

SCHEME AND SYLLABUS OF B.E.
IN
CONSTRUCTION TECHNOLOGY AND
MANAGEMENT

With effect from 2010-2011



VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANA SANGAMA CAMPUS
SANTI BASTAWADA ROAD, MACHCHE
BELGAUM 590 018

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
SCHEME OF STUDIES FOR BACHELOR OF ENGINEERING
IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Semester: THREE

Sl. No	Subject Code	Subject	Number of contact hours per			Marks allotment		Total	Duration of Exam
			Lecture	Practical	Total	Internal	Exam		
1	10MAT 31	Engineering Mathematics – III	4	-	4	25	100	125	3 Hours
2	10CT 32	Materials of Construction	4	-	4	25	100	125	3 Hours
3	10CV 33	Strength of Materials	4	-	4	25	100	125	3 Hours
4	10CV 34	Surveying – I	4	-	4	25	100	125	3 Hours
5	10CT 35	Management Theory – Principles and Practices	4	-	4	25	100	125	3 Hours
6	10CV 36	Applied Engineering Geology	4	-	4	25	100	125	3 Hours
7	10CVL 37	Survey Practice – I	1	3	3	25	50	75	3 Hours
8	10CTL 38	Construction Materials Testing Lab – I	1	3	3	25	50	75	3 Hours
Total					30	200	700	900	

Semester: FOUR

Sl. No	Subject Code	Subject	Number of contact hours per			Marks allotment		Total	Duration of Exam
			Lecture	Practical	Total	Internal	Exam		
1	10MAT 41	Engineering Mathematics – IV	4	-	4	25	100	125	3 Hours
2	10CT 42	Building Construction	4	-	4	25	100	125	3 Hours
3	10CV 43	Surveying – II	4	-	4	25	100	125	3 Hours
4	10CT 44	Structural Analysis	4	-	4	25	100	125	3 Hours
5	10CV 45	Concrete Technology	4	-	4	25	100	125	3 Hours
6	10CT 46	Financial and Cost Accounting	1	3	4	25	100	125	4 Hours
7	10CVL 47	Surveying Practice – II	1	3	3	25	50	75	3 Hours
8	10CTL 48	Construction Materials Testing Lab–II	1	3	3	25	50	75	3 Hours
Total					30	200	700	900	

Semester: FIVE

Sl. No	Subject Code	Subject	Number of contact hours per			Marks allotment		Total	Duration of Exam
			Lecture	Practical	Total	Internal	Exam		
1	10AL 51	Management & Entrepreneurship	4	-	4	25	100	125	3 Hours
2	10CT 52	Design of Structures	4	-	4	25	100	125	3 Hours
3	10CT 53	Building Drawing	1	3	4	25	100	125	3 Hours
4	10CV 54	Geo-technical Engineering – I	4	-	4	25	100	125	3 Hours
5	10CV 55	Hydrology & Irrigation Engineering	4	-	4	25	100	125	3 Hours
6	10CV 56	Transportation Engineering – I	4	-	4	25	100	125	4 Hours
7	10CTL 57	CAD Lab – I	-	3	3	25	50	75	3 Hours
8	10CTL 58	Construction Technology Laboratory	-	3	3	25	50	75	3 Hours
Total					30	200	700	900	

Semester: SIX

Sl. No	Subject Code	Subject	Number of contact hours per			Marks allotment		Total	Duration of Exam
			Lecture	Practical	Total	Internal	Exam		
1	10CT 61	Construction Quality Management	4	-	4	25	100	125	3 Hours
2	10CT 62	Contracts and Specifications	4	-	4	25	100	125	3 Hours
3	10CV 63	Transportation Engineering – II	4	-	4	25	100	125	3 Hours
4	10CT 64	Construction Planning & Control	4	-	4	25	100	125	3 Hours
5	10CT 65	Construction Economics & Finance	1	3	4	25	100	125	3 Hours
6	10CT 66	Elective – I	4	-	4	25	100	125	3 Hours
7	10CTL 67	Geo-technology Lab	-	3	3	25	50	75	3 Hours
8	10CTL 68	Construction Study Project	-	3	3	25	50	75	3 Hours
Total			24	6	30	200	700	900	

Semester: SEVEN

Sl. No	Subject Code	Subject	Number of contact hours per			Marks allotment		Total	Duration of Exam
			Lecture	Practical	Total	Internal	Exam		
1	10CT 71	Construction Methods & Equipments	4	-	4	25	100	125	3 Hours
2	10CT 72	Prestressed Concrete Structures	4	-	4	25	100	125	3 Hours
3	10CV 73	Estimation and Valuation	4	-	4	25	100	125	3 Hours
4	10CT 74	Building Services – I	4	-	4	25	100	125	3 Hours
5	10CT 75	Elective – II	4	-	4	25	100	125	3 Hours
6	10CT 76	Elective – III	4	-	4	25	100	125	3 Hours
7	10CTL 77	CAD Lab – II	1	3	3	25	50	75	3 Hours
8	10CTL 78	Building Services Lab	1	3	3	25	50	75	3 Hours
Total					30	200	700	900	

Semester: EIGHT

Sl. No	Subject Code	Subject	Number of contact hours per			Marks allotment		Total	Duration of Exam
			Lecture	Practical	Total	Internal	Exam		
1	10CT 81	Building Planning, Types & Standards	4	-	4	25	100	125	4 Hours
2	10CT 82	Building Services – II	4	-	4	25	100	125	3 Hours
3	10CT 83	Elective – IV	4	-	4	25	100	125	3 Hours
4	10CT 84	Elective – V	4	-	4	25	100	125	3 Hours
5	10CTP 85	Project Work	-	-	6	75	75	150	3 Hours
6	10CTS 86	Seminar	-	-	-	50	-	50	
Total					22	225	475	700	

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
SCHEME OF STUDIES FOR BACHELOR OF ENGINEERING
IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT

List of Electives

Semester – VI	Semester – VII	Semester – VIII
Group – A	Group – B	Group – D
10CT 661 Ground Improvement Techniques	10CT 751 Pre-fabrication Construction Techniques	10CT 831 Applied Geo-Technical Engineering
10CT 662 Design of Masonry Structures	10CT 752 Advanced Design of R.C. Structures	10CT 832 Building Climatology
10CT 663 Advanced Surveying	10CT 753 Urban and Regional Planning	10CT 833 Repair and Rehabilitation of Structures
10CT664 Fundamentals of Architecture	10CT 754 Landscape Design and Planning	10CT 834 Bridge Engineering
	Group – C	Group – E
	10CT 761 Photogrammetry and Remote Sensing	10CT 841 Foundation Engineering
	10CT 762 Alternative Building Materials and Technologies	10CT 842 Special Concretes
	10CT 763 Rural water supply and Sanitation	10CT 843 Geographic Information System (GIS)
	10CT 764 Computer Applications in Construction Engineering and Planning	10CT 844 Project Safety Management

ENGINEERING MATHEMATICS – III

CODE: 10 MAT 31
Hrs/Week: 04
Total Hrs: 52

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

PART-A

Unit-I: FOURIER SERIES

Convergence and divergence of infinite series of positive terms, definition and illustrative examples*

Periodic functions, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period, half range Fourier series. Complex form of Fourier Series. Practical harmonic analysis. [7 hours]

Unit-II: FOURIER TRANSFORMS

Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms [6 hours]

Unit-III: APPLICATIONS OF PDE

Various possible solutions of one dimensional wave and heat equations, two dimensional Laplace's equation by the method of separation of variables, Solution of all these equations with specified boundary conditions. D'Alembert's solution of one dimensional wave equation. [6 hours]

Unit-IV: CURVE FITTING AND OPTIMIZATION

Curve fitting by the method of least squares- Fitting of curves of the form $y = ax + b$, $y = ax^2 + bx + c$, $y = ae^{bx}$, $y = ax^b$

Optimization: Linear programming, mathematical formulation of linear programming problem (LPP), Graphical method and simplex method. [7 hours]

PART-B

Unit-V: NUMERICAL METHODS - 1

Numerical Solution of algebraic and transcendental equations: Regula-falsi method, Newton - Raphson method. Iterative methods of solution of a system of equations: Gauss-seidel and Relaxation methods. Largest eigen value and the corresponding eigen vector by Rayleigh's power method.

[6 hours]

Unit-VI: NUMERICAL METHODS – 2

Finite differences: Forward and backward differences, Newton's forward and backward interpolation formulae. Divided differences - Newton's divided difference formula, Lagrange's interpolation formula and inverse interpolation formula.

Numerical integration: Simpson's one-third, three-eighth and Weddle's rules (All formulae/rules without proof)

[7 hours]

Unit-VII: NUMERICAL METHODS – 3

Numerical solutions of PDE – finite difference approximation to derivatives, Numerical solution of two dimensional Laplace's equation, one dimensional heat and wave equations

[7 hours]

Unit-VIII: DIFFERENCE EQUATIONS AND Z-TRANSFORMS

Difference equations: Basic definition; Z-transforms – definition, standard Z-transforms, damping rule, shifting rule, initial value and final value theorems. Inverse Z-transform. Application of Z-transforms to solve difference equations.

[6 hours]

Note: * In the case of illustrative examples, questions are not to be set.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

Reference Book:

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd. Publishers

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]

PART-B

Unit-V: SPECIAL FUNCTIONS

Solution of Laplace equation in cylindrical and spherical systems leading Bessel's and Legendre's differential equations, Series solution of Bessel's differential equation leading to Bessel function of first kind. Orthogonal property of Bessel functions. Series solution of Legendre's differential equation leading to Legendre polynomials, Rodrigue's formula.

[7 hours]

Unit-VI: PROBABILITY THEORY - 1

Probability of an event, empirical and axiomatic definition, probability associated with set theory, addition law, conditional probability, multiplication law, Baye's theorem.

[6 hours]

Unit-VII: PROBABILITY THEORY - 2

Random variables (discrete and continuous), probability density function, cumulative density function. Probability distributions – Binomial and Poisson distributions; Exponential and normal distributions.

[7 hours]

Unit-VIII: SAMPLING THEORY

Sampling, Sampling distributions, standard error, test of hypothesis for means, confidence limits for means, student's t-distribution. Chi -Square distribution as a test of goodness of fit

[6 hours]

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

Reference Book:

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd. Publishers

10CT 32: MATERIALS OF CONSTRUCTION

1. **Basic Engineering Materials:** Varieties of building stones quarrying, different varieties of bricks, tiles and their manufacture, quality, suitability and choice of stones, bricks, tiles – their engineering uses.
Improved brick from inferior soils, Hand moulding brick, table semimechanised brick making plant, High draught Kiln.
Wood wool/coir-cement corrugated sheets. As phaltic corrugated sheets, clay flooring and terracing tiles.
2. **Timber:** Varieties and uses – defects in timber and causes of decay, Test for good timber, seasoning, preservation and fire proofing, plywood and its uses.
3. **Lime and Lime Mortar:** Hydraulic and fat limes and their manufacture. Improved design of kilns for the burning of lime. Activated lime-Puzzolana mixture.
4. **Cements, Cement mortar and cement concrete:** Portland cement, Non-portland cements, GYPSUM, Magnesium oxychloride-Manufacture of cement, classification, properties and uses-proportioning of ingredients and strength of concrete, light weight concrete.
5. **Refractors Materials:** Classification of refractories, properties and uses-Proportioning of the silicon, Magnesite, Chromite, Carbon bricks and insulating, wool wood board foamed concrete, plastic composite panels, solar timber seasoning kiln.
6. **Properties and application of metals and alloys:** Cast Iron, Wrought Iron, Plain carbon steel, Tool steel, Stainless steel, Elementary ideas of hardening, tempering and annealing, copper, aluminium, lead bronze solders, white metals and zinc.
7. **Glass:** Types and uses of glass as an engineering material.
 - a) *Rubber:* Types, Vulcanisation and compounding of rubber, synthetic rubber.
 - b) *Bitumen and Asphalt:* General properties and uses, Plaster of paris, surki-mortar-General properties and uses.
8. **Electrical, Thermal and sound insulations:** A brief account of their physical properties and uses.
9. **Surface preservatives:** Metallic coating by hot dipping Electro plating, spraying and cementation, specific examples of inorganic chemical coating, organic chemical coatings with paints, pigments, varnish and enamels.
10. **Plastics:** Composition - classification of plastic – Resins – properties, Moulding and plastics, uses of plastics in building industry.

REFERENCE BOOKS:

1. Engineering materials by Rangawala
2. A Text book of Engineering Materials, by G.J. Kulkarni.
3. Engineering Materials by Sunil Kumar
4. Engineering Materials by Vernon B. John.
5. Engineering Materials by Roy Choudhary.
6. Materials and Processes by Young.

7. Advances in Building Materials and Construction by Mohan Rai and M.P. Jain Singh
– publication by CBRI, Roorkee.

**STRENGTH OF MATERIALS
(COMMON TO CV/TR/EV/CTM)**

	:	10 CV 33	:	25	
Sub Code			IA Marks		
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 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** Affiliated East-West Press.
3. Mechanics of Materials, **James M. Gere, Barry J. Goodno** (India Edition), Cengage Learning.

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

	:	10 CV 34	:	25	
Sub Code			IA Marks		
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 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. Schmidt – 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.

10CT 35: MANAGEMENT THEORY – PRINCIPLES AND PRACTICES

1. **INTRODUCTION:** Evolution of Management thought, Early contribution to management – Taylor, Fayol and Elton Mayo, Scientific Movement, Administration moment and behavioral sciences movement, concept of management in development countries like USA, Japan, Britain etc., Role of Culture, technology, economics and social system.
2. **FORM OF OWNERSHIP IN INDUSTRY:** Public and Private enterprise sole proprietorship, partnership, joint stock company, co-operatives, Means of finance.
3. **FUNCTIONS AND PRINCIPLES OF MANAGEMENT:** Planning organizing, staffing, directing and controlling, principles of management, sources of authority and responsibility.

4. **PLANNING AND ORGANIZING:** Nature of planning, types, importances and steps in planning, MBO principles of sound organization , types of organization, structures span of control.
5. **STAFFING, DIRECTING AND CONTROLLING:** Selection, appraisal, training and development, leadership, motivation communication process and control, requirements of adequate control.
6. **GLOBAL MANAGEMENT CONCEPT:** Corporate strategies e-governance, Re-engineering, benchmarking six sigma, core competencies management and society.

RECOMMENDED BOOKS:

1. Heinz weithrich and Horold Koontz, Management – A global perspective, McGraw Hill, Int. Edition.
2. Peter F. Dicker, Management: Tasks, Responsibilities, Practices, Horper Business.

REFERENCE BOOKS:

1. Ernest Dalc, Management Theory and Practice, McGraw Hill, Int. Edition.
2. L.M. Prasad, Principles and Practice of Management, Sultan Chand and Sons.

APPLIED ENGINEERING GEOLOGY

	:	10 CV-36	:	25	
Sub Code			IA Marks		
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.

Magnetite, Hematite, Limonite, Pyrite, Chalcopryrite, Pyrolusite, Psilomalane, Chromite, Galena, Bauxite. – 6 hours

Unit: 2- PETROLOGY:

Rocks as fundamental units and building materials of the earth crust and their engineering applications: As building stones, road metals and stones for decoration, pavement, cladding, roofing, flooring, concreting and foundation engineering.

Igneous rocks: Origin, classification (chemical and textural), mode of occurrence; Identification and description of Granite, Syenite, Diorite, Gabbro, Dunite; Pegmatite, Porphyries, Dolerite; Rhyolite, Basalt and Pumice.

Sedimentary rocks: Origin, classification, primary structures and description of Sandstones, Conglomerate, Breccia, Shale, Limestones and Laterite.

Metamorphic rocks: Kinds of metamorphism, description of Gneiss, Quartzite, Marble, Slate, Phyllite and Schists. – 6 hours

Unit: 3-GEOMORPHOLOGY:

Epigene and Hypgene geological agents; rock weathering and its types; Soil formation, types, erosion and remedial measures; Geological action of rivers with different drainage patterns; Geological action of wind. – 5 hours

Unit: 4-GEODYNAMICS:

Earthquakes- seismic waves, seismograph, causes, effects, seismic zones, shield areas and seismic resisting structures. Coastal zones, coastal landforms, continental shelf, continental rise, continental slope, abyssal plain, mid-oceanic ridges, trenches, tsunamis. Land slides; causes, effects and remedial measures – 5 hours

PART B

Unit: 5- ROCK MECHANICS:

Stress, strain and deformational effects on different rocks; Out crop, Dip, strike and escarpment, Clinometer-compass- Joints, faults, folds and unconformities their effects on civil engineering structures. – 6 hours

Unit:6- ENGINEERING GEOLOGY:

Geotechnical investigations for civil engineering projects: Study of toposheets and geological maps, importance of lithological and structural features studies for the construction of Dams, Reservoirs, Tunnels, Bridges and Highways – 6 hours

Unit: 7-HYDROGEOLOGY:

Hydrological cycle; distribution of ground water in the earth crust; properties of water bearing geological formation: Aquifers and their types; selection of sites for well locations and spacing of wells; geological, hydrological and geophysical (electrical resistivity) investigations for ground water exploration; artificial recharge of groundwater methods and rain water harvesting. Sea water intrusion and remedial measures. – 9 hours

Unit:8- GEOMATICS AND ENVIRONMENTAL GEOLOGY:

Introduction to remote sensing (RS), geographical information system (GIS) and global positioning system (GPS); land sate imageries, stereoscopes and their applications in civil engineering. Impact of quarrying, mining and dams on Environment. Quality of ground water in different geological terrain. – 7 hours

QUESTION PAPER PATTERN:

Question paper shall be consisting of eight full questions, selecting four from each part.

The student has to answer any five, selecting at least two from each part. Each question carry 20 marks.

References books:

1. Text book of Geology by P.K. Mukerjee, World Press Pvt. Ltd. Kolkatta.
1. Foundations of Engineering Geology, by Tony Waltham (3rd Ed.) Universities Press.
2. Structural Geology (3rd Ed.) by M. P. Billings, Published by Prentice Hall of India Pvt. Ltd. New Delhi
3. Text of Engineering and General Geology by Parbin Singh, Published by S. K. Kataria and Sons, New Delhi.
4. Rock Mechanics for Engineers by Dr B.P.Verma, Khanna Publishers, New Delhi.

5. Engineering Geology for Civil Engineering by D. Venkata Reddy, Oxford and IBH Publishing Company, New Delhi.
6. Ground water geology by Todd D.K. John Wiley and Sons, New York.
7. Remote sensing Geology by Ravi P Gupta, Springer Verilog, New York.
8. Physical Geology by Arthur Holmes, Thomson Nelson and Sons, London.
9. Environmental Geology by K. S. Valdiya, Tata Mc Graw Hills.
10. A text book of Engineering Geology by Chenna Kesavulu, Mac Millan India Ltd.
11. Remote sensing and GIS by M.Anji Reddy.
12. Ground water assessment, development and management by K.R.Karanth, Tata Mc Graw Hills

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

	:	10 CVL 37	:	25	
Sub			IA Marks		
Code					
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 Bowditch 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

To conduct profile leveling for water supply /sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a given formation level.

Demonstration

Minor instruments – Clinometer, Ceylon ghat tracer, Hand level, Box sextant, Planimeter and Pantagraph.

Scheme of Examination:

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

TEXT BOOKS:

1. ‘Surveying’ Vol.–1, B.C. Punmia , Laxmi Publications, New Delhi.
2. “Plane Surveying’ Vol-1-A.M. Chandra , Newage International ® Ltd.
3. ‘Plane Surveying’ – ALAK , S. Chand and Company Ltd., New Delhi.

REFERENCE BOOKS :

1. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India.
2. **Fundamentals of Surveying** - Milton O. Schmidt – Wong, Thomson Learning.
4. **Surveying** Vol. I, S.K. Duggal

10CTL 38: CONSTRUCTION MATERIALS TESTING LAB–I

1. Tension test on structural materials-mild steel, cast iron, brass, aluminium.
2. Compression test on structural materials-mild steel, cast iron, brass, aluminium, timber.
3. Tests on timber: Moisture content, Volume stability and Bending strength
4. Cement – Specific gravity, fineness, Setting time, Strength
5. Aggregates – Sand and Coarse Aggregate – Sieve Analysis, Strength of C.A. Hardness, Size, Shape of C.A.
6. Bricks and Blocks – Test on Table Remoulded Bricks – Testing Hollow Concrete Blocks
7. Roofing and flooring tiles – interlocking pavement blocks
Mosaic tiles – stones and ceramic tiles Mangalore tiles and Microconcrete tiles.

8. Tests on building lime – soundness.

REFERENCE BOOKS:

1. A.J. Fenner-Mechanical testing of materials George newness Ltd., - 1965.
2. H.E. Davil, G.E. Troxell and C.T. Wiskocil – the testing and inspection of engineering materials McGraw Hill Book Company, 1995.
3. K.A. Holes Experimental strength of material the English Universities Press Ltd., London 1962.
4. The relevant I.S.I. codes
Mild steel ... IS.-1608... 1960. IS... 1521 ... 1960, IS: 1633...1960. Part I and II.

ENGINEERING MATHEMATICS – IV

CODE: 10 MAT 41
25
Hrs/Week: 04
03
Total Hrs: 52
Marks:100

IA Marks:

Exam Hrs:

Exam

10 CT 42: BUILDING CONSTRUCTION

1. FOUNDATION:

- 1.1 Preliminary Investigation of Soil
- 1.2 Bearing Capacity of Soil
 - 1.2.1 Bearing Capacity of Soil
 - 1.2.2. Safe Bearing Capacity of Soil
 - 1.2.3. Allowable Bearing Capacity of Soil.
 - 1.2.4 Determination of Bearing Capacity by Plate Load Test and by Method of dropping weight
- 1.3 Classification of Foundations
- 1.4 Introduction to different types of foundation
 - 1.4.1. Masonry footings
 - 1.4.2. Isolated footings
 - 1.4.3. Combined and strap RCC footings
 - 1.4.4. Raft footing
 - 1.4.5. Grillage foundation
 - 1.4.6. Pile foundations (Friction and Load bearing piles)
 - 1.4.7. Foundation in black cotton soils.

10 Hrs

2. BRICK MASONRY:

- Definition of terms used in masonry
- Bonds in brickwork
- English Bond
- Flemish Bond
- Reinforced brickwork
- Hollow Block construction
- Damp Proof construction
- Masonry arches
- Classification
- Stability of an arch
- Joints in Masonry
- Load Bearing and partition walls.

05 Hrs

3. STONE MASONRY:

Rubble Masonry
Coursed Rubble Masonry
Uncoursed rubble masonry
Random rubble masonry
Ashlar Masonry
Shoring
Underpinning
Scaffolding

03 Hrs

4. LINTELS, CHEJJA, CANOPY BALCONY:

Lintels
Types and classifications
Functions
Method of constructions
Chejja
Functions
Method of constructions
Canopy
Functions
Method of construction
Balcony
Functions
Method of construction

05 Hrs

5. ROOFS:

Flat Roof (R.C.C.)
Sloped roof (R.C.C. and Tile roof)
Lean to roof
Wooden truss (King post and queen post trusses)
Steel trusses

5.5.1. For various spans up to 15m using structural steel sections including
Tubular and Hollow sections with Details such as purlins, roof coverings and
joints.

Weather proof course for RCC Roof.

Roof Coverings.

06 Hrs

6. STAIRS:

Types (Classification) and Technical terms in stairs

Requirements of a good stair

Geometric Design of RCC Dog Legged and open well stairs (Plan and sectional
elevation of stairs)

03 Hrs

7. PLASTERING:

Purpose of plastering
Materials of plastering
Lime mortar
Cement Mortar
Methods of plastering

Lath plastering	
8. FLOORING:	
Types of flooring (Materials and method of laying)	
Granolithic	
Mosaic	
Ceramic	
Marble	
Polished granite	
Industrial flooring	
9. DOORS AND WINDOWS	
Doors	
Types	
Paneled doors	
Glazed doors	
Flush doors	
Collapsible and rolling shutters	
Louvered doors	
Revolving, sliding and swing doors	
Windows	
Types	
Paneled	
Glazed	
Bat window	
Dormer window	
Louvered and corner window	
Ventilators	03 Hrs
10. PAINTING	
Purpose	
Types	
Application of paints to new and old surfaces	
Distemper	
Plastic emulsion	
Enamel	
Powder coated painting to walls and iron and steel surfaces	
Polishing of wood surface	04 Hrs
11. INTRODUCTION TO COST EFFECTIVE CONSTRUCTION	
Necessity	
Advantages	
Materials and composites	
Stabilized and blocks	
Recast roofing elements	
L-Panel	
Channel section	
Micro concrete tiles	
Pre cast doors and windows (Pre cast frames and shutters)	

Pre fabrication techniques	04 Hrs
12. FORM WORK	
Form work details	
RCC columns	
Beams	
Floors	
Slip forming	03 Hrs

REFERENCE BOOKS:

1. Building Construction by S.C. Rangwala
2. Building Construction by Sushil Kumar
3. Building Construction by Punmia B.C.
4. Construction Technology Vol. 1 to Vol. 4 by Chutley
5. Construction Technology Vol. 1 and Vol. 2 by Mckay.

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

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

PART – A

UNIT 1:

THEODOLITE SURVEY

1.1 Theodolite and types, 1.2 Fundamental axes and parts of a transit theodolite, 1.3 Uses of theodolite, 1.4 Temporary adjustments of a transit theodolite, 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 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.

6 Hours

UNIT 6:

CURVE SETTING (Compound and Reverse curves)

6.1 Compound curves 6.2 Elements 6.3 Design of compound curves 6.4 Setting out of compound curves 6.5 Reverse curve between two parallel straights (Equal radius and unequal radius).

6 Hours

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 planimeter, 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. Schmidt – Wong, Thomson Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arthur Bannister et al., Pearson Education, India

10CT 44: STRUCTURAL ANALYSIS

1. Statically Determinate Structures

Conditions of Equilibrium, Degrees of freedom, Determinate and indeterminate structures. Analysis of plane trusses – Method of Sections, Method of Joints.

2. Determination of Deflection of Beams

Strain energy and complementary strain energy, strain energy due to axial load bending and shear, law of conservation of energy, principles of virtual work, Castigliano's first theorem, Betti's law, Clarke – Maxwell theorem of reciprocal deflection.

Deflection of beams and trusses using strain energy and unit load methods. Deflection of beams using geometric methods – moment area method and conjugate beam method.

3. Arches and Cables

Three hinged circular and parabolic arches with supports at same levels. Determination of thrust, shear and bending moment. Analysis of cables under point load and u.d.l. length of cables (supports at same level).

4. Force method

Analysis of statically indeterminate beams, trusses and sample frames by force method.

5. Displacement methods

Introduction, degrees of freedom, compatibility conditions, slope deflection method. Analysis of continuous beams and sample frames by slope deflection method. Fundamentals of moment distribution method.

REFERENCE BOOKS:

1. Pundit Gupta – Structural Analysis Vol. 1 and II.
2. C.S. Reddy – Basic Structural Analysis, TMH.

**CONCRETE TECHNOLOGY
(COMMON TO CV/TR/CTM)**

	:	10 CV 45	:	25	
Sub			IA Marks		
Code					
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, Specific 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 manufacture 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 and rice husk ash.

-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, Factors contributing to cracks in concrete - plastic shrinkage, settlement cracks, construction joints, Thermal expansion, transition zone, structural design deficiencies, - 6 Hours

Unit-8

Concept of Concrete Mix design, variables in proportioning , exposure conditions, Procedure of mix design as per IS 10262-1982, 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.

REFERENCES :

1. "Properties of Concrete" Neville, A.M. : , ELBS, London
2. "Concrete Technology" – A.R.Santakumar. Oxford University Press (2007)'

3. "Concrete Manual" - Gambhir Dhanpat Rai & Sons, New Delhi.
4. "Concrete Mix Design" - N.Krishna Raju, Sehgal - publishers.
5. "Recommended guidelines for concrete mix design" - IS:10262,BIS Publication

10CT 46: FINANCIAL AND COST ACCOUNTING

1. Financial Accounting: Basic Concept – Definitions of Book Keeping and Accounting – Objectives and Functions of Accounting – Types of Accounts – Rules of Debit and Credit, Journal – Ledger – Trial Balance.
2. Preparation of Final Accounts – Adjusting Entry – Trading, Profit and Loss Account and Balance Sheet.
3. Budget - Meaning and definitions – Preparation of Functional Budgets – Cash Budget - Sales Budget – Purchases and Production Budget – Flexible Budget.
4. Capital Budgeting – Nature, Importance and Objectives – Process involved in Capital Budgeting – Kinds of Capital Budgeting Decision – Methods of Evaluating Investment Proposals – Payback method – Payback profitability method – Discounted Cash Flow method – Net present – Value method.
5. Costing concepts – Meaning and Definition – Objectives – Difference between Cost of Financial Accounting – Cost Classification Statement of Cost and Estimation – Methods of Costing – Job Costing and Process Costing.
6. Project – Accounts – Preparation of Contract Accounts for each project – Methods of Recording and Reporting Site Accounts to Project Office and from Project Office to Head Office.

REFERENCE BOOKS:

1. Bhattacharya S.K. and Dearden John, “Accounting for Management”, Vani Educational Books, Mumbai (Latest Edition).
2. Saravanvel P. “Management Accounting” Principles and Practices.
3. B.S. Raman “Accountancy”.
4. Prof. K.S. Nagapathi, “Management Accounting” R. Chand and Co., New Delhi.
5. Kuchal S.C. “Corporate Finance”, Tata McGraw Hill, New Delhi.

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

	:	10 CVL 47	:	25	
Sub Code			IA Marks		
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 using theodolite only.

Exercise – 8

To set out the center line of a simple rectangular room using offset from base line

Exercise – 9

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

Demonstration

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.

10CTL 48: CONSTRUCTION MATERIALS TESTING LAB–II

Part – A

- 1. CEMENT:** Normal consistency, Setting time, Soundness by Autoclave method, Compression strength test and Air permeability test for fitness, Specific gravity of cement
08hrs
- 2. FRESH CONCRETE:** Workability – slump, Compaction factor and Vee Bee tests.
08hrs
- 3. HARDENED CONCRETE:** Compression Strength and Split tensile tests. 04 hrs

Part – B

- 4. AGGREGATES:** Crushing, abrasion, impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and water absorption. 04 hrs
- 5. BITUMINOUS MATERIALS AND MIXES:** Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity. Marshall Stability tests
08 hrs
- 6. SUBGRADE SOIL:** CBR Test, 08 hrs

REFERENCE BOOKS:

1. Relevant IS Codes and IRC Codes
2. Highway Material Testing Laboratory Manual – New Chand and Bros.
3. M.L. Gambhir – Concrete Manual – Dhanpat Rai and sons New – Delhi.

Scheme of Examination: Two questions are to be set one from part – A and one from.

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

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.

6 Hours

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

CT 52: DESIGN OF STRUCTURES

1. Fundamentals of design – loads, methods of design – working stress and limit state method – Basic principals of working stress method – Elastic limit, limit of proportionality, design stress, stress and blocks. Basic concept of limit state design – Material characteristics, characteristics strength characteristic load, stress block parameters Strength limit state or ultimate limit states, Serviceability limit states partial safety factors compression between limit state method and working stress method.
2. Fundamentals of R.C. Design by limit state method Design of R.C. Beams – Critical sections for design ultimate flexural strength of rectangular and flanged sections, ultimate shear strength of R.C. Sections, development length and anchorage, Deflection limitations, Design of beams – Detailing rules for beams sizing, cover bar spacing reinforcement percentages.

Design of R.C. Slabs – General considerations, one way simply supported continuous slabs, Two way slabs, simple examples.

Design of R.C. Columns - General aspect, Effective length, Slenderness limits, minimum eccentricity, Design of Short axially loaded columns, Design of isolated column footings.

3. Principles for design of steel structures, characteristics of steel Structures, working stresses, standard R.S. sections.

Design of tension members, and their connections, standard configuration, leg angles, strength calculation for different configuration. Design of steel struts and columns slenderness ratio, Tables for initial strength, Laced and battened columns, simple bases. Details of seating and splicing.

Design of steel beams. Laterally supported and independent beams. Design of simply supported steel beams. Deflection limits specification for bolts and words types, design simple bolted and welded connections.

(Use of IS: 456, SP:16, IS:800 and steel tables allured in exam)

REFERENCE BOOKS:

1. P.C. Varghese – Limit State Design of RC Structures, PHI.
2. N – Kneshta Raju – Design of R.C. Structures, CBSPD.
3. Rangachandra – Design of Steel Structures Vol. I, Std BH.

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 STRUCTURE: 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.

8 Hours

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 envelopes, 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

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., New Delhi.
4. **Geotechnical Engineering-** Donald 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**

CV 55: HYDRAULOGY and IRRIGATION ENGINEERING

PART-A Irrigation Engineering

1. **INTRODUCTION:** 1.1. Definition, benefits, effects and scope of irrigation. 1.2. Source of water for irrigation – surface and ground water. 1.3. Systems of irrigation. 1.4. Flow irrigation and Lift irrigation. 1.5. Methods of application of irrigation water. 1.6. Irrigation in India – Potential and developments. 06 Hrs
2. **IRRIGATION AND WATER REQUIREMENTS OF CROPS:** 2.1. Definitions of consumptive use, duty, delta and base period. 2.2. Factor affecting duty of water. 2.3. Water requirements of crops. 2.4. Crop and crop seasons. 2.6. Irrigation efficiencies. 2.6. Frequency of irrigation. 08 Hrs
3. **CANAL:** 3.1. Types of canals. 3.2. Alignment of canals. 3.3. Definition of gross command area, cultural command area, intensity of irrigation, time factor, crop factor. 3.4. Unlined and lined canals. 3.5. Standard sections. 3.6. Design of canals by Lacey's and Kennedy's method. 06 Hrs
4. **CANAL WORKS:** 4.1. Classification and suitability of canal regulators. 4.2. canal drop, 4.3. Canal escape. 4.4. Cross drainage works. 05 Hrs.
(No design)

PART-B Hydraulic Structures

5. **RESERVOIRS:** 5.1. Definitions, Investigation for reservoir site. 5.2. Storage zones. 5.3. determination of storage capacity and yield of reservoirs using mass curve. 5.4. Economical height of dam. 06 Hrs
6. **DIVERSION WORK:** 6.1. Definitions, Layout, components and their functions. 6.2. Design of impermeable floors – Bligh's and Khosla's (without problems) theories. 6.3. Silt control works – silt ejectors and silt excluder. 06 Hrs
7. **GRAVITY DAMS:** 8.1. Types of earthen dams. 8.2. Failures of earthen dams. (No problems). 8.3. Preliminary design. 8.4. Drainage arrangements (No designs). 06 Hrs
8. **EARTHEN DAMS:** 8.1. Types of earthen dams. 8.2. Failures of earthen dams (No problems). 8.3. Preliminary design. 8.4. Drainage arrangements (No designs). 04 Hrs
9. **SPILLWAYS:** 9.1. Definition, 9.2. Types of spillway – ogee spillway. 9.3. Types of Energy dissipators. 03 Hrs

REFERENCE BOOKS:

1. Irrigation, Water Resources and Water Power Engineering – Modi P. N. Standard books house New Delhi.
2. Irrigation, Engineering and Hydraulic. Structures – S.K. Garg, Khanna publications, New Delhi
3. Irrigation and Water power engineering – Punmia and Pandey La! Lakshmi Publications, New Delhi.
4. Text book of Irrigation Engineering and Hydraulics – R.K. Sharma, Oxford and IBH Publishing Co., New Delhi.
5. Irrigation theory and practice – Michael A.M. Vikas Publications House, New Delhi.
6. Irrigation theory and practice – Hansen and Isreal sen.

Scheme of Examinations: Student has to answer five questions out of eight.

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

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 & KRDCI) 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

05 Hrs

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 Subramaniam, 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.

10CTL 57: COMPUTER AIDED DRAWING LAB – I (CAD LAB – I)

Computer aided drawing of Buildings.

1. Fundamentals of Computer Drafting.

- Application
- Menu
- Keyboard Commands
- Scale and Formatting
- Drawing Handling and Saving
- Output Plotting
- Layers
- Object Colour
- Display

2. Drafting of simple building components and details like

- Foundation: Size stone masonry and isolated concrete footing.
- Masonry bonds, Lintel and chejja details
- Doors and Window joinery details – Wood, Steel and Aluminum

CTL 58: CONSTRUCTION TECHNOLOGY LABORATORY

- 1 Construction of Masonry: Bonding patterns (Joints Alignment, Level and Plumb maintenance) Constructing wall panels, New CBR method standard Procedure.
- 2 Plastering: Mixing Technique of applying plaster using trowel, float etc, Plastering vertical surface to plumb.
- 3 Concreting: Batching mixing and placing concrete.
- 4 Bar bending: Straightening, bending, hooking demo for slab, beam and column construction, Lapping.
- 5 Welding: Different types.
- 6 Setting out works.

10CT 61: CONSTRUCTION QUALITY MANAGEMENT

- 1 **QUALITY:** Principles, Concepts in Quality Management, Managing for quality, Impact of Quality Management in Business and Commerce. Quality Control, quality costs and its components, Quality Assurance, Recent Trends in Quality Management.
- 2 **TOTAL QUALITY MANAGEMENT:** Meaning and Scope, Quality Manuals, System Procedures, Project Quality Plan and quality Assurance System as per ISO: 9000:2000, Road map for quality planning.
- 3 **QUALITY CULTURE:** Training for Quality, Business excellence Models, ISO: 9000 for construction project and ISO: 10006 for quality in project, quality standards and Certification Procedures.
- 4 **QUALITY CONTROL:** Indian Standards and International Standards, Quality Study Comparisons and equivalence, Quality Standards in Construction, Standards for various Building Materials and other inputs.
- 5 **METHODS AND TECHNIQUES FOR CONSTRUCTION PROJECTS:** Survey Methods and Services, In process quality inspection and tests. Quality in foundations and piling work, Structural Work, electrical system, waste recovery and maintenance.
- 6 **BENCH MARKING:** Conducting a bench marking study, training for bench marking, legal aspects of bench marking in Indian Construction Industry.

RECOMMENDED BOOKS:

- 1 JQM (Principles, Production cases) Dr. D.D. Sharma, Sultanchand and Co.,
- 2 Mohammed Zairi, Total Quality Management for Engineers, Aditya Books Pvt. Ltd., New Delhi. 1992.

REFERENCE BOOKS:

- 1 Robert (QMP) Bench Marking, 'The search for Industry Best Practices that led to superior performance', American Society of Quality, 1995.
- 2 Fox, Arthur J., and Holly A. Cornell, Quality in the Construction Project, American Society of Civil Engineers, New York, Latest Edition.
- 3 Mohantray R.P. and Lakhe R.R., Total Quality Management, Jaico Publishing House, Mumbai, 2000.
- 4 Break Joseph and Susan Joseph, Total Quality Management, Excel Books, New Delhi, 1995.
- 5 Hellard R.B., Total Quality in Construction Projects: Achieving profitability with customer satisfaction, Thomas Telford, London, 1993.
- 6 Manjula, Satish, Quality Management, Raj Publishing House, Jaipur, 1999.
- 7 Quality Assurance for Contractors, FCEC, London, (Latest edition).
- 8 Thorpe, Brian, Quality Assurance in Construction, (2nd Ed.), Gower, Aldershot, 1996.

10CT 62: CONTRACTS AND SPECIFICATIONS

1. Construction Contracts

Indian Contracts Act – Elements – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document Standard Contract Document – Law of Torts.

2. Tenders

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines.

3. Arbitration

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs.

4. Legal Requirements

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations.

5. Labour Regulations

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Child Labour Act – Other Labour Laws.

REFERENCE BOOKS:

1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M. Tripathi Private Ltd., Bombay, 1982
2. Jimmie Hinze, Construction Contracts, 2nd Edition, McGraw Hill, 2001.
3. Joseph T. Bockrath, Contracats and the Legal Environment for Engineers and Architects, 6th Edition, McGraw Hill, 2000.

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-negative cant-safe speed based on various criteria,(both for normal and high speed tracks) Transition curve, Gradient and types, grade compensation, Examples on above.

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, 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
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

10CT 64: CONSTRUCTION PLANNING AND CONTROL

1. Constructing Planning

Basic concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships Among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.

2. Scheduling Procedures and Techniques

Relevance of Construction Schedules – The Critical Path Method – Calculations for Critical Path Scheduling – Activity Float and Schedules – Presenting Project Schedules – Critical Path Scheduling for Activity-on-Node and with Leads, Lags, and Windows – Calculations for Scheduling with Resource Constraints and Precedences – Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations – Calculations for Monte Carlo Schedule Simulation – Crashing and Time/Cost Tradeoffs – Scheduling in Poorly Structured Problems – Improving and Scheduling Process.

3. Cost Control, Monitoring and Accounting

The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows – Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.

4. Quality Control and Safety During Construction

Quality and Safety Concerns in Construction – Organizing for Quality and Safety – Work and Material Specifications – Total Quality Control – Quality Control by Statistical Control with Sampling by Variables – Safety.

5. Organization and Use of Project Information

Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.

TEXT BOOKS:

Ahuja H.N., “Project Management”, John Wiley, New York, 1999.

Chitkara K.K., “Construction Project Management – Planning, Scheduling and Controlling”, Tata McGraw Hill, New Delhi, 2000.

REFERENCE BOOKS:

Antil J.M. and Woodhead R.W., “Critical Path Methods in Construction Practice”, John Wiley, Canada, 1999.

Levy Sidney, Project Management in Construction, McGraw Hill Professional, New York, 2000.

O’Brien James, “CPM in Construction Management”, McGraw Hill, New York, 1999.

10CT 65: CONSTRUCTION ECONOMICS AND FINANCE

1. Economics

Role of Civil Engineering in Industrial Development – Advances in Civil Engineering – Engineering Economics – Support Matters of Economy as related to Engineering – Market demand and supply – Choice of Technology – Quality control and Quality Production – Audit in economic law of returns governing production.

2. Construction Economics

Construction development in Housing, transport and other infrastructures – Economics of ecology, environment, energy resources – Local material selection – Form and functional designs – Construction workers – Urban Problems – Poverty – Migration – Unemployment – Pollution.

3. Capital Structure

The need for financial management – Types of financing – short term borrowing – long term borrowing – leasing – equity financing – Internal generation of funds – External commercial borrowings – Assistance from government budgeting support and international finance corporations.

4. Fund Flow and Cash Flow statements (Simple Problems)

5. Financial Analysis – Meaning and Types – Tools and Techniques – Ratio Analysis – Types of Ratios – Profitability Ratio – Turnover ratio – Financial ratio (Balance sheet ratios) (Simple problems).

6. Working Capital Management – Concept of Working Capital – Kind Factors Affecting Working Capital – Sources of Working Capital – Forecasting the Working Capital Requirements.

REFERENCE BOOKS:

1. Warner Z Hirsch, “Urban Economics”, Macmillan, New York.
2. I.M. Pandey “Financial Management”
3. P. Sorallanavel “Management Accounting - Principles and Practice”.
4. Prof. K.S. Nagapathi “Management Accounting”, R. Chand & Co., New Delhi.

CT 661: GROUND IMPROVEMENT TECHNIQUES (Elective)

1. **GROUND IMPROVEMENT:** 1.1 Definition, 1.2 Objectives of soil improvement, 1.3. Classification of ground improvement techniques, 1.4. Factors to be considered in the selection of the best soil improvement technique. 04 hrs
2. **MECHANICAL MODIFICATION:** 2.1. Type of mechanical modification, 2.1. Aim of modification, compaction, Principle of modification for various types of soils. 2.3. Effect of grain size distribution on compaction for various soil types like BC soil, laterite, coarse-grained soil, micaceous soil etc. 2.4. Effect of compaction on engineering behaviour like Compressibility, Swelling and Shrinkage, Permeability, relative density, liquefaction potential. 2.5. Filed compaction - static, dynamic, impact and vibratory type. 2.6. Specification of compaction. 2.7. Tolerance of compaction, Shallow and deep compaction. 10 hrs
3. **HYDRAULIC MODIFICATION:** 3.1. Definition, aim, principle, techniques, gravity drain, lowering water table, multistage well point, vacuum dewatering, discharge equations, design of dewatering system including pipe line effects of dewatering. 3.2. Drainage of slopes, preloading, vertical drains, sand drains. 3.3. Assessment of ground condition for preloading, 3.4. Electro kinetic dewatering. 12 hrs
4. **CHEMICAL MODIFICATION:** 4.1. Definition, aim, special effects, and methods. 4.2. Techniques - sandwich technique, admixtures, cement stabilization. 4.3. Hydration - effect of cement stabilization on permeability, Swelling and shrinkage. 4.4. Criteria for cement stabilization. 4.5. Lime stabilization - suitability, process, special effects, criteria for lime stabilization. 4.6. Other chemicals, chlorides, hydroxides, lignin, hydrofluoric acid etc. 4.7. Fly ash in cement stabilization. Properties of chemical components, reactions and effects. 4.8. Bitumen, tar or asphalt in stabilization 12 hrs
5. **GROUTING:** 5.1. Introduction, 5.2. Effects of grouting, 5.3. Chemicals and materials used. 5.4. Types of grouting. 5.5. Grouting procedure. 5.6. Applications of grouting. 06 hrs
6. **MISCELLANEOUS METHODS (only Concepts):** 6.1. Introduction. 6.2. Soil reinforcement. 6.3. Thermal methods. 6.4. Ground improvement by confinement - Crib walls, Gabions and Mattresses. 6.5. Anchors, Rock bolts and soil nailing. 06 hrs

REFERENCE BOOKS:

1. Purushothama Raj. P. (1999) "Ground Improvement Techniques" Laxmi Publications, New Delhi.
2. Koerner. R.M (1985) "Construction and Geotechnical Methods in Foundation Engineering", McGraw Hill Pub. Co., New York.
3. Manfred Hausmann (1990) "Engineering principles of ground modification", McGraw Hill Pub. Co., New York.
4. Bell (1975) "Methods of treatment of unstable ground", Butterworths, London.
5. Nelson. J.D and Miller. D.J. "Expansive soils", John Wiley and Sons.
6. Ingles. C.G and Metcalf. J.B. (1972) "Soil Stabilization; Principles and Practice", Butterworths, London.

Scheme of Examination: Student have to answer five questions out of eight questions. The questions shall include numerical problems wherever possible.

10CT 662: DESIGN OF MASONRY STRUCTURES (Elective)

1. **MASONRY UNITS, MATERIALS AND TYPES:** Brick, Stone and Block masonry units - strength, modulus of elasticity and water absorption masonry materials – classification and properties of mortars, choice of mortars 05 hrs
2. **MASONRY CONSTRUCTION:** Defects and errors in masonry construction, cracks in masonry, types, reasons for cracking methods of avoiding cracks. 03 hrs
3. **STRENGTH AND STABILITY** of concentrically loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing, workmanship, strength formulas and mechanism of failure for masonry subjected to direct compression. 06 hrs
4. **PERMISSIBLE STRESSES:** Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stress for eccentric vertical and lateral loads, permissible tensile and shear stress. 05 hrs
5. **DESIGN CONSIDERATION:** Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels. 09 hrs
6. **DESIGN OF STRUCTURAL MASONRY:** Wall carrying axial load, eccentric load with different eccentricity ratio, walls with openings, free standing wall. Design of load bearing masonry for building up to 3 stories using IS: 1905 and SP: 20 procedure. 14 hrs
7. **REINFORCED MASONRY:** Application, flexural and compression elements, shear walls. 04 hrs
8. **MASONRY WALLS IN COMPOSITE ACTION:** Composite wall-beam elements, infilled frames. 04 hrs

REFERENCE BOOKS:

1. Hendry, A.W. “Structural Masonry”, Mcmillan Education Ltd., 1990.
2. Sinha B.P., Davies S.R, “Design of Masonry Structures”, E&FN spon 1997.
3. Dyaratnam, P. “Brick and Reinforced Brick Structures” Oxford and IBH, 1987.
4. IS-1905-1987 – “Code of practice for Structural use un-reinforced masonry (3rd revision)”, BIS, New Delhi.
5. SP-20(S&T) – 1991, “Hand book on Masonry Design and Construction (1st revision), BIS, New Delhi.

Scheme of Examination: Student has to answer five question out of eight.

CT 663: ADVANCED SURVEYING (Elective)

1. **THEORY OF ERRORS AND TRIANGULATION ADJUSTMENT:** 1.1. Errors and classification of errors 1.2. Precision and accuracy 1.3. Laws of weights and accidental errors 1.4. Probability. 1.4.1. Probability distribution function and density function-normal distribution 1.5. R.M.S. error-measure of precision 1.6. Rejection of observations-principles of least squares-normal equations 1.7. Method of correlates-**Triangulation adjustment:** 1.8. Angle adjustment, station adjustment and figure adjustment. 15 Hrs
2. **FIELD ASTRONOMY:** 2.1. Earth celestial sphere. 2.2. Solar system, 2.3. Position of by altitude and azimuth system-spherical triangle and spherical trigonometry 2.4. Astronomical triangle. 2.5. Nepiers rule. 2.6. Time: Siderial time, day and year-solar time and day-Greenwich mean time-standard time. Meridian and azimuth-their determination-latitude and its determination. 15 Hrs
3. **ELECTRONIC DISTANCE MEASUREMENT (EDM):** 3.1. Introduction 3.2. Electro Magnetic (E.M.) Waves, 3.3. Phase comparison and modulations, 3.4. Instruments-Geodimeter – Tellurimeter – Distomat - Range finders-Radars 3.5. Introduction to GPS, 3.6. Total station. 07 Hrs
4. **HYDROGRAPHIC SURVEYING:** 4.1. Methods of soundings 4.2. Instruments 4.3. Three point Problem 4.4. Tidal and Stream discharge measurements 05 Hrs
5. **SETTING OUT WORKS:** 5.1. Introduction, 5.2. Setting out of buildings, culverts, bridge , pipeline and sewers, tunnels. 05 hrs

TEXT BOOKS:

1. Punmia, B.C .”Surveying Vol I ,II & III” Lakshmi Publications-New Delhi
2. Duggal,S.K. ”Surveying Vol I & II” Tata McGraw-Hill Publishing Co.,
3. Kanitkar T.P. and Kulkarni S.V. “Surveying Levelling-Part I & II – Pune Vidhyarthi Gruha Prakashana.

REFERENCE BOOKS:

1. James, M. Anderson and Edward, M Mikhail-“Introduction to Surveying”, McGraw Hill Book Co.,1985
2. M. Mikhalil and Gracie, G: Analysis and Survey Measurements”, Van Nostrand Reinhold Co.,(NY)-1980
3. David Clark “Plane and Geodetic surveying for Engineers”, Vol. I & II-CBS Publishers and Distributors, New Delhi.

Scheme of Examination: **Eight** questions have to be set covering the entire syllabus and the students have to answer any **five** full questions.

CT 664: FUNDAMENTALS OF ARCHITECTURE (Elective)

1. **Introduction:** Aim and importance of architecture; architecture as fine art. Role of an architect and an engineer.
2. **Principles of Architecture:** The aesthetic and the functional components in architecture.
3. **Influences of the following on Architecture:** Association, tradition, climate, materials, topography, religion, social customs and aspirations of the times. Various factors influencing the architecture of a region, architecture as a response to social, technological and environment forces. Evolution of shelter forms in regions of the world and examples of vernacular architecture in the world, with particular reference to India.
4. **History of development of architecture in India-Indus valley civilization:** Characteristics and examples of Buddhist architecture, Hindu architecture, Jain and Chalukyan architecture.
5. Indo-Saracenic architecture India-Influences, characteristics and illustrative examples.
6. **Modern Architecture:** Contemporary trends in Architectures in India.

REFERENCE BOOKS:

1. Indian Architecture Vol. 1 & II by Percy Brown.
2. History of Architecture by Fletcher.
3. Rob Krier – Elements of Architecture.
4. Said Powell – Objects by Architects.
5. James C. Snyder and Anthony J. Catanese – Introduction to Architecture.

CTL67: GEOTECHNICAL ENGINEERING LABORATORY

- 1 Tests for determination of specific gravity and moisture content
- 2 Grain Size analysis of soil samples (Sieve analysis)
- 3 In situ density by core cutter and sand replacement methods
- 4 Consistency limits – Liquid limit (Casagrande and cone penetration methods), plastic limit and shrinkage limit
- 5 Standard proctor compaction test and modified proctor compaction test
- 6 Coefficient of permeability by constant head and variable head methods
- 7 Strength tests
 - 7.1 Unconfined compression test
 - 7.2 Direct shear test
 - 7.3 Triaxial compression test (Undrained)
 - 7.4 Vane shear test
- 8 Consolidation test – Determination of compression index and coefficient of consolidation
- 9 Demonstration of
 - 9.1 Miscellaneous equipments such as augers, samplers, rapid moisture meter, Proctor's needle
 - 9.2 Free swell index test
 - 9.3 Determination of relative density of sand
 - 9.4 Plate Load Test
 - 9.5 Standard Penetration Test
 - 9.6 Cone (Dynamic & static) Penetration Test
 - 9.7 Seismic Refraction Method
 - 9.8 Rock Quality Designation

REFERENCE BOOKS:

1. Lambe T W “Soil Testing for Engineers”, Wiley Eastern Ltd, New Delhi.
2. Head K H (1986) “Manual of soil laboratory testing”, Vol I, II and III, Pentech Press, London.
3. Bowles J E (1988) “Engineering Properties of soils and their measurements”, McGraw Hill Book Co, New York
4. BIS Codes of Practice
 - a. IS 2720 (Part 3/Sec 1) – 1987
 - b. IS 2720 (Part 2) – 1973
 - c. IS 2720 (Part 4) – 1973
 - d. IS 2720 (Part 5) – 1985
 - e. IS 2720 (Part 6) – 1972
 - f. IS 2720 (Part 7) – 1980
 - g. IS 2720 (Part 8) – 1983
 - h. IS 2720 (Part 17) – 1986
 - i. IS 2720 (Part 10) – 1973
 - j. IS 2720 (Part 13) – 1986
 - k. IS 2720 (Part 11) – 1971
 - l. IS 2720 (Part 15) – 1986
 - m. IS 2720 (Part 30) – 1987
 - n. IS 2720 (Part 40) – 1977
 - o. IS 2720 (Part 14) – 1983
 - p. IS 2720 (Part 28) – 1974
 - q. IS 2720 (Part 29) – 1966
 - r. IS 2131-1981
 - s. IS4434-1978

CTL 68: CONSTRUCTION STUDY PROJECT

Study of a construction project by selecting a construction site, studying and reporting various aspects of construction for – Eg:

1. Tending process award of contract
2. Estimate
3. Foundation details
4. Quality control aspects
5. construction scheduling study etc.,

Period of study: 2 months

Candidates has to be officially deputed to a construction site student shall be evaluated both by site supervisor from construction company and teaching staff from the college equal weightage given to both valuers.

10CT 71: CONSTRUCTION METHODS AND EQUIPMENTS

1. Construction Equipment Management

Identification – Planning – Equipment Management in Projects – Maintenance Management – Replacement – Cost Control of Equipment – Depreciation Analysis – Safety Management.

2. Equipment for Earthwork

Fundamentals of Earth Work Operations – Earth Moving Operations – Types of Earth Work Equipment – Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers.

3. Other Construction Equipment

Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting – Equipment for Compaction – Erection Equipment – Types of pumps used in Construction – Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment.

4. Materials handling Equipment

Forklifts and related equipment – Portable Material Bins – Conveyors – Hauling Equipment.

5. Equipment for Production of aggregate and concreting

Crushers – Feeders – Screening Equipment – Handling Equipment – Batching and Mixing Equipment – Hauling, Pouring and Pumping Equipment – Transporters.

REFERENCE BOOKS:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction. Planning, Equipment and Methods, 5th Edition, McGraw Hill, Singapore, 1995.
2. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988
3. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988
4. Dr. Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi, 1983.

10 CT 72: PRESTRESSED CONCRETE STRUCTURES

1. **MATERIALS:** High strength concrete and steel, Stress-Strain characteristics and properties. 02 hrs
2. **BASIC PRINCIPLES OF PRESTRESSING:** Fundamentals, Load balancing concept, Stress concept, centre of Thrust. Pre-tensioning and post-tensioning systems, tensioning methods and end anchorages. 04 hrs
3. **ANALYSIS OF SECTIONS FOR FLEXURE:** Stress in concrete due to pre-stress and loads, stresses in steel due to loads, Cable profiles. 08 hrs
4. **LOSSES OF PRE-STRESSES:** Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force. 06 hrs
5. **DEFLECTIONS:** Prediction of short term and long term deflections of un-cracked members. 06 hrs
6. **LIMIT STATE OF COLLAPSE AND SERVICEABILITY:** IS Code recommendations – Ultimate flexural and shear resistance of sections, shear reinforcement. Limit state of serviceability – control of deflections and cracking. Type of members and flexural tensile stress. 10 hrs
7. **DESIGN OF BEAMS:** Design of pre-tensioned and post-tensioned symmetrical and asymmetrical sections. Permissible stress, design of prestressing force and eccentricity, limiting zone of pre-stressing force cable profile. 08 hrs.

REFERENCE BOOKS:

1. N.. Krishna Raju 'Pre-stressed Concrete' Tata McGraw Hill Publishers.
2. P. Dayarathnam 'Pre-stressed Concrete' Oxford and IBH Publishing Co.
3. T.Y. Lin and Ned H. Burns 'Design of Pre-stressed Concrete Structures'.
4. N. C. Sinha and S.K. Roy 'Fundamental of Pre-stressed Concrete' John Wiley and Sons, New York.
5. IS: 1343:1980
6. N. Rajgopalan 'Pre-stressed Concrete'.

Scheme of Examination: One question from chapter 1 and 2. One question each from chapters 3,4,5,7 and 8. Two questions from chapter 6. Students shall answer any five questions. IS: 1343:1980 to be allowed in examination.

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.

5 Hours

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.

CT 74: BUILDING SERVICES – I

Water supply to buildings, systems of water supply, appurtenances, difficulties encountered in water supply to high rise buildings, system suggested, hot water and fire water supply systems.

Drainage of Buildings, systems of drainage from buildings, appurtenances, choice of systems, solid waste disposal from buildings.

Fire protection and equipment, code provisions from NBC.

Electrical wiring systems in domestic and commercial buildings, conductors, cables and conduits.

Acoustics, material properties, reverberation, acoustical design of assembly halls and buildings, noise and its control.

Communications, Inter-communication systems, sound amplification equipments.

REFERENCE BOOKS:

1. Rangwala, 'Water Supply and Sanitary Engineering'
2. Panchdhare, 'Building Services for W/s and Sanitation'
3. IS SP35: HB on WS and drainage
4. S.K. Kandaswamy (Ed), 'Architectural Acoustics and Noise Control – Theory, Design, Practice – Allied Publishers.
5. Acenteen and Cowan, 'Architectural Accoustic Design Guide', Book Base, Member.
1. Ando, 'Music and Concept Hall Accoustics, Book Base, Member.

CT 751: PRE-FABRICATION CONSTRUCTION TECHNIQUES (Elective)

Prefabricated construction, necessity, advantages disadvantages, Mass Produced steel, reinforced concrete and masonry system, industrialized buildings.

Modular coordination, basic module, planning and design modules, modular grid systems, National Building Code specifications, standardization, dimensioning of products, preferred dimensions and sizes, tolerances and deviations, layout and processes.

Prefabricates classification, foundation, columns, beams, roof and floor panels, wall panels, clay units, box prefabricates, erection and assembly,

Design of prefabricated elements, lift points, beams, slabs, columns, wall panels, footings, design of joints to transfer axial forces, moments and shear forces.

Construction techniques, large panel construction, lift slab system, Glover system, Constains's jack- block system, Constain V- plate system, Bison system, Silber – Kuhl system, control of construction processes.

Equipments, horizontal and vertical transportation.

REFERENCE BOOKS:

1. Hass A.M. – Precast Concrete – Design and applications Applied Science, 1983.
2. David Shepperd – “Plant cast, Precast and Prestressed concrete – McGraw Hill, 1989.
3. Dyachenko and Mirtousky – Prefabrication of reinforced concrete – MIR Publishers.

ADVANCED DESIGN OF RC STRUCTURES

Subject Code	: 10CV752/ 10CT752	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

Design of RCC overhead circular and rectangular water tanks with supporting towers.

8 Hours

UNIT - 2

Design of silos, bunkers using Janssen's Theory and Airy's Theory.

7 Hours

UNIT - 3

Design of RCC Chimneys.

6 Hours

UNIT - 4

Introduction to shell and folded plate roofs, their forms and structural behaviour. Design of simple cylindrical shell roof by beam theory.

6 Hours

PART - B

UNIT - 5

Yield line analysis of slabs by virtual work.

7Hours

UNIT - 6

Yield line analysis by equilibrium methods.

6 Hours

UNIT - 7

Design of Grid Floors Slabs by approximate method.

6 Hours

UNIT-8

Design of flat slabs by Direct Designer Method (with and without drops)

6 Hours

REFERENCE BOOKS:

1. **Reinforced Concrete Structures, Vol-II-** B C Punmia : Laxmi Publications (P) Ltd, New Delhi.
2. **Limit State Design of Reinforced Concrete Vol-II-** P C Varghese: Prentice Hall of India (P) Ltd, New Delhi.
3. **Plain and Reinforced Concrete – Vol-II-** Jai Krishna and Jain,: Nem Chand Bros, Roorkee.
4. **Analysis of Structures- Vol-II** : Vazirani V N & M M Ratwani : Khanna Publishers, New Delhi.

5. **Design Construction of Concrete Shell Roofs** : Ramaswamy G S : CBS Publishers and Distributors, new Delhi.
6. **Advanced Structural Design**- Bensen C
7. IS 456 – 2000 IS 3370 – 1967 (Part I, II and IS 1893)
8. **Advanced RCC Design- Vol-II**,- S. S. Bhavikatti New Age International Publication, New Delhi.

CT 753: URBAN AND REGIONAL PLANNING (Elective)

1. Human settlements – Rural and urban, Patterns of growth factors that promote growth and development.
2. Ancient settlements and history of towns and planning in India-Early period and the tradition of planning villages, towns and the region, principles following and typical examples.
3. Mediceaval period. Industrialization – it's growth and impact on town building. The British Period: Urbanization in India after the second world war, independence.
4. Circulation pattern in cities: Urban roads and states their functional classification. Traffic survey data and its use in planning of towns.
5. Contemporary objectives and methods of planning of towns. Development plans for cities – objectives and stages involved in their preparation and implementation: legal and administrative tools necessary in the process.
6. Zoning: Definition – zoning procedure zoning standards – zoning regulations regarding height and bulk of buildings, land use etc.
7. Rural Planning: Present situation of villages in India – problems and remedies; physical planning of villages: Urbanizational set up: Integration with regional planning.

REFERENCE BOOKS:

1. Town Planning in India by N.K. Gandhi
2. Town and Country Planning by K.S. Rame Gowda
3. Urban Design by Gallion and Eisner
4. Town planning in Ancient by B.B. Dutth.

CT 754: LANDSCAPE DESIGN AND PLANNING (Elective)

- Man and the landscape: Landscape Development in Historical perspective – brief review of development of garden styles. Importance and role of landscape in Architecture. Contemporary approach to landscape design-a brief review of evolution of concepts in landscape design after industrial revolution and increasing awareness of ecological variable in landscape design
- Site studies and site planning
 - a. Understanding different site characteristics and evaluation of their potential for development.
 - b. Philosophical and design issues related to site development – i.e., siting of buildings, spatial and contextual relationships of built and out door spaces, site and its relationship to its surroundings, Importance of climatic, social factors in development of site.
 - c. Process of design development, Identifying functional requirements of site, development of site by mutual exploitation of forms and use of grading principles. (Study should includes atleast two exercises in site planning).
- **Elements in Landscape Design:**
 - Use of landform, water, vegetation as elements Landscape design.
 - Design and types of garden furniture, lighting and water feature.
 - Pavement types and patterns and hard landscapes.
 - Sculptures and architectural features as elements.
 - Design concept related to use of landscape elements in out door design – Grouping of elements, visual effects etc.
- **Plants and design**
 - Botanical nomenclature, anatomy and physiology. Plant growth and development, plant communities and their environments in Indian Context.
 - Plants and landscape – Basic principles, Appearance of plants, functional and visual effects with plants in landscape.
 - Landscape layout and planting techniques.
 - Planting design in practice.
- **Landscape Construction**
 - Elementary knowledge of grading, cut and fill, shaping the site.
 - Use of materials use in landscape and their details.
 - Laying paths with different materials like pebble paving slabs stone etc.
 - Construction of garden steps.
 - Construction of detailing of drain inlets, curbs and gutter details.
 - Fountain and pool construction.
 - Elementary knowledge of irrigation systems, and water supply, lighting systems.

REFERENCE BOOKS:

1. Site Planning – Kevin Lynch
2. An Introduction to Landscape Architecture – Michael Laurie.
3. Landscape Construction and detailing – Alan Blanc
4. T.S.S. for Landscape Architecture.
5. Planting Design – Brian Hacheat.
6. Land and Landscape Brenda Colise
7. Common trees – Santapaer
8. Beautiful Shrubs – Pratibha Devi

CT 761 : PHOTOGRAMMETRY AND REMOTE SENSING (Elective)

1. **PHOTOGRAMMETRY:** Introduction Metric and Non-metric Photogrammetry - Metric cameras-advantages of Photogrammetry-terrestrial and Aerial Photogrammetry, Introduction to digital Photogrammetry. 05 hrs
2. **ARIAL PHOTOGRAMMETRY:** Advantages over ground survey methods- vertical, tilted and oblique photographs-geometry of vertical photographs-scale of vertical photographs-ground coordinates-relief displacement-tilted photographs-scale-ground coordinates-relief displacement-flight Planning. 15 hrs
3. **STEREOSCOPY:** Stereoscopes – parallax - measurement of parallax - parallax equations - elevation by parallax differences. 05 hrs
4. **TERRESTRIAL PHOTOGRAMMETRY:** Photo theodolites - locating points from two photos - determination of focal length 05 hrs
5. **REMOTE SENSING:** Advantages - electromagnetic radiation - idealized remote sensing system - types of sensors, satellites - Indian and other remote sensing satellites - black body radiation – gray body - atmospheric windows - Spectral signature - Multi concept in R.S.- Remote sensing products - Basics of image processing. 10 hrs
6. Applications of remote sensing in water resources, land use and land cover analysis - environmental applications - Geological applications. 10 hrs

REFERENCE BOOKS:

1. Paul-R Wolf “Elements of Photogrammetry”, McGraw-Hill International Editions - II edition
2. Floyd F Sabins, W.H. Freeman and company (NY) “Remote Sensing-Principles and Interpretation”, II Edition
3. John R. Jensen “ Introductory Digital Image processing” Verlag (NY)
4. Ravi P Gupta “Remote sensing Geology” Springer Verlag (NY)
5. R.I. Karle (Editor) “Natural Resource Management”, A new perspective-NNRMS, D.O.S. Govt. of India, Bagalore.
6. B.C. Punmia “Surveying Vol II and III” Lakshmi Publications, New Delhi
7. Duggal, “S.K. Surveying Vol I and II” Tata McGraw Hill Publishing Co.,
8. Lillisand and Kiefer Principles of Remote Sensing and image interpretation, John Wiley and Sons

Scheme of Examination: Students has to answer five questions out of eight.

CT 762: ALTERNATIVE BUILDING MATERIALS AND TECHNOLOGIES (Elective)

1. INTRODUCTION

Energy in building materials
Environmental issues concerned to building materials.
Global warming and construction industry
Environmental friendly and cost effective building technology.
Requirements for buildings of different climatic regions.
Traditional building methods and vernacular architecture.

06 hrs

2. ALTERNATIVE BUILDING MATERIALS

Characteristics of building blocks for walls
Stones and Laterite blocks
Bricks and hollow clay blocks
Concrete blocks
Stabilized blocks: mud blocks, steam cured blocks, Fal-G blocks and stone masonry block
Lime-pozzolana cements
Raw materials
Manufacturing process
Properties and uses
Fibre reinforced concretes
Matrix materials
Fibres: metal and synthetic
Properties and applications
Fibre reinforced plastics
Matrix materials
Fibres: organic and synthetic
Properties and applications
Building materials from agro and industrial wastes
Types of agro wastes
Types of industrial and mine wastes
Properties and applications
Field quality control test methods.

12 hrs

3. ALTERNATIVE BUILDING TECHNOLOGIES

3.1. Alternative for wall construction
 3.4.1. Types
 3.4.2. Construction methods
3.2. Masonry mortars
 3.4.1. Types
 3.4.2. Preparation
 3.4.3. Properties

- 3.3. Ferrocement and ferroconcrete building components
 - 3.4.1. Materials and specifications
 - 3.4.2. Properties
 - 3.4.3. Construction methods
 - 3.4.4. Applications
 - 3.4. Alternative roofing system
 - 3.4.1. Concepts
 - 3.4.2. Filler slabs
 - 3.4.3. Composite beam panel roofs
 - 3.4.4. Masonry vaults and domes
 - 3.5.
- 12 hrs
- 4. STRUCTURAL MASONRY**
- Compressive strength of masonry elements
 - Factors affecting compressive strength
 - Strength of units, prisms/walquettes and walls
 - Bond strength of masonry: Flexure and shear
 - Elastic properties of masonry materials and masonry
 - IS Code provisions
 - Design of masonry compression elements
 - Concepts in lateral load resistance
- 14 hrs
- 5. COST EFFECTIVE BUILDING DESIGN**
- Cost concepts in buildings
 - Cost saving techniques in planning, design and construction
 - Cost analysis: Case study using alternatives
- 06 hrs
- 6. EQUIPMENT FOR PRODUCTION OF ALTERNATIVE MATERIALS**
- Machines for manufacture of concrete materials
 - Equipments for production of stabilized blocks
 - moulds and methods of production of precast elements
- 02 hrs

REFERENCE BOOKS:

1. Relevant IS codes
2. Alternative Building Methodologies for Engineers and Architects, lecture notes edited by: K.S. Jagadish and B.V. Venkatarama Reddy, Indian Institute of Science, Bangalore.
3. Alternative Building Materials and Technology
4. Structural Masonry by Arnold W. Hendry

CT 763: RURAL WATER SUPPLY AND SANITATION (Elective)

- 1. RURAL WATER SUPPLY:** Introduction: Need for a protected water supply, investigation and selection of water sources, water borne diseases, protection of well waters, drinking water quality standards, Types of pumps, Supply systems: BWS, MWS, PWS, Water treatment methods – Disinfection, defluoridation, hardness and iron removal, ground water contamination and control. 12 hrs
- 2. RURAL SANITATION:** Conservancy, public latrine night soil-collection and disposal, trenching and composting methods. Two pit latrines, aqua privy, W.C. septic tank, soak pit. 10 hrs
- 3. DRAINAGE SYSTEMS:** Storm water and sullage disposal, rain water harvesting and uses. 03 hrs
- 4. COMMUNICABLE DISEASES:** Terminology, classifications, methods of communication, general methods of control. 04 hrs
- 5. REFUSE COLLECTION AND DISPOSAL:** Garbage, ash, rubbish, collection methods, Transportation, Disposal – Salvaging, Dumping, Controlled tipping, Incineration, Composting, Dung Disposal – Digestor, Bio-gas plant. 08 hrs
- 6. MILK SANITATION:** Essentials, test for milk quality, pasteurization, quality control, cattle borne disease, planning for a cow shed. 07 hrs
- 7. INSECT CONTROL:** House Fly and Mosquito-life cycle, disease transmission and control measures. 06 hrs.

REFERENCE BOOKS:

1. Environmental Sanitation by Salvato.
2. Preventive and Social medicine by Park and Park.
3. Water Supply and Sanitary Engineering by E.W. Steel.

Scheme of Examination:

Student has to answer five questions out of eight.

CT 764: COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND PLANNING (Elective)

1. Introduction

Introduction to System Hardware – Languages – Data Base Management – Spread Sheets – Applications. 07 hrs

2. Optimization Techniques

Modern Information System – System Development Life Cycle – Structured Methodologies – Designing Computer Based Methods, Procedures, Control – Designing Structured Programs. 08 hrs

3. Information System

Integrated Construction Management Information System – Project Management Information System – Functional Areas, Finance, Marketing, Production, Personnel – Levels, DSS, EIS, ES – Comparison, Concepts and Knowledge Representation – Managing International Information System. 10 hrs.

4. Implementation and Control

Control – Testing Security – Coding Techniques – Defection of Error – Validating – Cost Benefit Analysis – Assessing the value and risk of Information System. 10 hrs

5. System Audit

Software Engineering qualities – Design, Production, Service, Software specification, Software Metrics, Software quality assurance – Software life cycle models – Verification and Validation. 10 hrs

REFERENCE BOOKS:

1. Kenneth C. Laudon and Jane Price Laudon, Management Information Systems – Organization and Technology, Prentice Hall, 1996.
2. Gordon B. Davis, Management Information System: Conceptual Foundations, Structure and Development, McGraw Hill, 1996.
3. Joyce J. Elam, Case series for Management Information Systems, Simon and Schuster, Custom Publishing, 1996.
4. Ralph H. Sprague and Huge J. Watson, Decision Support for Managers, Prentice Hall, 1996.
5. Micheal W. Evans and John J. Marciniak, Software Quality assurance and Management, John Wiley and Sons, 1987.
6. Card and Glass, Measuring Software Design quality, Prentice Hall, 1990.

CTL 77: COMPUTER AIDED DRAWING LAB – II

(CAD LAB – II)

- 1 Detailed building drawing using AutoCAD and similar drafting packages: Development of plan of residence form line diagram with layers showing all the building components, titles, dimensions, hatching, details of interiors, details of services.
- 2 Structural detail drawing: Drawing reinforcement detail drawing for column, slab and beam from available design details.
- 3 3D drafting – Introduction to 3D
 - New points
 - Objectives
 - Surfaces
 - Shading
 - Wire frame
 - Editing of simple objects
 - Developing a 3D view plans and Elevations

CTL 78: BUILDING SERVICES LABORATORY

1. Drawing and working out
 - i) W/s sanitary service details for buildings
 - ii) Electrical details
 - iii) Air conditioning system – load calculations
2. Plumbing
 - G.I. Pipe threading – Assembly
 - Other pipes – comparisons –
 - Sanitary line assembly
 - Traps and lines, other fittings
3. Acoustics Laboratory

CT 81: BUILDING PLANNING, TYPES AND STANDARDS

1. Determinants of building form and plan
Function, climate, space definition, and material availability, cost, time frame, culture, aesthetics, contemporary factors
2. Basic parameters of planning –
Functionability, Circulation, Illumination and ventilation, architectural form, area project, axially spaces – parking, during space, greenery, lobbies, waiting area etc. location
3. Building types – Private, public, commercial, industrial, Planning criteria for and standards pertaining to various aspects.
4. Types and standards for -
 - Residential Buildings
 - Hospitals
 - Educational / Schools
 - Public offices.
 - Commercial Buildings
 - Auditoriums
 - Sports

REFERENCE BOOKS:

1. Chiara and Callender (Ed) – Tune Saver Standards for Building Types, McGraw Hill
2. Poulhans Peters (Ed) – Design and Planning series (i) Factories (ii) New Schools (iii) Laboratories (iv) Centres for storage and distributors – Van Nostrand
3. M.F. Schmertz (Ed) – Office Building Design – II Ed., McGraw Hill.
4. Edward D. Mills – Planning Buildings for Administration, Entertainment and recreation – Newnes Butterworth.
5. Kundars – Hospital Planning, Design and Management, Book Base
6. Kubba – Space planning for commercial and residential interiors, Book Base.

CT 82: BUILDING SERVICES – II

Ventilation, health and comfort ventilation, ventilation systems, natural and artificial ventilation for tropical regions.

Thermal environment inside a building and its control, factors affecting inside conditions. Heat transfer through building fabric, steady state and periodic heat transfer, thermal properties of building materials and insulation materials for buildings.

Thermal response of a building cooling and heating loads.

Air-conditioning systems, types, design, installation and maintenance costs.

Illumination, artificial lighting, day lighting, laws and principles of illumination.

Electric light sources, brief description, Characteristics, starting circuits and application of incandescent and discharge lamps.

Design of lighting systems, flood lighting, relevant IS codes. Elevators, escalators and conveyors.

Energy conservation in buildings. Building Technology.

REFERENCE BOOKS:

1. McGainess and Stein – Mechanical and Electrical Systems, John Wiley and Sons, 1977.
2. TAO, Mechanical and Electrical System Systems in Buildings, Book Base.
3. Easetop – Mechanical Services for Buildings
4. Bran David – Architectural Lighting.
5. IS SP 41 and SP32 – HB on Functional Requirements of Buildings.

CT 831: APPLIED GEO-TECHNICAL ENGINEERING (Elective)

1. SUBSURFACE EXPLORATION:

- 1.1. Importance, exploration program.
- 1.2. Methods of exploration: Boring, Sounding tests, Geophysical methods - Electrical resistivity and Seismic refraction methods.
- 1.3. Types of samples - Undisturbed, Disturbed and representative samples.
- 1.4. Samples, Sample disturbance, Area ratio, Recovery ratio, Clearance,
- 1.5. Stabilization of bore holes,
- 1.6. Typical boring log,
- 1.7. Number and depth of borings for buildings and dams.
- 1.8. Determination of ground water level by Hvorslev method (Raising water level method).
- 1.9. Control of ground water during excavation Dewatering – Ditches and sumps, Well point system, Shallow well system, Deep well system, Vacuum method, Electro Osmosis method. 08 hrs

2. STRESSES IN SOIL:

- 2.1. Boussinesq's and Westergaard's theories for concentrated, circular, rectangular, line and strip loads.
- 2.2. Newmark's chart.
- 2.3. Pressure bulb.
- 2.4. Contact pressure. 05 hrs

3. FLOWNETS:

- 3.1. Laplace equation, Characteristics and uses of flownets, Methods of drawing flownets for Dams and sheet piles.
- 3.2. Estimating quantity of Seepage and sheet piles.
- 3.3. Determination of phreatic line in earth dams with and without filters. 06 hrs

4. LATERAL EARTH PRESSURE:

- 4.1. Active and passive earth pressures, Earth pressure at rest, Earth pressure coefficients and their range.
- 4.2. Earth pressure theories - Rankine's and Coulomb's- assumptions and limitations.
- 4.3. Graphical solutions for active earth pressure (cohesion less soils only) - Culmann's and Rehmann's methods.
- 4.4. Lateral earth pressure in cohesion less soils, Earth pressure distribution. 10 hrs

5. STABILITY OF SLOPES:

- 5.1. Types of slope, Causes and types of failure of slopes.
- 5.2. Definition of factor of safety,
- 5.3. Stability of finite and infinite slopes- Swedish slip circle method, method of slices, Friction Circle method, Fellenius method,
- 5.4. Taylor's stability number. 08 hrs

6. BEARING CAPACITY:

- 6.1. Definition of ultimate, net and safe bearing capacity, Allowable bearing pressure.
- 6.2. Terzaghi's and Brinch Hansen's bearing capacity equation - assumptions and limitations.
- 6.3. Bearing capacity of footing subjected to eccentric loading.
- 6.4. Effects of ground water table on bearing capacity.
- 6.5. Plate load test, Standard penetration test, Cone penetration test. 08 hrs

7. FOUNDATION SETTLEMENT:

- 7.1. Concept, Immediate, Consolidation and Secondary settlement (no derivations), Tolerance.
- 7.2. BIS specifications for total and differential settlements of footings and rafts. 04 hrs

REFERENCE BOOKS:

- 1. Alam Singh and Chowdhary G.R (1994) "Soil Engineering in Theory and Practice", CBS Publishers and Distributors Ltd., New Delhi
- 2. Bowles JE (1996) "Foundation Analysis and Designs", 5th Edition, McGraw Hill Publication Co., New York
- 3. Murthy, V.N.S. (1996) "Soil Mechanics and Foundation Engineering", 4th Edition, UBS Publication and Distributors, New Delhi
- 4. Punmia B.C. (2003) "Soil Mechanics and Foundations", Laxmi Publishing Co., New Delhi
- 5. Gopal Ranjan and Rao, A.S.R. (2000), "Basic and Applied Soil Mechanics", New Age International (P) Ltd., New Delhi.
- 6. Narasimha Rao A.V., and Venkatramaiah C. (200), "Geotechnical Engineering", University press (India) Ltd., Hyderabad.

Scheme of Examination: Student has to answer five questions. The questions shall include numerical problems wherever possible.

CT 832: BUILDING CLIMATOLOGY (Elective)

1. Introduction to Building Climatology

Climate and built form interaction Global Climatic factors, elements of climate, graphic representation of climatic data, Mahoneys Tables, macro and micro climate.

2. Tropical Climates

Definition, classification of tropical climates, characteristics of different climatic zones, Design considerations for warm-humid, hot-dry, composite and upland climates.

3. Thermal Comfort

Thermal comfort factors, Physiological aspects, Body heat balances, comfort range, comfort charts.

4. Heat flow through Buildings

Basic principles of heat transfer through buildings, performance of different materials, Periodic heat flow.

5. Sun and Design process

Solar geometry, Solar charts, Sun angles, and shadow angles, orientation for sun, sun control, design of shading devices, building form and heat gain, basic principles of day lighting, sunlight and glare.

6. Natural Ventilation

Air movement around and through buildings, Orientation for wind, stack effect, Induced ventilation.

7. Passive Cooling

Passive methods of Cooling, roof pond, desiccant cooling, evaporative Cooling, earth sheltered buildings etc.

REFERENCE BOOKS:

1. Manual of Tropical Housing and Building – Koenigsberger, Ingersoll, Mayhew and Szokolay.
2. Buildings climate and energy – T.A. Markus and E.N. Morris.
3. Tropical Architecture – C.P. Kulkreja
4. Design for hot climates – Allan Konya.
5. Solar Control and Shading Devices – Olgyay and Olgyay.

CT 833: REPAIR AND REHABILITATION OF STRUCTURES (Elective)

Assessment of Structural Strength – Need and approach, Testing methodology, Insitu testing of Structures – Methods. Non destructive testing of concrete structures – Schmidt hammer, Ultrasonic sounding, core drilling, probes. Assessment of carbonation and permeability testing of steel, masonry and wooden structures.

Diagnosis, damage assessment parameters for repair / restration strategies, specification and detailing. Repair methods for concrete structures - slabs, beams, columns and foundations.

Chemicals and materials for repair and restoration – classification – Bending agents, adhesives Grout fillers, reinforcements polymer infrastructure fibres, etc., Tools for repairs – Drills Grouting Shotereting, Expansion bolts.

Earthquake and dynamic load indrced damages. Repair strategies, Bracing foundation isolation, dampers, Ductility provisions.

Fire resistance – Fire rating – Fire damage assessment and restoration measures for concrete and steel structures, Retrofitting and Strengthening of Structures, Need, Strategies and Techniques Refrofitting – steel and concrete bridges. Retrofitting of buildings of earthquake resistance.

Special topics – Architectural Restoration – Cracks and waterproofing, Demolition of Structures.

REFERENCE BOOKS:

1. R.T.L. Allen & S.C. Edwards (Ed), “Repair of Concrete Structures”, Blackie, 1987.
2. Releur Workshop – “Testing during Concrete Construction” – Chapman & Hall, 1991, Rexom & Maihaganom – Et FN Spon, 1986.
3. Chemical Admixtures for Concrete
4. John M. Bungey – “The Testing of Concrete in Structures, Survey Univ Press (Dh & Hall) 1982,
5. Newman P.E., “Structural Renovation of Buildings, “Methods, Details & Design Examples” – McGraw Hill, 2001.
6. Dr. R. Jagadeesh,
“Rehabilitation of Renovation and Reconstruction Bedle”, ASCE /ACI Journal.

CT 834: BRIDGE ENGINEERING (Elective)

- 1. INTRODUCTION:** Classification of Bridges – Masonry, Arches, RCC, Prestressed Concrete Steel and Composite Brief Description of different types of bridges – preliminary Design principles.
- 2. INVESTIGATIONS:** Selection of sites, Design data to be followed, Hydraulic design, linear waterway afflux – Economic span.
- 3. FOUNDATIONS:** Depth of scour – Depth of foundation – Types of foundation (Pie, Raft, Well and Caisson – Brief Description only) cofferdam, Design criteria – load bearing capacity of well caissons.
- 4. SUBSTRUCTURE:** Types of Abutment, piers, wing walls – Forces action on them – Stability consideration and empirical designs – Bank connection and protection works.
- 5. STANDARD LOADS:** IRC and Railway Loadings – Equivalent Loading for preliminary design – Impact effect.
- 6. CONSTRUCTION AND MAINTENANCE OF BRIDGES:** Form work and False work for concrete Bridges – Maintenance of bridges – Maintenance.
- 7. DESIGN OF RCC SLAB:** Culvert, pipe culverts – Types of Bearings – by Courbon's method.
- 8.** Design of RCC beams and slab bridge by Courbon's method only for IRC class AA loadings.
- 9.** Providing all the details to prepare the drawings for
 - (a) Slab culvert
 - (b) T-beam bridge
 - (c) Plate girder bridge
 - (d) Composite bridge

REFERENCE BOOKS:

1. A Text Book of Bridge Engineering by Victor Oxford and IBH Pub. Co. New Delhi.
2. Introduction to Bridge Engineering by Bindra Dhanpat Rai Pub. New Delhi.
3. Design of RCC Bridges by Vazirani
4. IRC Codes 5 Bridges, 6 Bridges – Rangwala
5. Design of Steel Structures by Krishnamachar and Sharma
6. Design of Bridge by Dr. N. Krishna Raju

CT 841: FOUNDATION ENGINEERING (Elective)

1. **SHALLOW FOUNDATION:** Presumptive Bearing Capacity according to BIS, Factors affecting bearing capacity and Settlement, Factors influencing selection of depth of foundation, types of shallow foundations – Isolated footing, Combined footing, Strip footing and Raft foundation (Proportioning only).
2. **PILE FOUNDATIONS:** Classification, Load bearing capacity by Static formula, Dynamic formula, Pile load test and Penetration tests, pile groups, Under reamed piles, Settlement of piles, Design of concrete and steel piles, Laterally loaded piles.
3. **MACHINE FOUNDATION:** Introduction to vibration theory – Free and Forced vibrations with and without damping, Single degree of freedom system, Natural frequency of foundation soil system, BIS approach and Pressure bulb concept, Dynamic analysis of block foundation, BIS practice for Reciprocating, Rotary and Impact type of machines, Design of block foundation for machines, Vibration isolation.
4. **SPECIAL FOUNDATIONS:** Expansive soil – Definition, Identification, Structure, Index properties, Swell potential, Swell pressure, Free swell, CNS layer, Foundation treatment for structures on expansive soil.
Ground improvement techniques – Importance, Methods – Vibroflotation, Stone column, Precompression, Blasting, Compaction piles, Cement grout, Thermal treatment, Electro osmosis.
Excavations and Bracings – Introduction, Open excavation with unsupported slopes, Sheet piling and bracing for Shallow and Deep excavations, Movements associated with excavation.

REFERENCE BOOKS:

1. Bowles J.E. (1996), 'Foundation Analysis and Designs, 5th Ed. McGraw Hill Publication, Co., New York.
2. Kameswara Rao NSV (1998), 'Vibration analysis and foundation dynamics', Wheeler Pub. Co., New Delhi.
3. Kurian N.P. (1994) 'Design of foundation systems', Narosa Pub. House, New Delhi.
4. Murthy V.N.S. (1996), 'Soil Mechanics and Foundation Engineering, 4th Ed. USB Publication and Distributors, New Delhi.
5. Nayak, N.V. (1982), 'Foundation Design Manual', 2nd Ed. Dhanpat Rai and Sons, New Delhi.
6. Prakash S., Ranjan G. and Saran S. (1989), 'Analysis and Design of Foundation and Retaining Structures', 2nd Eds., Sarita Prakashan, New Delhi.
7. Punmia B.C. (1981), 'Soil Mechanics and Foundations', Standard Book House, New Delhi.
8. Swami Saran (1999), 'Analysis and Design of Sub-structures', Oxford and IBH Pub. Co., New Delhi.
9. Relevant BIS Codes.

CT 842: SPECIAL CONCRETE (Elective)

Review of conventional concrete and its recent developments in process and constituent materially.

Ferrocement Materials and mechanical properties, strength and behaviour in tension, Compression, flexure and cracking. Durability of ferrocement, prestressed, lightweight ferrocement, design of ferrocement in flexure.

Fibre reinforced concrete: Fibre materially, mix properties, fibre content – distribution, orientation and interfacial bond fibre concrete properties in fresh state. Strength and behaviour in tension, compression and bending.

High density concrete: Materials, placement method, properties in wet and hardened state, use of high density concrete as radiation shields.

Light weight concrete: Classification, properties of light – weight concrete, strength and durability, design of lightweight concrete mixes. Super plasticized concrete, polymer concrete compositing admixtures in concrete, polymer interiated concrete.

High strength concrete.

Modern concrete chemicals.

REFERENCE BOOKS:

1. Paul and Rama, 'Ferrocement IFIC, All, Bangalore
2. Short A and V Auniburg N. 'Lightweight concrete'
3. Hevile A.M. 'Properties of Concrete'
4. Shah S.P. 'Special Concrete' Proceedings of seminar university of Illinois, 1973.

CT 843: GEOGRAPHIC INFORMATION SYSTEM (GIS) (Elective)

1. Geographic Information concepts and spatial models, Introduction, Spatial information, temporal information, conceptual models of spatial information, representation of geographic information. 03 hrs
2. GIS Functionality – Introduction, data acquisition, preliminary data processing, data storage and retrieval, spatial search and analysis, graphics and interaction. 04 hrs
3. Computer Fundamentals of GIS and Data storage Fundamentals of computers vector/raster storage character files and binary files, file organization, linked lists, chains, trees. 04 Hrs
4. Coordinate systems and map projection: Rectangular, polar and spherical coordinates, types of map projections, choosing a map projection. 04 Hrs
5. GIS Data models and structures - Cartographic map model, Geo-relation model, vector/raster methods, non-spatial data base structure viz., tierarchail network, relational structures. 05 Hrs
6. Digitizing Editing and Structuring map data – Entering the spatial data (digitising), the non-spatial, associated attributes, linking spatial and non-spatial data, use of digitizers and scanners of different types. 05 Hrs
7. Data quality and sources of error – Sources of errors in GIS data, obvious sources, natural variations and the processing errors and accuracy. 05 Hrs
8. Principles of Spatial data access and search, regular and object oriented decomposition, introduction to spatial data analysis, and overlay analysis, raster analysis, network analysis in GIS. 05 Hrs
9. GIS and remote sensing data integration techniques in spatial decision support system land suitability and multioriteria evaluation, rule based systems, network analysis, special interaction modeling , Virtual GIS. 06 Hrs
10. Data base positioning systems, desirable characteristics of data base management systems, components of a data base management system, understanding the data conceptual modeling. 04 Hrs
11. Global positioning system, hyper spectral remote sensing, DIP techniques, hardware and software requirements for GIS, overview of GIS software. 05 Hrs

REFERENCE BOOKS:

1. Peter A Burrough Rachael A Mc Donnel, Principles of GIS (Oxford)
2. Christopher Jones, GIS and Computer Cartography (Longman)
3. Lillesand, remote sensing and image interpretation (John Wiley and Sons)

Scheme of Examination: Student has to answer five questions out of eight.

CT 844: PROJECT SAFETY MANAGEMENT (Elective)

1. Construction Accidents

Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications. 10 hrs

2. Safety Programmes

Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives. 10 hrs

3. Contractual Obligations

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping.

4. Designing for Safety

Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety Personnel – Sub-contractual Obligation – Project Co-ordination and Safety Procedures – Workers Compensation.

5. Owner's and Designers' Outlook, Building Legislation regarding Safety in Construction.

REFERENCE BOOKS:

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997.
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.

CT 85: PROJECT WORK

The problem (analytical/ computational / experimental / design oriented / statically) Shall be selected after detailed discussion with guide and H.O.D. The project shall have following features:

- i. Definition of the problem
- ii. Exhaustive literature survey
- iii. Analysis based on type of problem (as given above)
- iv. Conclusions, scope for further work
- v. References.

The Project shall be submitted in the prescribed standard format and four copies shall be submitted after certification by the Guide and H.O.D.

CT 86: SEMINAR

Students have to prepare and submit a report on the topic of seminar selected.
Students have

To give a presentation of the seminar topic to a departmental seminar committee.

Report Evaluation : 25 Marks (by Guide)

Presentation : 25 Marks.

Presentation to be evaluated by departmental seminar committee.

Departmental Seminar Committee : Head of the Department

: Guide

: One Subject expert from the department.