-Functions-requirements—types and sections-length-defects-wear-creep-welding-joints, creep of rails

06 Hrs

UNIT – 2

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

06Hrs

UNIT – 3

GEOMETRIC DESIGN: Necessity, Safe speed on curves, **Cant**-cant deficiency-negetive cant-safe speed based on various criteria,(both for normal and high speed tracks) Transition curve, Gradient and types, grade compensation, Examples on above.

06 Hrs

UNIT – 4

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 and types-diamond and crossover, 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,

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and maintenance. Traffic control system- Absolute and automatic Block systems.

08 Hrs

PART – B
AIRPORT ENGINEERING

UNIT – 5
INTRODUCTION: 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

06 Hrs

UNIT – 6
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.

06 Hrs

TUNNEL ENGINEERING

UNIT – 7
TUNNELS: Advantages and disadvantages, Size and shape of tunnels, Surveying-Transferring centre line, and gradient from surface to inside the tunnel working face, Weisbach triangle-Examples, Tunnelling in rocks-methods, Tunnelling methods in soils-Needle beam method, Liner plate, Tunnel lining, Tunnel ventilation, vertical shafts, Pilot tunneling, mucking and methods, drilling and drilling pattern.

06Hrs

UNIT – 8
HARBOURS: Harbour classifications, Layout with components, Natural phenomenon affecting the design of harbour's - wind, wave and tide, currents, Breakwater-Types Wharf and Quays, Jetties and Piers, Dry dock and wet docks, Slipways, Navigational aids, warehouse and transit-shed.

08 Hrs

TEXT BOOKS
1. **Railway Engineering -** Saxena and Arora, Dhanpat Rai & Sons, New Delhi
2. **Indian Railway Track –** M M Agarwal, Jaico Publications, Bombay

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3. **Airport Planning and Design** – Khanna Arora and Jain, Nem Chand Bros, Roorkee
4. **Docks and Tunnel Engineering** – R Srinivasan, Charaotar Publishing House
5. **Docks and Harbour Engineering** –H P Oza and G H Oza Charaotar Publishing House
6. **Surveying** – B C Punmia, Laxmi Publications

REFERENCE BOOK
Railway Engineering – Mundrey, McGraw Hill Publications

GEOTECHNICAL ENGINEERING – II

Subject Code	: 10CV64	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1

SUBSURFACE EXPLORATION: Importance of exploration program, Methods of exploration: Boring, Seismic refraction method of grophysical exploration, Types of samples - undisturbed, disturbed and representative samples, Samplers, sample disturbance, area ratio, Recovery ratio, clearance, Stabilisation of boreholes - Typical bore log. Number and depth of borings for various civil engineering structures, soil exploration report.

DRAINAGE AND DEWATERING: Determination of ground water level by Hvorselev's method, Control of ground water during excavation: Dewatering - Ditches and sumps, well point system, Vacuum method, Electro- Osmosis method.

8 Hours

UNIT - 2

STRESSES IN SOILS: Boussinesq's and Westergaard's theories for concentrated, circular and rectangular loads. Comparison of Boussinesq's and westergaard's analysis. Pressure distribution diagrams, Contact pressure, Newmark's chart.

3. **Airport Planning and Design** – Khanna Arora and Jain, Nem Chand Bros, Roorkee
4. **Docks and Tunnel Engineering** – R Srinivasan, Charaotar Publishing House
5. **Docks and Harbour Engineering** –H P Oza and G H Oza Charaotar Publishing House
6. **Surveying** – B C Punmia, Laxmi Publications

REFERENCE BOOK
Railway Engineering – Mundrey, McGraw Hill Publications

GEOTECHNICAL ENGINEERING – II

Subject Code	: 10CV64	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
SUBSURFACE EXPLORATION: Importance of exploration program, Methods of exploration: Boring, Seismic refraction method of grophysical exploration, Types of samples - undisturbed, disturbed and representative samples, Samplers, sample disturbance, area ratio, Recovery ratio, clearance, Stabilisation of boreholes - Typical bore log. Number and depth of borings for various civil engineering structures, soil exploration report.

DRAINAGE AND DEWATERING: Determination of ground water level by Hvorselev's method, Control of ground water during excavation: Dewatering - Ditches and sumps, well point system, Vacuum method, Electro- Osmosis method.

8 Hours

UNIT - 2
STRESSES IN SOILS: Boussinesq's and Westergaard's theories for concentrated, circular and rectangular loads. Comparison of Boussinesq's and westergaard's analysis. Pressure distribution diagrams, Contact pressure, Newmark's chart.

UNIT - 3

FLOWNETS: Laplace equation (no derivation) assumptions and limitations only, characteristics and uses of flownets, Methods of drawing flownets for Dams and sheet piles. Estimating quantity of seepage and Exit gradient. Determination of phreatic line in earth dams with and without filter. Piping and protective filter.

5 Hours

UNIT - 4

LATERAL EARTH PRESSURE: Active and Passive earth pressures, Earth pressure at rest. Rankine's and Coulomb's Earth pressure theories—assumptions and limitations, Graphical solutions for active earth pressure (cohesionless soil only) – Culmann's and Rebhann's methods, Lateral earth pressure in cohesive and cohesionless soils, Earth pressure distribution.

7 Hours

PART - B

UNIT - 5

STABILITY OF EARTH SLOPES: Types of slopes, causes and type of failure of slopes. Definition of factor of safety, Stability of infinite slopes, Stability of finite slopes by Method of slices and Friction Circle method, Taylor's stability number, Fellineous method,.

**7
Hours**

UNIT - 6

BEARING CAPACITY: Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure. Terzaghi's and Brinch Hansen's bearing capacity equations - assumptions and limitations, Bearing capacity of footing subjected to eccentric loading. Effect of ground water table on bearing capacity. Field methods of evaluation of bearing capacity - Plate load test, Standard penetration test and cone penetration test.

8 Hours

UNIT - 7
FOUNDATION SETTLEMENT: Importance and Concept of Settlement Analysis, Immediate, Consolidation and Secondary settlements (no derivations, but, computation using relevant formula for Normally Consolidated soils), Tolerance. BIS specifications for total and differential settlements of footings and rafts.

5 Hours

UNIT – 8
PROPORTIONING SHALLOW AND PILE FOUNDATIONS
Allowable Bearing Pressure, Factors influencing the selection of depth of foundation, Factors influencing Allowable Bearing Pressure, Factors influencing the choice of foundation, Proportioning isolated, combined, strip and mat foundations, Classification of pile foundation, Pile load capacity, Proportioning pile foundation.

6

Hours

TEXT BOOKS:
1. **Soil Engineering in Theory and Practice-** Alam Singh and Chowdhary G.R. (1994), CBS Publishers and Distributors Ltd., New Delhi.
2. **Soil Mechanics and Foundation Engg.-** Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.

REFERENCES BOOKS:
1. **Foundation Analysis and Design-** Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. Co. New York.
2. **Soil Mechanics and Foundation Engineering-** Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.
3. **Basic and Applied Soil Mechanics-** Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., Newe Delhi.
4. **Geotechnical Engineering-** Venkatrahmaiah C. (2006), 3rd Edition New Age International (P) Ltd., Newe Delhi.
5. **Soil Mechanics-** Craig R.F. (1987), Van Nostrand Reinhold Co. Ltd.
6. **Principles of Geotechnical Engineering-** Braja M. Das (2009), 5th Edition; Cengage Learning (P) Ltd., India.

GROUND WATER EXPLORATION: Seismic method, Electrical resistivity method, Bore hole geo-physical techniques; Electrical logging, Radio active logging, Induction logging, Sonic logging and Fluid logging.

6 Hours

UNIT - 8

GROUND WATER RECHARGE AND RUNOFF: Recharge by vertical leakage. Artificial recharge. Ground water runoff. Ground water budget.

6 Hours

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.

RURAL WATER SUPPLY AND SANITATION

Subject Code	:10CV666	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

Part - A

UNIT - 1

RURAL WATER SUPPLY: Introduction: Need for a protected water supply, investigation and selection of water sources, water borne diseases, protection of well water, drinking water quality standards.

6 Hours

UNIT - 2

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Types of pumps, supply systems viz., BWS MWS, PWS, water treatment methods – disinfection, deflouridation, hardness and iron removal, ground water contamination and control.

6 Hours

UNIT - 3
RURAL SANITATION: public latrine, concept of Eco-sanitation, trenching and composting methods, Two pit latrines, aqua privy, W.C, septic tank, soak pit.

8 Hours

UNIT - 4
DRAINAGE SYSTEMS: Storm water and sullage disposal, rain water harvesting and uses.

3 Hours

Part - B

UNIT - 5
COMMUNICABLE DISEASES: Terminology, classifications, methods of communication, general methods of control.

4 Hours

UNIT - 6
REFUSE COLLECTION AND DISPOSAL: collection methods, transportation, disposal – salvaging, dumping, manure pits, dumping in low lands , composting, dung disposal – digester, biogas plant.

10 Hours

UNIT - 7
MILK SANITATION: Essentials, test for milk quality, pasteurization, quality control, cattle borne diseases, planning for a cow shed.

9 Hours

UNIT - 8
INSECT CONTROL: House fly and mosquito – life cycle, diseases, transmission and control measures.

6 Hours

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TEXT BOOKS:
1. Environmental Sanitation - Joseph. A. Solveto
2. Water Supply & Sanitary Engineering - E.W.Steel

REFERENCE BOOK:
1. Preventive & Social Medicine - Park & Park

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sections of road. (The Highway project should be done by using TOTAL STATION)

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 surveys to explore the quantity.
   iii) Details at existing Waste weir and sluice points.

VII SEMESTER
ENVIRONMENTAL ENGINEERING – II

Subject Code	: 10CV71	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
INTRODUCTION: Necessity for sanitation, methods of domestic waste water disposal, types of sewerage systems and their suitability.

Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration.

6 Hours

UNIT - 2
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 flowing partially full (No derivations).
MATERIALS OF SEWERS: Sewer materials, shapes of sewers, laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers.

6 Hours

UNIT - 3
SEWER APPURTENANCES: Catch basins, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage.

6 Hours

UNIT - 4

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WASTE WATER CHARACTERIZATION: Sampling, significance, techniques and frequency. Physical, Chemical and Biological characteristics, Aerobic and Anaerobic activity, CNS cycles. BOD and COD. Their significance & problems

06 Hours

PART – B

UNIT - 5
DISPOSAL OF EFFLUENTS : Disposal of Effluents by dilution, self-purification phenomenon. Oxygen sag curve, Zones of purification, Sewage farming, sewage sickness, Effluent Disposal standards for land, surface water & ocean. Numerical Problems on Disposal of Effluents. Streeter Phelps equation.

6 Hours

UNIT - 6
TREATMENT OF WASTE WATER: Flow diagram of municipal waste water treatment plant. Preliminary & Primary treatment : Screening, grit chambers, skimming tanks, primary sedimentation tanks – Design criteria & Design examples.

6 Hours

UNIT - 7
SECONDARY TREATMENT: Suspended growth and fixed film bioprocess. Trickling filter – theory and operation, types and designs. Activated sludge process- Principle and flow diagram, Modifications of ASP, F/M ratio. Design of ASP.

8 Hours

UNIT - 8
Anaerobic Sludge digestion, Sludge digestion tanks, Design of Sludge drying beds. Low cost waste treatment method. Septic tank, Oxidation Pond and Oxidation ditches – Design. Reuse and recycle of waste water.

8 Hours

REFERENCES

1. **Manual on Waste Water Treatment** : CPHEEO, Ministry of Urban Development, New Delhi.
2. **Water and Wastewater Engineering Vol-II** :- Fair, Geyer and Okun : John Willey Publishers, New York.
3. **Waste Water Treatment, Disposal and Reuse** : Metcalf and Eddy inc : Tata McGraw Hill Publications.
4. **Water Technology.**- Hammer and Hammer
5. **Environmental Engineering**: Howard S. Peavy, Donald R. Rowe, George Tchnobanoglous McGraw Hill International Edition.

DESIGN OF STEEL STRUCTURES

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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

7 Hours

Note: Study of this course should be based on **IS: 800-2007**
Reference Books

1) **Design of Steel Structures**, N.Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures. Duggal. TATA Megra Hill 2010
3) Bureau of Indian Standards, IS800-2007, IS875-1987
4) Design of Steel Structures, William T.Segui, India Edition, Cengage Learning.
4) **Steel Tables**

ESTIMATION & VALUATION

Subject Code	: 10CV73	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

ESTIMATION: Study of various drawings with estimates, important terms, units of measurement, abstract Methods of taking out quantities and cost – center line method, long and short wall method or crossing 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.

16 Hours

PART - B

ESTIMATE: Different type of estimates, approximate methods of estimating buildings, cost of materials. Estimation of wooden joineries such as doors, windows & ventilators.

5 Hours

ESTIMATES: Steel truss (Fink and Howe truss), manhole and septic tanks, RCC Culverts.

6 Hours

SPECIFICATIONS: Definition of specifications, objective of writing specifications, essentials in specifications, general and detail specifications of common item of works in buildings.

81

PART - C

RATE ANALYSIS: Definition and purpose. Working out quantities and rates for the following standard items of works – earth work in different types of soils, cement concrete of different mixes, bricks and stone masonry, flooring, plastering, RCC works, centering and form work for different RCC items, wood and steel works for doors, windows and ventilators.

6 Hours

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.

6 Hours

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.
Valuation- Definitions of various terms, method of valuation, Freehold & Leasehold properties, Sinking fund, depreciation and method of estimating depreciation, Outgoings.

8 Hours

REFERENCE BOOKS:
1. **Estimating & Costing**, B. N. Dutta, Chand Publisher
2. **Quantity Surveying-** P.L. Basin S. Chand : New Delhi.
3. **Estimating & Specification -** S.C. Rangwala :: Charotar publishing house, Anand.
4. **Text book of Estimating & Costing-** G.S. Birde, Dhanpath Rai and sons : New Delhi.
5. **A text book on Estimating, Costing and Accounts-** D.D. Kohli and R.C. Kohli S. Chand : New Delhi.
6. **Contracts and Estimates,** B. S. Patil, University Press, 2006.

DESIGN OF PRE-STRESSED CONCRETE STRUCTURES

Subject Code	: 10CV74	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

2. **Soil Mechanics and Foundation Engineering,** : S.K. Garg : Pub : Khanna Publishers.

REFERENCE BOOKS:
1. **Soil Mechanics and Foundation Engineering,**: Dr. B.C. Punmia : Pub : Laxmi Publications Ltd.,
2. **Foundation Engineering.**: Dr. B.J. Kasmalkar
3. **Numericals in Geotechnical Engineering** : A.V. Narasimha Rao & C. Venkataramaiah :Pub : University Press.
4. **Hydraulic Structures**: S.K. Garg : Pub : Khanna Publishers.
5. **Soil Mechanics and Foundation Engineering,** : Dr. V.N.S. Murthy : Pub : Sai Tech.
6. **Geotechnical Engineering,** : Dr. C. Venkataramaiah : Pub : New age publications.
7. **Geotechnical Engineering** : Purushotam Raj .
8. **Theory and Practice of Soil Engineering** : Alum Singh .
9. **Principles of Geotechnical Engineering,** Das, B. M., Cengage Learning, 2009

HIGHWAY GEOMETRIC DESIGN

Subject Code	: 10CV755	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
INTRODUCTION: Geometric Control factors like Topography -design speed – design vehicle – Traffic – Capacity – volume – environment and other factors as per IRC and AASHTO standards and specifications- PCU concept – factors controlling PCU for different design purpose

6 Hours

UNIT - 2
CROSS SECTIONAL ELEMENTS: Pavement surface characteristics – friction – skid resistance – pavement unevenness - light reflecting characteristics – camber – objectives – types of camber – methods of providing cambers in the field – problems – carriage way – kerb – median – shoulder – foot path – parking lanes – service roads – cycle tracks – Driveways – Right of way – Factors influencing right of way – Design of Road humps as per latest I RC provisions.

10 Hours

UNIT - 3
SIGHT DISTANCE: Importants, types, Side distance at uncontrolled intersection, derivation, factors affecting side distance, IRC, AASHTO standards, problems on above.

6 Hours

UNIT - 4

HORIZONTAL ALIGNMENT: Definition, Checking the stability of vehicle, while moving on horizontal curve, Super elevation, Ruling minimum and maximum radius, Assumptions – problems – method of providing super elevation for different curves – Extra widening of pavement on curves – objectives – Mechanical widening – psychological widening – Transition curve – objectives – Ideal requirements – Types of transition curve – Method of evaluating length of transition curve – Setting the transition curve in the field, set back distance on horizontal curve and problems on above

8 Hours

PART - B

UNIT - 5

VERTICAL ALIGNMENT: Gradient – Types of gradient – Design criteria of summit and valley curve – Design of vertical curves based on SSD – OSD – Night visibility considerations – Design standards for hilly roads – problems on the above.

5 Hours

UNIT - 6

INTERSECTION DESIGN: Principle – Atgrade and Grade separated junctions – Types – channelization – Features of channelising Island – median opening – Gap in median at junction.

6 Hours

UNIT - 7

ROTARY INTERSECTION: Elements – Advantages – Disadvantages – Design guide lines – problem on the above – Grade separated intersection – Three legged inter section – Diamond inter change – Half clover leaf – clover leaf- Advantages- Disadvantages only

6 Hours

UNIT - 8

HIGHWAY DRAINAGE: Importance – sub surface drainage –surface drainage – Design of road side drives – Hydrological – Hydraulical considerations and design of filter media, problems on above.

5 Hours

TEXT BOOKS:

1. **Principle and practice of Highway Engineering-** L R KADIYALI & N B LAL : Khanna publications
2. **Highway Engineering –** Khanna S K & Justo, Nemchand & Bros.
3. **Highway Engineering** by Srinivas Kumar.

REFERENCE BOOKS:

1. **Highway Engineering-** Kadiyali L R : Khanna publications
2. **Relavent IRC** Publications
   Transportation Engineering and Planning- Papa Coastas and Prevendors PHI, New Delhi.

OPEN CHANNEL HYDRAULICS

Subject Code : 10CV756   IA Marks   : 25

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

REFERENCE BOOKS:

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

SOLID WASTE MANAGEMENT

Subject Code	10CV757	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1

INTRODUCTION: Definition, Land Pollution – scope and importance of solid waste management, functional elements of solid waste management.

SOURCES: Classification and characteristics – municipal, commercial & industrial. Methods of quantification.

08 Hours

UNIT - 2

COLLECTION AND TRANSPORTATION: Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, route optimization techniques and problems.

06 Hours

UNIT - 3

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TREATMENT / PROCESSING TECHNIQUES: Components separation, volume reduction, size reduction, chemical reduction and biological processing problems.

6 Hours

UNIT - 4

INCINERATION: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolsis, design criteria for incineration.

7 Hours

PART - B

UNIT - 5

COMPOSTING: Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting.

6 Hours

UNIT - 6

SANITARY LAND FILLING: Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, geosynthetic fabrics in sanitary land fills.

8 Hours

UNIT - 7

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.

6 Hours

UNIT - 8

RECYCLE AND REUSE: Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse.

5 Hours

REFERENCES

1. **Integrated Solid Waste Management:** Tchobanoglous : M/c Graw Hill.
2. **Solid Waste Management in developing countries.** Bhide and Sunderashan
3. **Hand book on Solid Waste Disposal.:** Pavoni J.L.
4. **Environmental Engineering.:** Peavy and Tchobanoglous
5. **Environmental Engineering – Vol II.:** S.K. Garg
6. **Biomedical waste handling rules** – 2000.
7. **Solid Waste Engineering by** Vesilind.Pa Worrell & Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi.

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multiple excavations. Structural defects in Rock masses, their improvement by rock bolting, grouting and other methods. Rock grouting, Rock Reinforcement

<div align="right">8 Hours</div>

TEXT BOOKS:
1. **Foundation of Rock masses** - Joegar and Cook : 3rd Edition Chapman and Hall, London.
2. **Engineering in Rocks for Slopes foundations and Tunnels** – Ramamurthy, T., PHI Publishers, 2007
3. **Introduction to rock mechanics**- Goodman : : Wiley International.

REFERENCE BOOKS:
1. **Rock Mechanics and the design of structures in Rock**- : John Wiley, New York.
2. **Rock Mechanics in Engineering practice**- Ziekiewicz. O.C. and Stagg K.G. : John, Wiley, New York.

PAVEMENT MATERIALS AND CONSTRUCTION

Subject Code	: 10CV763	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A
PAVEMENT MATERIALS

UNIT - 1
AGGREGATES: Origin, classification, requirements, properties and tests on road aggregates, concepts of size and gradation – design gradation, maximum aggregate size, aggregate blending by different methods to meet specification.

<div align="right">6 Hours</div>

UNIT - 2
BITUMEN AND TAR: Origin, preparation, properties and chemical constitution of bituminous road binders; requirements.

<div align="right">4 Hours</div>

UNIT - 3
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.

<div align="right">8 Hours</div>

UNIT - 4
BITUMINOUS MIXES: Mechanical properties, dense and open textured mixes, flexibility and brittleness, (no Hveem Stabilometer & Hubbar – Field

<div align="center">98</div>

Tests) bituminous mix, design methods using Rotchfutch'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.

6 Hours

PART - B

PAVEMENT CONSTRUCTION

UNIT - 5

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.

6 Hours

UNIT - 6

SUBGRADE: Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests.

6 Hours

UNIT - 7

FLEXIBLE PAVEMENTS: Specifications of materials, construction method and field control checks for various types of flexible pavement layers.

8 Hours

UNIT - 8

CEMENT CONCRETE PAVEMENTS: Specifications and method of cement concrete pavement construction (PQC Importance of providing DLC as sub-base and polythene thin layer between PQC and sub-base); Quality control tests; Construction of various types of joints.

8 Hours

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

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

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UNIT - 6

Forced vibration motion of shear builings, modal super position method, response of shear buldings to base motion, harmonic forced excitation.

<div align="right">6 Hours</div>

UNIT - 7

Damped motion of shear buildings, equations for damped shear buildings, uncoupled damped equations, conditions for damping uncoupling.

<div align="right">7 Hours</div>

UNIT - 8

Dynamic analysis of beams stiffness matrices, lumped mass and consistent mass formulation equations of motion.

<div align="right">7 Hours</div>

REFERENCE BOOK:

1. **Vibrations, structural dynamics**- M. Mukhopadhaya : Oxford IBH
2. **Structural Dynamics**- Mario Paz : CBS publishers.
3. **Structural Dynamics**- Anil Chopra : PHI Publishers.
4. **Structural Dynamics**- Clough & Penzen : TMH.

ENVIRONMENTAL ENGINEERING LABORATORY

Subject Code	10CVL77	IA Marks	: 25
No. of Practical Hours/Week	: 03	Exam Hours	: 03
Total No. of Practical Hours	: 42	Exam Marks	: 50

1. Determination of Solids in Sewage: Total Solids, Suspended Solids, Dissolved Solids, Volatile Solids, Fixed Solids, Settleable Solids.

2. Electrical conductivity. Determination of Chlorides and Sulphates.

3. Determination of Alkalinity, Acidity and pH.

4. Determination of Calcium, Magnesium and Total Hardness.

5. Determination of Dissolved Oxygen. Determination of BOD.

6. Determination of COD.

7. Determination of percentage of available chlorine in bleaching powder, Residual Chlorine and Chlorine Demand.

8. Jar Test for Optimum Dosage of Alum, Turbidity determination by

Nephelometer.

9. Determination of Iron. Phenanthroline method.

10. Determination of Fluorides SPANDS Method.

11. MPN Determination

12. Determination Nitrates by spectrophotometer.

13. Determination of sodium and potassium by flame photometer.

REFERENCES
1. **Manual of Water and Wastewater Analysis** – NEERI Publication.
2. **Standard Methods for Examination of Water and Wastewater** (1995), American Publication – Association, Water Pollution Control Federation, American Water Works Association, Washington DC.
3. **IS Standards :** 2490-1974, 3360-1974, 3307-1974.
4. **Chemistry for Environment Engineering**. Sawyer and Mc Carthy,

CONCRETE AND HIGHWAY MATERIALS LABORATORY

Subject Code	: 10CVL78	IA Marks	: 25
No. of Practical Hours/Week	: 03	Exam Hours	: 03
Total No. of Practical Hours	: 42	Exam Marks	: 50

PART - A

CEMENT: Normal Consistency, Setting time, Soundness by Autoclave method, Compression strength test and Air permeability test for fineness, Specific gravity of cement.

FRESH CONCRETE : Workability – slump, Compaction factor and Vee Bee tests.

HARDENED CONCRETE : Compression strength and Split tensile tests. Test on flexural strength of RCC beams, Permeability of concrete.

PART - B

SOIL: CBR Test.

AGGREGATES: Crushing, Abrasion (Los Angeles Abrasion), Impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and Water Absorption.

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Nephelometer.

9. Determination of Iron. Phenanthroline method.

10. Determination of Fluorides SPANDS Method.

11. MPN Determination

12. Determination Nitrates by spectrophotometer.

13. Determination of sodium and potassium by flame photometer.

REFERENCES
1. **Manual of Water and Wastewater Analysis** – NEERI Publication.
2. **Standard Methods for Examination of Water and Wastewater** (1995), American Publication – Association, Water Pollution Control Federation, American Water Works Association, Washington DC.
3. **IS Standards** : 2490-1974, 3360-1974, 3307-1974.
4. **Chemistry for Environment Engineering.** Sawyer and Mc Carthy,

CONCRETE AND HIGHWAY MATERIALS LABORATORY

Subject Code	: 10CVL78	IA Marks	: 25
No. of Practical Hours/Week	: 03	Exam Hours	: 03
Total No. of Practical Hours	: 42	Exam Marks	: 50

PART - A

CEMENT: Normal Consistency, Setting time, Soundness by Autoclave method, Compression strength test and Air permeability test for fineness, Specific gravity of cement.

FRESH CONCRETE : Workability – slump, Compaction factor and Vee Bee tests.

HARDENED CONCRETE : Compression strength and Split tensile tests. Test on flexural strength of RCC beams, Permeability of concrete.

PART - B

SOIL: CBR Test.

AGGREGATES: Crushing, Abrasion (Los Angeles Abrasion), Impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and Water Absorption.

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BITUMINOUS MATERIALS AND MIXES: Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity, proportioning of aggregate mixes by Rotchfutch Method, Marshall Stability tests. Water Sensitivity test on Compacted Bituminous mixes.

REFERENCE BOOK:

1. Relevant IS Codes and IRC Codes.
2. **Highway Material Testing Laboratory Manual** by Khanna S K and Justo, – CEG Nemi Chand & Bros.
3. M. L. Gambhir : Concrete Manual : Dhanpat Rai & sons New – Delhi.

VIII Semester

ADVANCED CONCRETE TECHNOLOGY

Subject Code	: 10CV81	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1

Importance of Bogue's compounds, Structure of a Hydrated Cement Paste, Volume of hydrated product, porosity of paste and concrete, transition Zone, Elastic Modulus, factors affecting strength and elasticity of concrete, Rheology of concrete in terms of Bingham's parameter.

7 Hour

UNIT - 2

CHEMICAL ADMIXTURES- Mechanism of chemical admixture, Plasticizers and super Plasticizers and their effect on concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, new generation superplasticiser.

MINERAL ADMIXTURE-Fly ash, Silica fume, GGBS, and their effect on concrete property in fresh state and hardened state.

6 Hours

UNIT - 3

MIX DESIGN - Factors affecting mix design, design of concrete mix by BIS method using IS10262-2009, current American (ACI)/ British (BS) methods. Problems as per provisions in IS10262-2009.

6 Hours

UNIT - 4

DURABILITY OF CONCRETE - Introduction, Permeability of concrete, acid attack, efflorescence, Corrosion in concrete. Thermal conductivity, thermal diffusivity, specific heat. Alkali Aggregate Reaction, IS456-2000 requirement for durability.

7 Hours

PART - B

UNIT - 5

Ready mixed concrete - manufacturing, transporting, placing, precautions.

Methods of concreting- Pumping, under water concreting, shotcrete.
High volume fly ash concrete concept, properties, typical mix
Self compacting concrete concept, materials, tests, properties, application and
Typical mix.

6 Hours

UNIT - 6

Fibre reinforced concrete - Fibers types and properties, Behavior of FRC in
compression, tension including pre-cracking stage and post-cracking stages,
behavior in flexure and shear.
Ferro cement - materials, techniques of manufacture, properties and
applications.

7 Hours

UNIT - 7

Light weight concrete-materials properties and types. Typical light weight
concrete mix.
High density concrete and high performance concrete-materials, properties
and applications, typical mix.

6 Hours

UNIT - 8

Tests on Hardened concrete-Effect of end condition of specimen, capping,
H/D ratio, rate of loading, moisture condition. Compression, tension and
flexure tests. Tests on composition of hardened concrete-cement content,
original w/c ratio. NDT tests concepts-Rebound hammer, pulse velocity
methods.

7 Hours

TEXT / REFERENCE BOOKS:

1. **Properties of Concrete-** Neville, A.M. - ELBS Edition, Longman Ltd., London
2. **Concrete Technology-** M.S. Shetty, S.Chandand Company, New Delhi, 2002.
3. **Concrete Technology-** A.R. Santhakumar,-Oxford University Press.
4. **Concrete-** P.K. Mehta, P J M Monteiro,- Prentice Hall, New Jersey (Special Student Edition by Indian Concrete Institute Chennai)
5. IS 10262-2009 and IS 456-2000
6. ACI Code for Mix Design
7. **Concrete Mix Design-** N. Krishna Raju - Sehgal Publishers
8. **Concrete Technology** – M.L.Gambhir, TATA McGRAW HILL, New Delhi.
9. **Advanced Concrete Technology Processes-** John Newman, Ban Seng Choo, - London.
10. **Advanced Concrete Technology Constituent materials-** John Newman, Ban Seng Choo- London

11. **Non-Destructive Test and Evaluation of Materials**- J.Prasad, C G K Nair,-Mc Graw Hill.
12. **High Performance Concrete**- Prof Aitcin P C- E and FN, London.
13. **Properties of Fresh Concrete**- Power T.C.- E and FN, London.

DESIGN AND DRAWING OF STEEL STRUCTURES

Subject Code	:10CV82	IA Marks	: 25
No. of Lecture Hours/Week	: 02 (T) + 3 (D)	Exam Hours	: 04
Total No. of Lecture Hours	: 26 (T) + 39 (D)	Exam Marks	: 100

PART - A

(DRAWINGS TO BE PREPARED FOR GIVEN STRUCTURAL DETAILS)

UNIT - 1
CONNECTIONS: Bolted and welded, beam-beam, Beam-column, seated, stiffened and un-stiffened.

UNIT - 2
COLUMNS: Splices, Column-column of same and different sections. Lacing and battens.

UNIT - 3
COLUMN BASES: Slab base and gusseted base.

08 (T) + 15 (D)

PART - B

UNIT - 4

Design and drawing of
i) Bolted **or** welded plate girder
ii) Roof Truss (Forces in the members to be given)
iii) Gantry girder

18 (T) + 24 (D)

Note : i. In part A, Two questions to be set, out of which one question to be answered (30% weightage).
ii. In part B, Two questions to be set, out of which one question to be answered (70% weightage).

TEXT / REFERENCE BOOKS:

1. **Structural Design & Drawing** – N.Krishna Raju, Unversities Press, India.
2. **Design of Steel Structures** - N. Subramanian : Oxford University, Press.
3. **Design of Steel Structures** - Negi - Tata Mc Graw Hill Publishers.

4. **Design of Steel Structures** - Arya and Ajaman- Nem Chand & Bros. Roorkee.
5. **Design of Steel Structures.**- Raghupati
6. IS : 800 – 2007,
7. SP 6 (1) – 1984 or Steel Table.

ADVANCED PRESTRESSED CONCRETE STRUCTURES

Subject Code	: 10CV831	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
ANCHORAGE ZONE STRESSES IN POST-TENSIONED MEMBERS: Introduction, stress distribution in end block, investigations on Anchorage zone stresses, Magnel and Guyon's Methods, Comparative Analysis, Anchorage zone reinforcement.

6 Hours

UNIT - 2
SHEAR AND TORSIONAL RESISTANCE: Shear and principal stresses, ultimate shear resistance, design of shear reinforcement, Torsion, Design of reinforcement for torsion.

6 Hours

UNIT - 3
COMPOSITE BEAMS: Introduction, types of composite beams, analysis for stresses, differential shrinkage, serviceability limit state. Design for flexural and shear strength.

8 Hours

UNIT – 4
TENSION MEMBERS: Introduction, Ties, Pressure pipes – fabrication process, analysis, design and specifications. Cylindrical containers - construction techniques, analysis, design and specifications.

6 Hours

PART - B

UNIT - 5
STATICALLY INDETERMINATE STRUCTURES: Introduction, Advantages of continuous members, effect of prestressing in indeterminate structures, methods of analysis for secondary moments, concordant cable

2. **Earthquake Resistant Design of Structures** - S.K. Duggal - Oxford University Press, 2007.
3. **Earthquake Resistant Design-** Anil Chopra
4. **Earth Quake Engineering Damage Assessment and Structural design-** S.F. Borg - (John Wiley and Sons. 1983).

INDUSTRIAL WASTEWATER TREATMENT

Subject Code	: 10CV835	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
INTRODUCTION: Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Sampling, effluent and stream Standards and Legislation to Control Water Pollution.

5 Hours

UNIT - 2
Stream Quality, Dissolved oxygen Sag Curve in Stream, Streeter– Phelps formulation, Numerical Problems on DO prediction.

6 Hours

UNIT - 3
TREATMENT METHODS-I: Volume Reduction, Strength Reduction, Neutralization, Equalization and Proportioning.

5 Hours

UNIT - 4
TREATMENT METHODS-II: Removal of Inorganic suspended solids, Removal of Organic Solids, Removal of suspended solids and colloids. Treatment and Disposal of Sludge Solids.

6 Hours

PART - B

UNIT - 5
COMBINED TREATMENT: Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated Wastes to Streams.

6 Hours

UNIT - 6

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TREATMENT OF SELECTED INDUSTRIAL WASTE: Process flow sheet showing origin / sources of waste water, characteristics of waste, alternative treatment methods, disposal, reuse and recovery along with flow sheet. Effect of waste disposal on water bodies

THE INDUSTRIES TO BE COVERED ARE:
1. Cotton Textile Industry
2. Tanning Industry
3. Cane Sugar Industry & Distillery Industry

10 Hours

UNIT - 7
TREATMENT OF SELECTED INDUSTRIAL WASTE-I:
1. Dairy Industry
2. Canning Industry
3. Steel and Cement Industry

7 Hours

UNIT - 8
TREATMENT OF SELECTED INDUSTRIAL WASTE-II:
1. Paper and Pulp Industry
2. Pharmaceutical Industry
3. Food Processing Industry

7 Hours

REFEENCES

1. **Industrial Waste Water Treatment-** Nelsol L. Nemerow.
2. **Industrial Waste Water Treatment.-** Rao MN, and Dutta A.K.
3. **Waste Water Treatment, Disposal and Reuse -** Metcalf and Eddy inc - Tata McGraw Hill Publications, 2003.
4. **Industrial Wastewater Treatment** – Patwardhan A.D., PHI Learning Private Ltd., New Delhi, 2009
5. **Pollution Control Processes in industries-** Mahajan S.P.
6. Relevant IS Codes.

QUALITY MANAGEMENT SYSTEM IN CIVIL ENGINEERING

Subject Code	: 10CV836	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

Principal axes of section, maximum stress due to unsymmetrical bending, the Z-polygon, deflection of beams under unsymmetrical bending, design of purlins subjected to unsymmetrical bending.

5 Hours

UNIT - 8

Tubular structures – Introduction, permissible stresses, tubular columns and compression members, tubular tension members. Design of tubular members roof truss for given member forces and their combination, joints in tubular trusses, design of tubular beams and purlins.

6 Hours

TEXT/REFERENCE BOOKS:
1. **Plastic Analysis-** B.G. Neal.
2. **Introduction to Plastic Analysis of Steel Structures-** J.F. Banker and Heyman
3. **Plastic Analysis of steel structures.-** Beedle
4. **Design of steel structures –** William T.Segui, Cengage Learning, India-2007.
5. **Steel Structures Vol - 1 and 2-** J.F. Baker
6. **Design of Steel Structures-** Ramachandra.
7. **Design of Steel Structures.-** Arya and Ajmani
8. CMERI Design Hand Book for Open Web Structures, Durgapur.
9. SP-6 (6) , IS : 800-2007,Steel Table

WATER RESOURCES ENGINEERING

Subject Code	: 10CV 846	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

UNIT:1 INTRODUCTION
Introduction, The world's fresh water resources, water use in the world, water management sectors, the water management community, the future of water resources.   06 hrs.

UNIT:2 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. 06 hrs.

UNIT:3 SURFACE RUNOFF
Drainage basins, hydrologic losses and rainfall excess, rainfall-runoff analysis using unit hydrograph approach, SCS rainfall-runoff relation.
07 hrs.

UNIT:4 WATER WITHDRAWLS AND USES

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H.O.D.
Dept. of Civil Engineering
Alva's Institute of Engg. & Technology
Mijar, Moodbidri - 574 225

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.

08 hrs.

UNIT:5 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.

08 hrs.

UNIT:6 STORM WATER CONTROL:

Storm water management, storm system: information needs and design criteria. Rational method design. Hydraulic analysis of design, storm sewer appurtenances.

Storm detention: effects of urbanisation, types of surface detention, subsurface disposal of storm water.   07 hrs.

UNIT:7 STORM WATER CONTROL STREET AND HIGHWAY DRAINAGE AND CULVERTS:

Drainage of street and highway pavements: design considerations, flow in gutters, pavement drainage inlets, inlet locations, median, embankment and bridge culvert design.

Hydraulic design of culverts: culvert hydraulics, culver design.

08 hrs.

UNIT:8 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.   08 hrs.

Text Books:

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

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

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ENVIRONMENTAL IMPACT ASSESSMENT

Subject Code	: 10CV847	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information,

6 Hours

UNIT - 2
Step-by-step procedures for conducting EIA, Limitations of EIA.

6 Hours

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

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ENVIRONMENTAL IMPACT ASSESSMENT

Subject Code	: 10CV847	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information,

6 Hours

UNIT - 2
Step-by-step procedures for conducting EIA, Limitations of EIA.

6 Hours

UNIT - 3

Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.

8 Hours

UNIT - 4

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.

6 Hours

PART - B

UNIT - 5

EIA guidelines for Development Projects, Rapid and Comprehensive EIA.

6 Hours

UNIT - 6

Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements.

6 Hours

UNIT - 7

Salient Features of the Project Activity-Environmental Parameter Activity Relationships- Matrices.

4 Hours

UNIT - 8

EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.

10 Hours

REFERENCES

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

11. **Non-Destructive Test and Evaluation of Materials**- J.Prasad, C G K Nair,-Mc Graw Hill.
12. **High Performance Concrete**- Prof Aitcin P C- E and FN, London.
13. **Properties of Fresh Concrete**- Power T.C.- E and FN, London.

DESIGN AND DRAWING OF STEEL STRUCTURES

Subject Code	:10CV82	IA Marks	: 25
No. of Lecture Hours/Week	: 02 (T) + 3 (D)	Exam Hours	: 04
Total No. of Lecture Hours	: 26 (T) + 39 (D)	Exam Marks	: 100

PART - A

(DRAWINGS TO BE PREPARED FOR GIVEN STRUCTURAL DETAILS)

UNIT - 1
CONNECTIONS: Bolted and welded, beam-beam, Beam-column, seated, stiffened and un-stiffened.

UNIT - 2
COLUMNS: Splices, Column-column of same and different sections. Lacing and battens.

UNIT - 3
COLUMN BASES: Slab base and gusseted base.

08 (T) + 15 (D)

PART - B

UNIT - 4
Design and drawing of
i) Bolted or welded plate girder
ii) Roof Truss (Forces in the members to be given)
iii) Gantry girder

18 (T) + 24 (D)

Note :   i. In part A, Two questions to be set, out of which one question to be answered (30% weightage).
ii. In part B, Two questions to be set, out of which one question to be answered (70% weightage).

TEXT / REFERENCE BOOKS:
1. **Structural Design & Drawing** – N.Krishna Raju, Unversities Press, India.
2. **Design of Steel Structures** - N. Subramanian : Oxford University, Press.
3. **Design of Steel Structures** - Negi - Tata Mc Graw Hill Publishers.

4. **Design of Steel Structures** - Arya and Ajaman- Nem Chand & Bros. Roorkee.
5. **Design of Steel Structures.**- Raghupati
6. IS : 800 – 2007,
7. SP 6 (1) – 1984 or Steel Table.

ADVANCED PRESTRESSED CONCRETE STRUCTURES

Subject Code	: 10CV831	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
ANCHORAGE ZONE STRESSES IN POST-TENSIONED MEMBERS: Introduction, stress distribution in end block, investigations on Anchorage zone stresses, Magnel and Guyon's Methods, Comparative Analysis, Anchorage zone reinforcement.

6 Hours

UNIT - 2
SHEAR AND TORSIONAL RESISTANCE: Shear and principal stresses, ultimate shear resistance, design of shear reinforcement, Torsion, Design of reinforcement for torsion.

6 Hours

UNIT - 3
COMPOSITE BEAMS: Introduction, types of composite beams, analysis for stresses, differential shrinkage, serviceability limit state. Design for flexural and shear strength.

8 Hours

UNIT – 4
TENSION MEMBERS: Introduction, Ties, Pressure pipes – fabrication process, analysis, design and specifications. Cylindrical containers - construction techniques, analysis, design and specifications.

6 Hours

PART - B

UNIT - 5
STATICALLY INDETERMINATE STRUCTURES: Introduction, Advantages of continuous members, effect of prestressing in indeterminate structures, methods of analysis for secondary moments, concordant cable

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deflectometer, GPR Method. Design factors for Runway Pavements - Design methods for Airfield pavements and problems on above.

7 Hours

UNIT - 8
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 Hours

TEXT BOOKS:
1. **Highway Engineering-** Khanna & Justo
2. **Principles & Practices of Highway Engineering-** L R Kadiyalli & N B. Lal
3. **Pavement Analysis & Design -** Yang H. Huang- II edition.
4. Relevant IRC codes

REFERENCE BOOKS:
1. **Principles of Pavement Design-** Yoder and Witzack - 2nd edition, John Wileys and Sons
   Principles of Pavement Design- **Subha Rao**

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Subject Code	:10CV834	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1
Earthquake ground Motion, Engineering Seismology, Theory of plate tectonics, seismic waves, Magnitude and intensity of earthquakes, local site effects, seismic zoning map of India.

6 Hours

UNIT - 2
Seismic Design Parameters. Types of Earthquakes, earthquake ground motion characteristics, response spectra and design spectrum.

6 Hours

UNIT - 3

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Structural modelling, Code based seismic design methods. Response control concepts, seismic evaluation and retrofitting methods.

6 Hours

UNIT - 4
Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity and plan configuration problems, Seismo resistant building architecture – lateral load resistant systems, building characteristics.

6 Hours

PART - B

UNIT - 5
Seismic design philosophy, Determination of design lateral forces - Equivalent lateral force procedure, dynamic analysis procedure.

8 Hours

UNIT - 6
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 Hours

UNIT - 7
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).

7 Hours

UNIT - 8
Earthquake resistant design of masonry buildings - elastic properties of structural masonry, lateral load analysis, Design of two storied masonry buildings.

6 Hours

TEXT / REFERENCE BOOKS:

1. **Earthquake resistant design of structures** - Pankaj Agarwal, Manish Shrikande - PHI India.