

**III SEMESTER B.E (CT&M)**  
**10 MAT 31: ENGINEERING MATHEMATICS – III**

**PART – A**

**NUMERICAL ANALYSIS:** Roots of Transcendental equations using Bisection Method, Regular Falsi Method and Newton-Raphson Method, Finite difference, forward, backward and central difference operators (no derivations on relations between operators), Newton-Gregory forward and backward interpolation formulæ. Stirling's and Bessel's interpolation formulæ (without proof), Language's and Newton's divided difference interpolation formulæ (without proof), Inverse interpolation using Language's interpolation formulæ, Numerical differentiation using Newton's forward and backward formulæ.

Numerical integration-Trapezoidal rule, Simpson's one third rule, Simpson's three eight rule and Weddle's rule (no derivation of any formulæ). Numerical solutions of first order ODE – Taylor's series Method, Modified Euler's method, Runge-Kutta 4<sup>th</sup> order method, Milne's Predictor and Corrector method (problems only). 14 hrs

**PART – B**

**FOURIER SERIES, FOURIER TRANSFORMS, Z-TRANSFORMS:** Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous functions and functions having infinite number of discontinuities, even and odd functions. Half-range series, Practical Harmonic Analysis.

Infinite Fourier transforms and Inverse Fourier transforms-simple properties, Complex Fourier transform, Fourier sine and Fourier cosine transforms, Inverse Fourier sine and cosine transforms, Convolution theorem and Parseval's identity (without proofs).

Z-Transforms – definition, standard forms, Linearity property, damping rule, shifting rule – problems. 14 hrs

**PART – C**

**PARTIAL DIFFERENTIAL EQUATIONS:** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, Solution of equations of the type:  $P_p + Q_p = R$ , Charpit's method, Solution of PDEs by the method of separation of variables.

Derivation of one-dimensional heat and wave equations. Numerical solutions of One-dimensional heat and wave equations by Explicit method, Laplace equation by using standard five points formula. 12 hrs

**PART – D**

**LINEAR ALGEBRA:** Rank of a matrix by elementary row transformations, Consistency of system of linear equations, Gauss elimination method, Gauss – Seidel method Characteristic values and Characteristic vectors of matrices (no theorems), Largest Eigen value and the corresponding Eigen vector by power Method.

**CALCULUS OF VARIATIONS:** Variation of a function and a functional, Extremal of a functional, Variational Problems, Euler’s equation, Standard variational problems including geodesics, minimal surface of revolution, hanging chain and Brachistochrone problems.

**TEXT BOOKS:**

Higher Engineering Mathematics (36<sup>th</sup> edition-2002) by Dr. B.S. Grewal, Khanna Publishers, New Delhi.

**PART – A: Numerical Analysis:**

Chapter 24: 24.1, 24.2

Chapter 25: 25.1, 25.5 to 25.7, 25.12 to 25.14, 25.16

Chapter 27: 27.1, 27.3 to 27.5, 27.7, 27.8

**PART – B: Fourier Series, Fourier Transforms, Z-Transforms:**

Chapter 10: 10.1 to 10.7, 10.11

Chapter 22: 22.1, 22.4 to 22.7

Chapter 26: 26.9 to 26.14

Chapter 18: 18.1 to 18.4(1), 18.5(1)

Chapter 28: 28.1 to 30.5

**PART – C: Partial Differential Equations:**

Chapter 17: 17.1 to 17.3, 17.5, 17.7

Chapter 18: 18.1 to 18.4(1), 18.5(1)

Chapter 28: 28.1 to 28.5

**PART – D: Linear Algebra and Calculus of Variations:**

Chapter 2 : 29(1), 29(2), 211(1), 2.14(2)

Chapter 24: 24.4, 24.5(1). 24.6(2), 24.8

Chapter 30: 30.1 to 30.5

**REFERENCE BOOKS:**

Advanced Engineering Mathematics by E Kreyszig (John Wiley and Sons)

PART – A	Roots of Transcendental equations – Numerical differentiation Integration – End	One Question One Question
PART – B	Fourier Series Fourier Transforms and Z – Transforms	One Question One Question
PART – C	Formation of PDEs – Method of Separation of variables Derivation of One-dimensional heat and wave equations – End.	One Question One Question
PART – D	Linear Algebra Calculus of Variations	One Question One Question

Note: Eight questions to be set, out of which five full questions to be answered, choosing at least one question from each part.

**III SEMESTER B.E (CT&M)**  
**10CT 32: Materials Of Construction**

Part – A

Unit - I

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. Asphaltic corrugated sheets, clay flooring and terracing tiles. 8 Hrs

Unit - II

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. 6 Hr

Unit-III

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.  
**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. 10 Hrs

Unit - IV

4. **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. 8Hrs

Part- B

Unit - V

5. **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. 4 HRs

Unit - VI

6. **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. 4Hrs

Unit - VII

7. **Electrical, Thermal and sound insulations:** A brief account of their physical properties and uses.  
**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. 8 Hrs

Unit - VIII

8. **Plastics:** Composition - classification of plastic – Resins – properties, Moulding and plastics, uses of plastics in building industry. 4 Hrs

**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.

# 10CT/CV33 Strength Of Materials

## Part - A

### UNIT 1:

#### Simple Stress and Strain

1.1 Introduction, 1.2 Properties of Materials, 1.3 Stress, Strain, Hook's law, 1.4 Poisson's Ratio, 1.5 Stress – Strain Diagram for structural steel and non ferrous materials, 1.6 Principles of superposition, 1.7 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, 2.2 Volumetric strain, expression for volumetric strain, 2.3 Elastic constants, relationship among elastic constants, 2.4 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 Types of beams loadings and supports, 4.3 Shearing force in beam, 4.4 Bending moment, 4.5 Sign convention, 4.6 Relationship between loading, shear force and bending moment, 4.7 Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering point loads, UDL, UVL and Couple.

7 Hours

## Part - B

### UNIT 5:

#### Bending stress, shear stress in beams

5.1 Introduction – Bending stress in beam, 5.2 Assumptions in simple bending theory, 5.3 Pure bending derivation of Bernoulli's 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, symmetrical '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 ration, 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 and 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 (5<sup>th</sup> Edition), Thomson Learning.**

## **10CT/CV 34: Surveying – I**

### **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 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, Thomson 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.



## **10CT35 Management Theory – Principles And Practices Part – A**

### **Unit - I**

**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. 10 Hrs

### **Unit - II**

**FORM OF OWNERSHIP IN INDUSTRY:** Public and Private enterprise sole proprietorship, partnership, joint stock company, co-operatives, Means of finance. 10 Hrs

### **Unit - III**

**FUNCTIONS AND PRINCIPLES OF MANAGEMENT:** Planning organizing, staffing, directing and controlling, principles of management, sources of authority and responsibility. 10 Hrs

### **Unit - IV**

**PLANNING AND ORGANIZING:** Nature of planning, types, importances and steps in planning. 4 Hrs

## **Part - B**

### **Unit - V**

**MBO principles of sound organization , types of organization, structures span of control.** 4 Hrs

### **Unit -VI**

**STAFFING, DIRECTING AND CONTROLLING:** Selection, appraisal, training and development. 4 Hrs

### **Unit -VII**

**Leadership, motivation communication process and control, requirements of adequate control.** 4 Hrs

### **Unit - VIII**

**GLOBAL MANAGEMENT CONCEPT:** Corporate strategies e-governance, Re-engineering, benchmarking six sigma, core competencies management and society. 6 Hrs

### **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.

## **10CT/CV36: Applied Engineering Geology**

### **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, Chalcopyrite, 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, Porphiries, 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 (3<sup>rd</sup> Ed.) Universities Press.
2. Structural Geology (3<sup>rd</sup> 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 Verilag, 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.

## **10CTL37: Construction Materials Testing Lab-I**

1. Tension test on structural materials-mild steel and HYSD bars.
2. Compression test on structural materials-mild steel, cast iron and 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. Strength tests on Roofing, flooring tiles, interlocking pavement blocks, Mosaic tiles and ceramic 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.

## 10CTL/CVL38: Survey Practice – I

### 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. Setting out building plans.

### Exercise – 2

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

### Exercise – 3

Measurement of bearing of sides of a closed traverse and adjustment of closing error by Bowdich method and Transit method.

### Exercise – 4

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

### Exercise – 5

To determine the distance between two inaccessible points using chain/tape and compass.

### Exercise – 6

To locate points using radiation and intersection method of plane tabling.

### Exercise – 7

To solve 3-point problem in plane using Bessel's graphical solution.

### Exercise – 8

To determine difference in elevation between two points using fly levelling technique and to conduct fly back levelling using HI and Rise and Fall methods.

### Exercise – 9

To determine difference in elevation between two points using reciprocal levelling and determine the collimation error.

### Exercise – 10

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

### Exercise – 11

Demonstration of minor instruments like clinometer, cyclone 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.

**IV SEMESTER B.E (CT&M)**  
**10MAT41: ENGINEERING MATHEMATICS – IV**

**PART – A**

**COMPLEX VARIABLES:**

Functions of complex variables, Limit, continuity and differentiability (definitions only), Analytic functions, Cauchy-Reimann equations in Cartesian and Polar forms – consequences, construction of analytic function (Cartesian and polar forms), Definition of Conformal transformations:  $z^2$ ,  $e^z$  and  $z + a^2/z$  ( $z \neq 0$ ), Bilinear transformations.

**Complex Integrations:** Line integral, Cauchy's theorem – corollaries, Cauchy's integral formula. Taylor's and Laurent's series (statements only), Singularities, Poles, Calculations of Residues, Residue theorem (without proof) – problems. 14 Hrs

**PART – B**

**SPECIAL FUNCTIONS:**

Series solution of Bessel's differential equation, recurrence formulae, Generating function, orthogonal property, Bessel's integral formula. Series solution of Legendre's differential equation, Recurrence formulae, Generating function, orthogonal property, Rodrigue's formula. 14 Hrs

**PART – C**

**STATISTICS AND PROBABILITY:**

Curve fitting by the method of least squares:  $y = a + bx$ ,  $y = ab^x$ ,  $y = a + bx + cx^2$ . Correlation probability, multiplication rule, bayes' rule. Discrete and continuous random variables-PDF-CDF, Binomial, Poisson, Exponential and Normal distributions. 12 Hrs

**PART – D**

**SAMPLING DISTRIBUTION:**

Sampling, Sampling distribution, Standard error, Null and alternate hypotheses, Type I and Type II errors, Testing of hypothesis for Means, Level of Significance for means, Confidence limits for Means, large and small samples, Student's t-distribution.

**JOINT PROBABILITY DISTRIBUTION AND MARKOV CHAINS:**

Concept of joint probability, Joint distributions – discrete random variables, Independent random variables, Problems on expectations and variance. Markov chains – Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

**TEXT BOOKS:** Higher Engineering Mathematics (36<sup>th</sup> edition-2002) by Dr. B.S. Grewal, Khanna Publishers, New Delhi.

**PART – A: Complex Variables:**

Chapter 20: 20.1 to 20.6, 20.8(4), 20.9(1), 20.10 (1 to 3)  
20.12 to 20.14, 20.16(2,3), 20.17 to 20.19

**PART – B: Special Functions:**

Chapter 16: 16.6 to 16.9, 16.11, 16.13 to 16.17

**PART – C: Statistics and Probability:**

Chapter 1 : 1.13, 1.14

Chapter 23: 23.9, 23.10, 23.14, 23.16 to 23.21, 23.26, 23.27(5), 23.28

**PART – D: Sampling Distribution:**

Chapter 23: 23.31 to 23.33, 23.34 to 23.36

Joint Probability distributions and Markov Chains:

**REFERENCES:BOOKS:** Advanced Engineering Mathematics by E. Kreyszig (John Wiley & Sons).

PART – A	Functions of Complex Variable – Bilinear transformation Complex integration	One Question One Question
PART – B	Bessel’s Differential Equation Legendre’s Differential Equation	One Question One Question
PART – C	Curve fitting – Bayes’ Rule Random Variables – End	One Question One Question
PART – D	Sampling Distributions Joint Probability distributions End.	One Question One Question

## 10CT/CV42: Concrete Technology

### 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

## 10CT43 Structural Analysis

### Part - A

#### Unit - I

Introduction- Conditions of Equilibrium, Degrees of freedom, Determinate and indeterminate structures. 3 Hrs

Analysis of plane trusses – Method of Joints and Method of Sections 5 Hrs

#### Unit - II

Determination of Deflection of determinate beams by using geometric methods- moment area and conjugate beam approach 6 Hrs

#### Unit - III

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 8 Hrs

#### Unit – IV

Analysis of three hinged parabolic arch 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). 6 Hrs

### Part - B

#### Unit - V

Analysis of statically indeterminate beam- Propped cantilever using consistent deformation method. 5 Hrs

#### Unit – VI

Analysis of continuous beams using Clapeyron's three moment equation 6 Hrs

#### Unit – VII

Analysis of continuous beams and simple orthogonal portal frames (without sway) by slope deflection method 7 Hrs

#### Unit - VIII

Analysis of continuous beams and simple orthogonal portal frames (without sway) by moment distribution method 6 Hrs

#### TEXT BOOKS:

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

#### REFERENCE BOOKS:

1. Indeterminate Structural Analysis – J. Sterling Kinney
2. Elemental Structural Analysis – Norris C H , Wilbur J.B
3. Intermediate Structural Analysis – C.K.Wang

**10CT44: Surveying – II**  
**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 Subtense bar, 4.8 Beam and 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**, Arther Bannister et al., Pearson Education, India

# 10CT45: Building Construction

## Part - A

### Unit- I

#### 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

### Unit - II

#### 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.

#### STONE MASONRY:

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

08 Hrs

### Unit - III

**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

**Unit - IV**

**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

**Part - B**

**Unit - V**

**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)

**PLASTERING:**

Purpose of plastering

Materials of plastering

Lime mortar

Cement Mortar

Methods of plastering

Lath plastering

06 Hrs

**Unit - VI**

**FLOORING:**

Types of flooring (Materials and method of laying)

Granolithic

Mosaic

Ceramic  
Marble  
Polished granite  
Industrial flooring

03 Hrs

#### **Unit - VII**

### **3. 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  
Bay window  
Dormer window  
Louvered and corner window  
Ventilators

#### **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

07 Hrs

#### **Unit - VIII**

### **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

#### **FORM WORK**

Form work details

RCC columns  
Beams  
Floors  
Slip forming

07 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.



## **10CT46: Financial And Cost Accounting**

### **Part – A**

#### **Unit - I**

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. 10 Hrs

#### **Unit - II**

2. Preparation of Final Accounts – Adjusting Entry – Trading, Profit and Loss Account and Balance Sheet. 6 hrs

#### **Unit - III**

3. Budget - Meaning and definitions – Preparation of Functional Budgets – Cash Budget - Sales Budget – Purchases and Production Budget – Flexible Budget. 6 Hrs

#### **Unit - IV**

4. Capital Budgeting – Nature, Importance and Objectives – Process involved in Capital Budgeting – Kinds of Capital Budgeting Decision 6 Hrs

### **Part – B**

#### **Unit - V**

5. Methods of Evaluating Investment Proposals – Payback method – Payback profitability method – Discounted Cash Flow method – Net present – Value method. 6 Hrs

#### **Unit - VI**

6. Costing concepts – Meaning and Definition – Objectives – Difference between Cost of Financial Accounting 6 Hrs

#### **Unit - VII**

7. Cost Classification Statement of Cost and Estimation – Methods of Costing – Job Costing and Process Costing. 6 Hrs

#### **Unit - VIII**

8. 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. 6 Hrs

#### **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.

## 10CVL47: Survey Practice – II

### 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 tachometric 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.

## 10CTL48: 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 B.E (CT&M)**  
**10AL51 Management & Entrepreneurship**

**PART - A**

**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**

**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, Tata McGraw Hill.
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 – 17<sup>th</sup> Edition, 2003.
4. **Management & Entrepreneurship** by N V R Naidu & T Krishna Rao – I K International Publishing House Pvt. Ltd. 1<sup>st</sup> edition

# 10CV52: Design Of Rcc Structural Elements

## PART - A

### UNIT - 1

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

**6 Hours**

### UNIT - 2

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

7

**Hours**

### UNIT - 3

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

**6 Hours**

### UNIT - 4

**DESIGN OF BEAMS:** Design procedures for critical sections for moment and shears. Anchorages of bars, check for development length, Reinforcement requirements, Slenderness limits for beams to ensure lateral stability, Design examples for Simply supported and Cantilever beams for rectangular and flanged sections.

**8 Hours**

## PART - B

### UNIT - 5

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

**8 Hours**

### UNIT - 6

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

**5 Hours**

### UNIT - 7

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

**6 Hours**

### UNIT - 8

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

**6 Hours**

**REFERENCE BOOKS:**

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

## **10CT53 Transportation Engineering (Roads & Railways)**

### **10CT53 TRANSPORTATION ENGINEERING (ROADS AND RAILWAYS) PART – A (ROADWAYS)**

#### **UNIT – 1**

**PRINCIPLES OF TRANSPORTATION ENGINEERING:** Importance of Transportation. Different modes of transportation, characteristics and comparison of different modes. Jayakar committee recommendations and implementation. **3 Hours**

#### **UNIT – 2**

**HIGHWAY DEVELOPMENT AND PLANNING:** Road Types and classification, road patterns. Planning surveys, Master plan - saturation system of road planning, phasing road development programme Road Development in India, 1st, 2nd & 3rd 20-year road development plan and problems only on 3rd 20-year road plan. Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCCL) – problems on best alignment among alternate proposals and phasing, Road Development Plan Vision 2021. **5 Hours**

#### **UNIT – 3**

**HIGHWAY ALIGNMENT AND SURVEYS:** Ideal alignment, factors affecting alignment, engineering surveys for new and realignment projects. **3 Hours**

**HIGHWAY GEOMETRIC DESIGN:** Importance, Factors controlling the design of geometric elements, highway cross section elements – pavement surface characteristics, camber, width of carriageway, shoulder width, formation width, right of way, typical cross section of roads. Sight distance, Types and importance - Design of horizontal and vertical alignment – Numerical problems on above (No derivation of formulae). **8 Hours**

#### **UNIT – 4**

**PAVEMENT DESIGN:** Types of pavements – Design factors, Determination of ESWL by equal stress criteria and problems. IRC method of flexible pavement design based on CSA method using IRC: 37 – 2001. Stresses in rigid pavement and design of rigid pavement as per IRC: 58 –2002 excluding design of joints. **7 Hours**

### **PART – B (RAILWAYS)**

#### **UNIT – 5**

**PERMANENT WAY:** Role of railways in transportation, Indian Railways, selection of routes. Introduction to Permanent Way, requirements for an ideal permanent way, typical cross sections of single and double line B.G. tracks – in cutting , embankment and electrified tracks. Gauges and types of gauges with dimensions. Coning of wheels and tilting of rails. Track stresses in rails, sleepers, ballast and subgrade. Problems on these. Rails functions requirements, types of rail sections, length of rails, defects in rails. Wear on rails, rail joints, welding of rails, creep of rails. **7 Hours**



#### **UNIT – 6**

**BALLAST AND SLEEPERS:** Functions, requirements, types, track fittings and fasteners, calculation of quantity of materials needed for laying a track. Traction and tractive resistances, tractive power, Hauling capacity. Problems on above. **4 Hours**

#### **UNIT – 7**

**GEOMETRIC DESIGN OF TRACK:** Necessity of Geometric Design of railway track, gradient and types of gradient. Speed of train, curve, transition curve, super elevation, cant- deficiency, negative cant- speed calculation based on Indian Railways Formulae for High speed tracks only-problems on above. **7 Hours**

#### **UNIT – 8**

**POINTS AND CROSSING:** Necessity and its components, turnout, design of turnout, Types of switches, crossings, track junctions. Stations and yards, marshalling yard, signalling and interlocking, track defects, track maintenance, level crossing, Indian Railway standards (no derivations, only relevant problems). Equipment in stations and yards such as turn-table, water columns, fouling marks, buffer stops etc. **8 Hours**

#### **TEXT BOOKS:**

1. **Highway Engineering-** Khanna, S.K. & Justo, C.E.G., Nem Chand & Bros, Roorkee (2003).
2. **Highway Engineering-** Kadiyali, L.R., Khanna Publishers, New Delhi.
3. **Railway Engineering-** Saxena and Arora, Dhanpat Rai and Sons, New Delhi.
4. **Railway Engineering-** Satish Chandra & Agarwal, M.M., Oxford University Press, New Delhi
5. **Indian railway Track,** Agarwal M.M, Jaico Publications, Bombay.

# 10CT54 Geotechnical Engineering

## Part – A

### Unit - I

#### **INTRODUCTION**

Definition, origin and formation of soil

Phase Diagram; Voids ratio, Porosity, Percentage Air voids, Air content, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density – inter relationships.

Field identification of soils.

06 Hrs

### Unit - II

#### **INDEX PROPERTIES OF SOILS AND THEIR DETERMINATION**

Index properties of soils – Specific gravity, water content, particle size distribution, consistency limits and indices, in situ density, and density index.

Laboratory determination of index properties of soils: Specific gravity by pycnometer / density bottle method, particle size distribution – Sieve analysis and Sedimentation analysis (Hydrometer analysis only), Liquid limit – Casagrande and cone penetration methods, Plastic limit and shrinkage limit determination.

06 Hrs

### Unit - III

#### **CLASSIFICATION OF SOILS**

Particle size classification – MIT classification and IS classification; Textural classification.

Unified soil classification and IS classification – plasticity chart and its importance.

03 Hrs

### Unit - IV

#### **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.

Common clay minerals in soils and their structures – kaolinite, illite and montmorillonite.

06 Hrs

## Part - B

### Unit - V

#### **FLOW OF WATER THROUGH SOILS**

Darcy's law – assumptions 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

Effective stress concept – total pressure and effective stress, quick sand phenomenon.

Capillary phenomenon.

07 Hrs

## **Unit - VI**

### **COMPACTION OF SOILS**

Definition; Standard and Modified Proctor's compaction tests

Factors affecting compaction; Effect of compaction on soil properties.

Field compaction methods – Rollers and vibrators; Field compaction control – Procter's needle. 04 Hrs

## **Unit - VII**

### **CONSOLIDATION OF SOILS**

Definition, Mass – spring analogy

Terzaghi's one dimensional consolidation theory – assumptions and limitations (No derivations)

Normally consolidated, under consolidated and over consolidated soils; Pre-consolidation pressure and its determination by Casagrande's method and log-log method.

Laboratory one dimensional consolidation test; Determination of consolidation characteristics of soils – compression index, and co-efficient of consolidation; Determination of co-efficient of consolidation by square root of time fitting method, logarithmic time fitting method and rectangular hyperbola method.

09 Hrs

## **Unit - VIII**

### **SHEAR STRENGTH OF SOIL**

Concept of shear strength

Mohr's strength theory, Mohr – Coulomb theory

Measurement of shear parameters- Direct shear test, unconfined compression test, triaxial compression test and vane shear test; Tests under different drainage conditions, conventional and modified failure envelopes.

Total and effective shear strength parameters.

Factors affecting shear strength of soils; Sensitivity and thixotropy in soils.

09 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, J.E. (1996), "Foundation Analysis and Designs", 5<sup>th</sup> Edition, McGraw Hill Publishing Co., New York.
3. Murthy, V.N.S. (1996), "Soil Mechanics and Foundation Engineering", 4<sup>th</sup> Edition, UBS Publishers 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. (2000), "Geotechnical Engineering", University press (India) Ltd., Hyderabad.

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

## **10CT55: Construction Economics And Finance**

### **Part - A**

#### **UNIT-I**

##### **ECONOMICS**

Role of Civil Engineering in Industrial Development – Advances in Civil Engineering –Economics – Support Matters of Economy as related to Engineering.

06 Hrs

#### **UNIT-II**

Market demand and supply – Choice of Technology – Quality control and Quality Production.

06 Hrs

#### **UNIT-III**

##### **CONSTRUCTION ECONOMICS**

Construction development in Housing, transport and other infrastructures – Economics of ecology, environment, energy resources.

06 Hrs

#### **UNIT-IV**

Construction workers – Urban Problems – Poverty – Unemployment Effects on economics due to migration of construction workers to urban area.

08 Hrs

### **Part - B**

#### **UNIT-V**

##### **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.

10 Hrs

#### **UNIT-VI**

Fund Flow and Cash Flow statements (Simple Problems)

06 Hrs

#### **UNIT-VII**

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

06 Hrs

#### **UNIT-VIII**

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

04 Hrs

#### **REFERENCE BOOKS:**

1. Urban Economics by Warneer Z Hirsch, Macmillan, New York.

2. Financial Management, I.M. Pandey
3. P. Saravanavelu, "Management Accounting - Principles and Practice".
4. Prof. K.S. Nagapathi "Management Accounting", R. Chand & Co., New Delhi.

## 10CT56: Building Planning, Types And Standards

### Part – A

#### Unit - I

To prepare working drawing of component of buildings.

i) stepped well footing and isolated RCC column footing, ii) Sectional details of doors and window frames iii) RCC dog legged and open well stairs, iv) Steel truss 9 Hrs

#### Unit - II

Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio. 05 Hrs

#### Unit - III

Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Two bed room building, ii) Two storeyed building. 10 Hrs

#### Unit - IV

Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building i) Primary health centre, ii) Primary school building, iii) College canteen iv) Office building. 06 Hrs

### Part - B

#### Unit - V

Determinants of building form and plan

Function, climate, space definition, and material availability, cost, time frame, culture, aesthetics, contemporary factors 06 Hrs

#### Unit - VI

Basic parameters of planning –

Functionability, Circulation, Illumination and ventilation, architectural form, area project, axially spaces – parking, during space, greenery, lobbies, waiting area etc. location 06 Hrs

#### Unit - VII

Building types – Private, public, commercial, industrial, Planning criteria for and standards pertaining to various asses. )4 Hrs

#### Unit - VIII

1. Types and standards for -

- a. Residential Buildings
- b. Hospitals
- c. Educational / Schools
- d. Public offices.
- e. Commercial Buildings

- f. Auditoriums
- g. Sports

04 Hrs

**REFERENCE BOOKS:**

1. Shah M.H. and Kale C.M. “Building Drawing” Tata McGraw Hill Publishing Code, BIS, New Delhi.
2. National Building Code, BIS, New Delhi.
3. Gurucharan Singh: “Building Construction”, Standard Publishers and Distributors, New Delhi.
4. Sushil Kumar “Building Construction”, Lakshmi Publishers, New Delhi.
5. Chiara and callender (Ed) – Time Saver Standards for Building Types, McGraw Hill
6. Poulhans Peters (Ed) – Design and Planning series (i) Factories (ii) New Schools (iii) Laboratories (iv) Centres for storage and distributors – Van Nostrand
7. M.F. Schmertz (Ed) – Office Building Design – II Ed., McGraw Hill.
8. Edward D. Mills – Planning Buildings for Administration, Entertainment and recreation – Newnes Butterworth.
9. Kunders – Hospital Planning, Design and Management, Book Base
10. Kubba – Space planning for commercial and residential interiors, Book Base.

## **10CTL57: Computer Aided Drawing Laboratory (CAD LAB)**

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



## 10CTL58 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

## **10CT61: Construction Quality Management**

### **Part - A**

#### **UNIT-I**

##### **QUALITY**

Principles, Concepts in Quality Management, Managing for quality, Impact of Quality Management in Business and Commerce. 04 Hrs

#### **UNIT-II**

Quality Control, Quality costs and its components, Features of Quality, Determinants of service Quality, Need for Quality management in industry. 05 Hrs

#### **UNIT-III**

##### **TOTAL QUALITY MANAGEMENT**

Meaning and Scope, TQM models, Benefits of TQM programme, causes for TQM failures, Remedial measures, Quality Manuals, System Procedures. 06 Hrs

#### **UNIT-IV**

Project Quality Plan and quality Assurance System as per ISO: 9000:2000, TQM Road Map, ISO:9000 for construction, Quality standards and Certification Procedures. 06 Hrs

### **Part – B**

#### **UNIT-V**

##### **QUALITY CIRCLE**

Objectives, structure, steps in formation of Quality Circle, Roles and Responsibilities of QC members and Facilitator, Skills for the Facilitator, precautions to be taken by the Facilitator, Roles and Responsibilities of Leader/ Deputy leader, Prerequisites for a successful leader, Roles and Responsibilities of Steering Committee, Procedure to conduct QC meetings, Quality Audit. 09 Hrs

#### **UNIT-VI**

##### **QUALITY CONTROL IN CONSTRUCTION PROJECTS**

QC in concreting, Brick work, stone masonry, Formwork, Foundations, Piling work, Structural work, Woodwork & Timber, Painting, Electrical system, Waste recovery and maintenance. 09 Hrs

#### **UNIT-VII**

##### **QUALITY MANAGEMENT SYSTEM IN CONSTRUCTION PROJECTS**

Concept, Approach to Problems, Quality Assurance, Quality Control, Quality Inspection, Records and Reports, Training, Total Quality Control, Manual/Check Lists, Guide Lines. 09 Hrs

#### **UNIT-VIII**

##### **BENCH MARKING**

Sources of Benchmarking, Process of Benchmarking, Step model for Benchmarking, Types of Benchmarking, Code of Conduct for Benchmarking, Internal and External Benchmarking, Advantages of Benchmarking. 04 Hrs

#### **Text Books:**

- 1 Total Quality Management for Engineers by Mohammed Zairi, Aditya Books Pvt. Ltd., New Delhi. 1992.
- 2 Project Planning and Control with PERT and CPM by B.C. Punmia and K.K. Khandelwal, Lakshmi Publications Pvt. Ltd., New Delhi.
- 3 Total Quality Management by B. Janakiraman and R.K. Goopal, Prentice-Hall of India Private Limited, New Delhi.

**Reference Books:**

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

**10CT62: Building Services - I**  
**Part - A**

**UNIT-I**

1. Introduction: requirements and necessity of services for buildings 04 Hrs

**UNIT-II**

2. Water supply in buildings
- systems of water supply
  - distribution system
  - appurtenances
  - water supply to high rise buildings-difficulties encountered and remedies
  - fire water supply system
- 08 Hrs

**UNIT-III**

3. Drainage of buildings
- systems of drainage
  - appurtenances
  - choice of systems
  - solid waste disposal from buildings
- 08 Hrs

**UNIT-IV**

4. Air conditioning of buildings
- systems
  - types
  - design
  - installation and maintenance cost
- 08 Hrs

**Part - B**

**UNIT-V**

5. Acoustics
- definition of terminologies
  - acoustic materials-properties
- 06 Hrs

**UNIT-VI**

- design of assembly halls, theatre, auditorium and musical studio
  - noise control in buildings
- 06 Hrs

**UNIT-VII**

6. Fire protection
- necessity
  - fire resistant materials
  - fire load and its calculations
  - fire protection equipment
- 06 Hrs

**UNIT-VIII**

Electrical wiring

- systems of wiring-domestic and commercial buildings
  - conductors, cables and conduits
- 06 Hrs

**Text Books:**

1. Water supply and sanitary engineering by Rangwala,
2. Acoustics and noise control-theory, design by S.K.Kandaswamy(Ed), practice-allied publishers
3. Mechanical and electrical systems by Mc Gainess and stein, John Wiley and Sons.1977

**Reference Books:**

1. ISSP35: Hand Book on water supply and drainage.
2. Architectural acoustic design guide by Acenteen and Cowan, Book Base Member.

## 10CT63 Fluid Mechanics And Hydraulic Structures

### UNIT – 1

**BASIC PROPERTIES OF FLUIDS:** Introduction, Definition of Fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension, & Capillarity. Newton's law of viscosity (theory & problems). Capillary rise in a vertical tube and between two plane surfaces (theory & problems) **5 Hours**

### UNIT – 2

**PRESSURE AND ITS MEASUREMENT:** Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure. Vapour pressure. Measurement of pressure using a simple, differential & inclined manometers (theory & problems). Introduction to Mechanical and electronic pressure measuring devices. Basic definitions of hydrostatic pressure, equations for hydrostatic force and depth of centre of pressure for Vertical and inclined submerged laminae (plane and curved)- Problems. **8 Hours**

### UNIT – 3

**DYNAMICS OF FLUID FLOW:** Introduction, Energy possessed by a fluid body. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Problems on applications of Bernoulli's equation (with and without losses). Introduction to kinetic energy correction factor. Momentum equation problems on pipe bends. Introduction, losses in pipe flow, Darcy-Weisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe – problems **8 Hours**

### UNIT – 4

**DISCHARGE MEASUREMENTS:** Introduction, Venturimeter, Orificemeter, Rotometer, Venturiflume, Triangular notch, Rectangular notch, Cipolletti notch, Ogee weir and Broad crested weir, Small orifices – Problems. **5 Hours**

## PART – B (HYDRAULIC MACHINES)

### UNIT – 5

**IMPACT OF JET ON VANES:** Introduction to Impulse – momentum equation and its applications, Force exerted by a jet on a fixed target, Derivations, Force exerted by a Jet on a moving target, Derivations, Force exerted by a jet on a series of curved vanes, Concept of velocity triangles, Equation for work done & efficiency, Problems of force exerted by a Jet on a series of curved vanes **7 Hours**

### UNIT – 6

**HYDRAULIC TURBINES:** Introduction, Types and classifications, Pelton Wheel, theory, equation for work done and efficiency, design parameters, Problems on Pelton Wheel, Francis Turbine – Theory, equation for work done and efficiency, design parameters, Problems on Francis turbine, Kaplan turbine – Theory,

equation for work done & efficiency, Design parameters, Problems on Kaplan turbine **8 Hours**

#### **UNIT – 7**

**FLOW IN OPEN CHANNELS:** Definition of open channels, Classification, Difference between pipe flow & open channel flow, Types of flow, Geometric properties of open channels, Uniform flow in open channels, Chezy's and Manning's formulae, Problems on uniform flow, Most economical open channels. Derivation of conditions for rectangle, triangle and trapezoidal sections, Problems on most economical sections, Most economical circular channels derivations and problems **6 Hours**

#### **UNIT – 8**

**CENTRIFUGAL PUMPS:** Definition of pump, classification, Description & general principle of working, priming & methods, Work done & efficiencies of a centrifugal pump, Minimum starting speed, cavitation in centrifugal pumps, Multistage pumps, Problems on Centrifugal pumps **5 Hours**

#### **TEXT BOOKS :**

1. **Hydraulics & Fluid Mechanics**, Modi & Seth., Standard Book House, New Delhi
2. **Fluid Mechanics & Machinery**, Raghunath. H M., CBS Publishers
3. **Text Book on Fluid mechanics & Hydraulic Machines**, Bansal R.K., Laxmi publications

#### **REFERENCE BOOKS:**

1. **Fluid Mechanics and Hydraulic Machines**, S.C. Gupta, Pearson Education, India
2. **Elementary Hydraulics' (1<sup>st</sup> Edition)** James F Cruise, Vijay P. Singh, Mohsan M. Sherif, Thomson Learning.
3. **Hydraulics & Fluid Mechanics**, K.R. Arora, Standard Book house, New Delhi.

# 10CT64: Construction Planning And Control

## Part - A

### UNIT-I

#### **Constructing Planning**

Basic concepts in the Development of Construction Plans, Planning Process – 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.

08 Hrs

### UNIT-II

#### **Scheduling Procedures and Techniques**

Relevance of Construction Schedules – Bar Chart, The Critical Path Method and PERT – Calculations for Critical Path Scheduling and PERT –Presenting Project Schedules

06 Hrs

### UNIT-III

Critical Path Scheduling for Activity-on-Arrow and with Leads, Lags, and Windows – Calculations for Scheduling with Resource Constraints and Precedences – Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations

06 Hrs

### UNIT-IV

Crashing and Time/Cost Tradeoffs – Scheduling in Poorly Structured Problems – Improving and Scheduling Process, work breakdown structure.

06 Hrs

## Part - B

### UNIT-V

#### **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.

08 Hrs

### UNIT-VI

#### **Quality Control in construction**

Quality Concerns in Construction – Organizing for Quality – Work and Material Specifications.

04 Hrs

### UNIT-VII

Total Quality Control – Quality Control by Statistical Control with Sampling by Variables.

4 Hrs



## **UNIT-VIII**

### **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.

10 Hrs

### **Text Books:**

- 1 Project Management by Ahuja H.N., John Wiley, New York, 1999.
- 2 Construction Project Management – Planning, Scheduling and Controlling by Chitkara K.K., Tata McGraw Hill, New Delhi, 2000.

### **Reference Books:**

- 1 Critical Path Methods in Construction Practice by Antil J.M. and Woodhead R.W., John Wiley, Canada, 1999.
- 2 Project Management in Construction by Levy Sidney, McGraw Hill Professional, New York, 2000.
- 3 CPM in Construction Management by O'brien James, McGraw Hill, New York, 1999.

## **06CT65 Highway Construction And Maintenance**

### **PART – A**

#### **UNIT – 1**

Components of road and pavement structure including subgrade, drainage system, functions, requirements and sequence of construction operations **5 Hours**

#### **UNIT – 2**

Pre-construction surveys and marking on ground - Specifications and steps for the construction of road formation in embankment and cut, construction steps for granular sub-base, quality control tests **7 Hours**

#### **UNIT – 3**

Plants and equipment for production of materials - crushers, mixers, bituminous mixing plants, cement concrete mixers – various types, advantages and choice, different types of excavators, graders, soil compactors / rollers, pavers and other equipment for construction of different pavement layers – their uses and choice Problem on equipment usage charges **7 Hours**

#### **UNIT – 4**

Quality assurance, statistical approach, quality system for road construction. Safety aspects during road construction and maintenance works. Installation of various traffic safety devices and information system, Principle of construction planning, application of CPM and PERT (Problems not included) **7 Hours**

### **PART – B**

#### **UNIT – 5**

Different types of granular base course – WMM, CRM, WBM, specifications, construction method and quality control tests. Different types of bituminous layers for binder and surface courses, their specifications (as per IRC and MORTH), construction method and quality control tests **7 Hours**

#### **UNIT – 6**

Different types of sub-base and base course for cement concrete (CC) pavement and construction method. Construction of cement concrete (PQC) pavements and joints, quality control during construction. Construction details of interlocking concrete block pavements **5 Hours**

#### **UNIT – 7**

Road maintenance works – day to day and periodic maintenance works of various components of road works and road furniture. Preventive maintenance of road drainage system, pavements and other components of road. Preparation of existing pavement – patching, profile correction, Special measures to deal with reflection cracks in pavement layers, slipperiness of surface, etc. Requirements for rehabilitation, recycling and re-construction. Special problems in construction

& maintenance of hill roads, land slide, causes, investigation, and preventive and remedial measures, protection of embankment and cut slopes **10 Hours**

### **UNIT – 8**

Drainage – Assessment of drainage requirements for the road and design of various components, drainage materials, Construction of surface and subsurface drainage system and design of filter materials for roads. drainage of urban roads, problems. **4 Hours**

### **TEXT BOOKS:**

1. Peurifoy, R.L., and Clifford, JS “Construction Planning Equipment and Method”- McGraw Hill Book Co. Inc.
2. Sharma S.C., “Construction Equipment and its Management”- Khanna Publishers

### **REFERENCE BOOKS**

1. Freddy L Roberts, Prithvi S Kandhal et al, “Hot Mix Asphalt Materials, mixture design and construction”- (2<sup>nd</sup> Edition), National Asphalt Pavement Association Research and Education Foundation, Maryland, USA
2. National Asphalt Pavement Association “Hot Mix Asphalt Paving Hand book”- 5100 Forbes Boulevard, Lanham, Mary Land, USA
3. “Hand Book on Cement Concrete Roads”- Cement Manufacturers Association, New Delhi
4. MoRTH “Specifications for Roads and Bridge Works”- 2001, fourth revision, Indian Roads Congress
5. MoRTH “Manual for Construction and Supervision of Bituminous Works”- 2001, Indian Roads Congress
6. MoRTH “Manual for Maintenance of Roads”- 1989, Indian Roads Congress
7. IRC: 42-1994, IRC:15-2002, IRC SP :11-1988, , 55-2001, 57-2001,58-2001, IRC 19-1977, 27-1967, 29-1988, 34-1970, 36-1970,48-1972,61-1976, 63-1976, 68-1976, 81-1997,82-1982, 84-1983,93-1985, 94-1986, 95-1987, 98-1997, 105-1988.

# 10CT661 Advanced Surveying

## PART - A

### UNIT - 1

**THEORY OF ERRORS AND TRIANGULATION ADJUSTMENT:** Errors and classification of errors Precision and accuracy, Laws of weights and accidental errors.

**5 Hours**

### UNIT - 2

**PROBABILITY:** Probability distribution function and density function-normal distribution. RMS error-measure of precision. Rejection of observations-principles of least squares-Normal equations.

**6 Hours**

### UNIT - 3

**METHOD OF CORRELATES:** Triangulation adjustment. Angle adjustment, station adjustment and figure adjustment.

**6 Hours**

### UNIT - 4

**ELECTRONIC DISTANCE MEASUREMENT (EDM):** Introduction, Electro Magnetic (EM) Waves. Phase comparison and modulations. Instruments – Geodimeter – Tellurimeter – Distomat – Range finders – Radars. Introduction to GPS Total station.

**8 Hours**

## PART - B

### UNIT - 5

**FIELD ASTRONOMY:** Earth celestial sphere. Solar system Position by altitude and azimuth system-spherical triangle and spherical trigonometry. Astronomical triangle. Nepiers rule.

**8 Hours**

### UNIT - 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.

**6 Hours**

### UNIT - 7

**HYDROGRAPHIC SURVEYING:** Methods of soundings. Instruments. Three point problem. Tidal and Stream discharge measurem

**7 Hours**

### UNIT - 8

**SETTING OUT WORKS:** Introduction. Setting out of buildings, culverts, bridge, pipeline and sewers, tunnels.

**6 Hours**

### TEXT BOOKS:

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

### REFERENCE BOOKS:

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

## 10CT662 Special Concretes

### Part – A

#### Unit - I

1. Fundamentals of concrete technology in relation to special concrete requirements, types of special concretes and their applications. 4 Hrs

#### Unit - II

##### 2. FIBER REINFORCED CONCRETE

Fibre material, mix proportions, fibre content – distribution, orientation and interfacial bond. Fibre concrete properties in fresh state. Strengthen behaviour in tension, compression and bending. Toughness and related tests, Mix design criteria and application. 8 Hrs

#### Unit - III

##### 3. HIGH DENSITY CONCRETE

Materials, placement method, properties in wet and hardened state, Mix design criteria and applications. 8 Hrs

#### Unit - IV

##### 4. LIGHTWEIGHT CONCRETE

Classification, Properties of light weight concrete, Strength and durability, Design of lightweight concrete mixes. 6 Hrs

### Part - B

#### Unit -V

##### 5. HIGH STRENGTH CONCRETE

General introduction, significance of HSC, methods of making HSC, materials and mix proportions. Application of HSC, Ultra HSC, Methods of making Ultra HSC. 8 Hrs

#### Unit -VI

##### 6. POLYMER CONCRETE

Materials, Types, Properties, Mix design criteria and its applications. 4 Hrs

#### Unit - VII

##### 7. HIGH PERFORMANCE CONCRETE

General introduction and significance of HPC. Mix design criteria using plasticizers, SP, HP, Pozzolonic materials such as fly ash, ground granulated blast furnace slag, silica fumes, metakaolin rice husk ash. 8 Hrs

#### Unit -VIII

##### 8. SELF COMPACTING CONCRETE

Introduction, Properties, Test methods and its application. 6 Hrs

#### Text Books

1. Concrete Microstructures, Properties and Materials by P.K. Mehta, and Paulo J.M., Monteiro, Indian Edition.
2. Properties of Concrete by A.M. Neville, Longmans, 4th Edition, 1995

#### Reference Books

1. Relevant National, International Codes, Technical Papers and Internet Information for Special Concrete.

# 10CT663 Water Supply And Sanitation

## Unit I

**Introduction:** Requirement of water for various beneficial uses, Need for protected water supply.

**Demand Of Water:** Types of water demands - domestic demand in detail, institutional and commercial, public uses, fire demand. Per-capita consumption - factors affecting per-capita demand, population forecasting, different methods with merits and demerits - variations in demand of water. Fire demand. Design periods and factors governing the design period.

06 Hrs.

## Unit II

**Quality Of Water:** Objectives of water quality management. Concept of safe water wholesomeness, palatability and potable, waterborne diseases. Examination of water:- Objectives – Physical, Chemical and Microbiological Examinations, (IS:3025 and IS:1622). Drinking water standards- BIS & WHO standards, Health significance of Fluoride, Nitrates.

06 Hrs.

## Unit III

**Water Treatment:** Objectives - Treatment flowchart. Aeration - Principles, types of aerators.

**Sedimentation:** Theory, settling tanks, types and design. Aided sedimentation- with coagulants, dosages.

**Filtration:** Mechanism - theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning.

**Disinfection:** Theory of disinfection, methods of disinfection, Chlorination, chlorine demand, residual chlorine.

07 Hrs.

## Unit IV

**Softening:** Definition, methods of removal of hardness by lime soda-process and zeolite process. Removal of colour, odour, taste with methods like aeration, use of copper sulfate, activated carbon treatment, oxidizing organic matters, removal of iron and manganese, fluoridation and defluoridation.

**Methods of Distribution Systems:** System of supply, service reservoirs and their capacity determination, methods of layout of distribution systems.

**Miscellaneous:** pipe fittings, location of water supply pipes in buildings.

07 Hrs

## Unit V

Waste water disposal - Necessity for sanitation, methods of sewage disposal, types of sewerage systems and their suitability.

**Quantity of Sewage:** Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system, Estimation of storm flow, Rational method and Empirical formulae of design of storm water drain, Time of concentration.

06 Hrs.

## Unit VI

**Sewer Appurtenances:** Catch basins, Manholes, Flushing tanks, oil and grease traps,

Drainage traps, Basic principles of house drainage, Typical layout plan showing house drainage connections, maintenance of house drainage. Sewage Pumps - Need, Types of pumps and pumping stations.

**Analysis of Sewage:** Physical, chemical and Biological characteristics, concepts of Aerobic and Anaerobic activity, more emphasis on BOD and COD. **07 Hrs.**

**Unit VII**

**Treatment of Sewage:** Flow diagram of municipal sewage treatment plant

**Primary treatment:** screening, grit chambers, skimming tanks and design of primary sedimentation tanks. **06 Hrs.**

**Unit VIII**

**Secondary treatment:** Trickling filter (introduction only) Activated sludge process - Principle and flow diagram, methods of aeration, modifications. Methods of sludge disposal: Sludge digestion and Sludge drying beds. **07 Hrs.**

**Text Books:**

1. Garg, S.K., "Water Supply Engineering", Khanna Publishers, 5<sup>th</sup> Edn, 1992
2. Garg, S.K., "Waste Water Treatment" - Khanna Publishers, 4<sup>th</sup> Ed., 1992
3. Punmia B.C. and Ashok Kumar Jain, "Environmental Engineering- I / II", Arihant Publications, 3<sup>rd</sup> Edn, 1995

**Reference Books:**

1. Hammer and Hammer, "Water Technology", Mc Graw Hill Publications
2. Metcalf and Eddy, "Wastewater Treatment- Disposal and Reuse", Tata McGraw Hill Publications 2003
3. Howard S. Peavy, Donald R. Rowe. George Techno Bano Glous, "Environmental Engineering" - McGraw Hill International Ed..

## **10CT664: Fundamentals Of Architecture**

### **Part – A**

#### **Unit - I**

##### **INTRODUCTION**

Aim and importance of architecture; Perceptions of architecture by Architects, Definitions, Architectural composition and analysis – Terms associated with qualities, The aesthetic and functional components. 8 Hrs

#### **Unit - II**

##### **INFLUENCES OF THE FOLLOWING ON ARCHITECTURE**

Association, tradition, climate, materials, topography, religion, social customs and aspirations of the times. 4 Hrs

#### **Unit - III**

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. 8 Hrs

#### **Unit - IV**

##### **INDIAN ARCHITECTURE**

Historical perspective – Hindu Jain, Buddhist, Indo-saracenic and colonial. Features, characteristics and analysis. 8 Hrs

### **Part - B**

#### **Unit - V**

##### **WORLD ARCHITECTURE**

Greek, Roman, Egyptian and Saracenic – Epochs in world architecture, Description and examples 8 Hrs

#### **Unit -VI**

Modern movements and modern architecture. 4 Hrs

#### **Unit -VII**

Post independence Architecture in India, Influences, trends and developments important Indian architects and their works 8 Hrs

#### **Unit -VIII**

Examples of noted Indian architectural works. 4 Hrs

#### **Reference Books:**

1. Indian Architecture by Percy Brown, Vol. 1 & II., Tarapore Publishers, Bombay, 1981.
2. History of Architecture by Fletcher, CBS Publishers, Delhi, 1983.



## **10CTL67: 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.

## **10CTL68: Computer Application Laboratory**

### **MICROSOFT EXCEL LAB EXERCISES**

1. Use basic Windows operations such as how to view toolbars, Spell Check, Open, New, Save, Save As, Print, Print Preview, Page Setup, Headers, Footers, Undo, etc.
2. Enter data and formulas to create an accurate spreadsheet Update and format an existing spreadsheet (Editing--Cut, Paste, Copy, Paste, Font, Borders And Shading, Number Format, Column Width, Center Across Columns, Alignment, Indent, Format Painter, etc.)
3. Use templates, wizards, Work with data bases and use data sort or filters to manipulate information in a spreadsheet
4. Create graphs for reports and presentations (column, bar, pie, three-dimensional, etc.).
5. Development of spreadsheet for Estimation and Design of basic structural elements.

### **MICROSOFT PROJECT SCHEDULING (PLANNING PHASE)**

#### **1. CREATING THE PROJECT SCHEDULE**

Work Breakdown Structure (WBS), Task Relationships, Dependencies and Linking, Lag Time and Lead Time, Constraints,

#### **2. USING CALENDARS**

Project Calendar, Task Calendars, Resource Calendars.

#### **3. PUTTING REALITY INTO YOUR SCHEDULE**

Resources, Resource Allocation and Availability, The Difference Between Duration and Work, Duration vs. Work Based Scheduling, Resource Assignments, 4/40 or 8/80 Rule, Assignment Changes and How They Affect Your Schedule, Resource Over-Allocation

#### **4. BASELINES**

Saving the Baseline, Viewing Baseline Data.

#### **5. REPORTS**

Default Reports, Visual Reports, Custom Reports, Custom Formatting

#### **Reference Books:**

- Microsoft Office Excel, Microsoft Corporation.
- MS Project - User manual, Microsoft Corporation.

**VII SEMESTER B.E (CT&M)**  
**10CT71: Construction Methods And Equipments**  
**Part – A**

**Unit - I**

**Construction Equipment Management**

Identification, construction economy, construction Planning, importance of planning, lack of planning, types of planning, equipment management in projects, classification of equipments, selection of construction equipments, cost of owning and operation, economic life of equipments, cost control of equipments, depreciation analysis.

8 Hrs.

Safety Management- Introduction, salient features of safety programs, general safety programs for construction, safety lacunae in Indian Construction Industry.

2Hrs.

**Unit - II**

**Equipment for Earthwork**

Fundamentals of Earth Work Operations , Machines for preliminary work, types of Earth Work Equipments

Tractors – Basic parts and operation

Scrapers – types, construction, operation and applications.

Motor Graders – construction, operation and safety

Power Shovel – types, basic parts, operation of shovel, selection of type, size of power shovel and factors affecting the output of power shovel, methods of improving the output of power shovel.

Dragline – types, basic parts and operation.

Clamshells - Classification

Hoe – basic parts, operation and application.

Bulldozer – Classification, selection of type of bulldozer and out of bulldozer.

8 Hrs.

**Unit - III**

**Other Construction Equipment**

Equipment for Dredging- Classification, construction and operation

Trenching – types, operation, selecting suitable equipment and trench safety.

Tunneling - aspects for construction of tunnels

Drilling – types of drills(operation), factors affecting selection of drilling equipments.

Blasting – general terms, explosives(type of explosives), blasting operation, transporting, handling and storing of explosives.

8 Hrs.

**Unit - IV**

Equipment for Compaction – Introduction, specification and types of compacting equipments.

Foundation grouting – purpose, exploring the need of grouting, rate of grouting, materials used for grouting, equipments of cement grouting and effectiveness of grouting.

06 Hrs.

## **Part - B**

### **Unit - V**

Pumping Equipments – factors in selecting construction pump and classification.

04 Hrs.

### **Unit – VI**

Dewatering – types.

Hauling equipments and pile driving equipments

06 Hrs.

### **Unit - VII**

**Equipment for Production of aggregate and concreting**

Crushers –Operations and classification.

Screening - types.

06 Hrs.

### **Unit – VIII**

Hauling, Pouring Equipment, Batching and Mixing Equipments – handling equipments.

04 Hrs.

### **REFERENCE BOOKS:**

1. B.Satyanarayana and S.C.Saxena., Constructin, Planning and Equipements, Standard Publishers New Delhi. 1985.
2. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction. Planning, Equipment and Methods, 5<sup>th</sup> Edition, McGraw Hill, Singapore, 1995.
3. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988
4. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988
5. Dr. Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi, 1983.

# 10CT72 Design Of Structures (STEEL AND PSC)

## Part - A

### UNIT-1

**INTRODUCTION:** Advantages and Disadvantages of Steel structures, Loads and Load combinations, Design considerations, Limit State Method (LSM) of design, Failure criteria for steel, Codes, Specifications and section classification. **6 Hours\**

### UNIT-2

**BOLTED CONNECTIONS:** Introduction, Behaviour of Bolted joints, Design strength of ordinary Black Bolts, Design strength of High Strength Friction Grip bolts (HSFG), Pin Connections, Simple Connections, Moment resistant connections, Beam to Beam connections, Beam and Column splices, Semi rigid connections **6 Hours**

### UNIT-3

**WELDED CONNECTIONS:** Introduction, Welding process, Welding electrodes, Advantages of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Effective areas of welds, Design of welds, Simple joints, Moment resistant connections, Continuous Beam to Column connections, Continuous Beam to Beam connections, Beam Column splices, Tubular connections **6 Hours**

### UNIT-4

**Design of Tension & Compression Members:** Introduction, Types of tension members, Design of strands, Slenderness ratio, Behaviour of tension members, Modes of failure, Factors affecting the strength of tension members, Angles under tension, Design of tension members. Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression members, Effective length of compression members, Design of compression members. **8 Hours**

## Part - B

### UNIT-5

**MATERIALS:** High strength concrete and steel, Stress-Strain characteristics and properties. **02 hrs**

### UNIT-6

**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**

### UNIT-7

**ANALYSIS OF SECTIONS FOR FLEXURE:** Stress in concrete due to pre-stress and loads, stresses in steel due to loads, Cable profiles. **08 hrs**

### UNIT-8

**LOSSES OF PRE-STRESSES:** Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force. **06 hrs**

### REFERENCE BOOKS:

1. Design of Steel Structures, N.Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures. Duggal. TATA Megra Hill 2010
3. Bureau of Indian Standards, IS800-2007, IS875-1987
4. Steel Tables
5. N.. Krishna Raju 'Pre-stressed Concrete' Tata McGraw Hill Publishers.
6. P. Dayarathnam 'Pre=stressed Concrete' Oxford and IBH Publishing Co.
7. T.Y. Lin and Ned H. Burns 'Design of Pre-stressed Concrete Structures'.
8. N. C. Sinha and S.K. Roy 'Fundamental of Pre-stressed Concrete' John Wiley and Sons, New York.
9. IS: 1343:1980
10. N. Rajgopalan 'Pre-stressed Concrete'.

# 10CV73 Estimation And Valuation

## 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 & prismatic 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.

## Scheme of Examination:

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# 10CT74: Building Services-II

## Part - A

### UNIT-I

#### Ventilation

- health and comfort ventilation
  - systems
  - factories to be considered for good ventilation
- 08 Hrs

### UNIT-II

#### Thermal comfort in buildings

- factors affecting
  - heat transfer through buildings
  - thermal properties of building materials
  - insulation materials for buildings
- 08 Hrs

### UNIT-III

#### Illumination of buildings

- definition
  - laws of illumination
  - principles of illumination
  - artificial lighting
  - day lighting
  - flood lighting
  - introduction to various types of lamps
- 08 Hrs

### UNIT-IV

#### Elevators

- types
  - working principle
- 06 Hrs

## Part - B

### UNIT-V

- principles of design
  - escalators
- 06 Hrs

### UNIT-VI

#### Communication systems

- terminologies
  - systems of communication
- 06 Hrs

### UNIT-VII

- sound amplification equipments
- 06 Hrs

### UNIT-VIII

Energy conservation in buildings-simple technologies  
06 Hrs

**Text Books:**

1. Mechanical and Electrical Systems in Buildings, by Tao, Prentice Hall publications
2. Building construction by B.C.Punmia, Laxmi Publications.
3. A Text Book on Building Construction by P.C.Varghese, Prentice Hall of India publications
4. Architectural Lighting by Bran David.

**Reference Books:**

1. Mechanical Services for Buildings by Eastop, Longman Publications.
2. IS SP41 and SP32-hand book on functional requirements of buildings



## **10CT751 Pre-Fabrication Construction Techniques (Elective)**

### **Part – A**

#### **Unit - I**

Prefabricated construction, necessity, advantages disadvantages, Mass Produced steel, reinforced concrete and masonry system, industrialized buildings. 6 Hrs

#### **Unit - II**

Modular coordination, basic module, planning and design modules, modular grid systems. 6 Hrs

#### **Unit - III**

National Building Code specifications, standardization, dimensioning of products, preferred dimensions and sizes, tolerances and deviations, layout and processes. 6 Hrs

#### **Unit - IV**

Prefabricates classification, foundation, columns, beams, roof and floor panels, wall panels, clay units, box prefabricates, erection and assembly 6 Hrs

### **Part - B**

#### **Unit -V**

Design of prefabricated elements, lift points, beams, slabs, columns, wall panels, footings 8 Hrs

#### **Unit -VI**

Design of joints to transfer axial forces, moments and shear forces. 6 Hrs

#### **Unit - VII**

Construction techniques, large panel construction, lift slab system, Glover system, Constains's jack- block system, Constain V- plate system, Bison system, Silber – Kuhi system, control of construction processes. 8 Hrs

#### **Unit -VIII**

Equipments, horizontal and vertical transportation. 6 Hrs

#### **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.

# 10CT752 Ground Improvement Techniques

## PART - A

### UNIT - 1

**GROUND IMPROVEMENT:** Definition, Objectives of ground improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique. Ground modification for Black Cotton soil

**4 Hours**

### UNIT - 2

**COMPACTION:** Effect of grain size distribution on compaction for various soil types like lateritic soil, coarse-grained soil and micaceous soil. Effect of compaction on engineering behaviour like compressibility, swelling and shrinkage, permeability, relative density, liquefaction potential. Field compaction – static, dynamic, impact and vibratory type. Specification of compaction. Tolerance of compaction. Shallow and deep compaction, Dynamic Compaction, Vibrofloatation.

**8 Hours**

### UNIT - 3

**HYDRAULIC MODIFICATION:** Definition, Principle and techniques. gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering.

**6 Hours**

### UNIT - 4

**DRAINAGE & PRELOADING:** Importance, Vertical drains, Sand drains, Drainage of slopes, Electro kinetic dewatering, Preloading.

**6 Hours**

## PART - B

### UNIT - 5

**CHEMICAL MODIFICATION-I:** Definition, cement stabilization, sandwich technique, admixtures. Hydration – effect of cement stabilization on permeability, Swelling and shrinkage and strength and deformation characteristics. Criteria for cement stabilization. Stabilization using Fly ash.

**6 Hours**

### UNIT - 6

**CHEMICAL MODIFICATION-II:** Lime stabilization – suitability, process, criteria for lime stabilization. Other chemicals like chlorides, hydroxides, lignin and hydrofluoric acid. Properties of chemical components, reactions and effects. Bitumen, tar or asphalt in stabilization.

**6 Hours**

### UNIT - 7

**GROUTING:** Introduction, Effect of grouting. Chemicals and materials used. Types of grouting. Grouting procedure, Applications of grouting.

**6 Hours**

### UNIT - 8

**MISCELLANEOUS METHODS (ONLY CONCEPTS & USES):** Soil reinforcement, Thermal methods, Ground improvement by confinement – Crib walls, Gabions and Mattresses, Anchors, Rock bolts and soil nailing. Stone Column, Micropiles.

**8 Hours**

### TEXT BOOKS:

1. **Ground Improvement Techniques-** Purushothama Raj P. (1999) Laxmi Publications, New Delhi.

2. **Construction and Geotechnical Method in Foundation Engineering-** Koerner R.M. (1985) - Mc Graw Hill Pub. Co., New York.

**REFERENCE BOOKS:**

1. **Engineering principles of ground modification-** Manfred Hausmann (1990) - Mc Graw Hill Pub. Co., New York.
2. **Methods of treatment of unstable ground-** Bell, F.G. (1975) Butterworths, London.
3. **Expansive soils-** Nelson J.D. and Miller D.J. (1992) -, John Wiley and Sons.
4. **Soil Stabilization; Principles and Practice-** Ingles. C.G. and Metcalf J.B. (1972) - Butterworths, London.

# 10CT753 Numerical Methods In Engineering(Elective)

## PART -A

### UNIT - 1

**INTRODUCTION:** Historical development of Numerical techniques, role in investigations, research and design in the field of civil engineering

**1 Hour**

**DEVELOPMENT OF ALGORITHM/ FLOW CHARTS FOR FOLLOWING METHODS FOR SOLUTION OF LINEAR SIMULTANEOUS EQUATION:**

- a) Gaussian elimination method,
- b) Gauss-Jordan matrix inversion method,
- c) Gauss-Siedel method and
- d) Factorization method

**6 Hours**

### UNIT - 2

**APPLICATION OF SOLUTION OF LINEAR SYSTEM OF EQUATIONS TO CIVIL ENGINEERING PROBLEMS :** Construction planning, slope deflection method applied to beams, frames and truss analysis.

**5 Hours**

### UNIT - 3

**APPLICATION OF ROOT FINDING TO CIVIL ENGINEERING PROBLEMS:** Development of algorithm for a) Bisection method and b) Newton-Raphson method and its applications for solution of non linear algebraic and transcendental equations from problems in hydraulics, irrigation engineering, structural engineering and environmental engineering.

**6 Hours**

### UNIT - 4

**APPLICATION OF NUMERICAL INTEGRATION FOR SOLVING SIMPLE BEAM PROBLEMS:** Development of algorithm for a) Trapezoidal rule and b) Simpson's one third rule and its application for computation of area of BMD drawn for statically determinate beams.

**6 Hours**

## PART -B

### UNIT - 5

New Marks method for computation of slopes and deflections in statically determinate beams.

**6 Hours**

### UNIT - 6

**DEVELOPMENT OF ALGORITHM AND APPLICATION OF SOLUTION OF ORDINARY DIFFERENTIAL EQUATION TO CIVIL ENGINEERING PROBLEMS BY:** a) Euler's method b) Runge Kutta 4<sup>th</sup> order method

**7 Hours**

### UNIT - 7

**APPLICATION OF FINITE DIFFERENCE TECHNIQUE IN STRUCTURAL MECHANICS:**

- i. Introduction, expression of derivatives by finite difference: backward differences, forward differences and central differences.
- ii. Application of finite difference method for analysis of a) statically determinate beams, b) statically indeterminate beams

**8 Hours**

### UNIT - 8

Application of Finite difference technique in structural mechanics (Contd..)

- a) Buckling of columns, b) Beams on elastic foundation.

**7 Hours**

**REFERENCE BOOKS:**

1. **Numerical Methods for Engineers-** Chapra S.C. & R.P.Canale : McGraw Hill, 1990.
2. **Numerical methods in Engineering Problem-** N.Krishna Raju, K.U.Muthu : MacMillan Indian Limited, 1990.
3. **Numerical methods for Engineers and Scientists-** Iqbal H.Khan, Q. Hassan : Galgotia, New Delhi, 1997.
4. **Numerical methods in Computer Programs in C<sup>++</sup>** - Pallab Ghosh : Prentice Hall of India Private Limited, New Delhi, 2006.
5. **Numerical methods for engineers using MATLAB and C – I Edition** SCHILLING “ Thomson Publications”

## 10CT754 Landscape Design And Planning (Elective)

### Unit - I

Man and the landscape: Landscape Development in Historical perspective – brief review of development of garden styles. Importance and role of landscape in Architecture. 7 Hrs

### Unit II

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 6 Hrs

### Unit III

- 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). 7 Hrs

### Unit IV

- **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. 6 Hrs

### Unit V

- Sculptures and architectural features as elements.
- Design concept related to use of landscape elements in out door design – Grouping of elements, visual effects etc. 6Hrs

### Unit VI

- **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. 7 Hrs

### Unit VII

- **Landscape Construction**
  - Elementary knowledge of grading, cut and fill, shaping the site.
  - Use of materials use in landscape and their details. 6 Hrs

### Unit VIII

- 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.

7 Hrs

**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

# 10CT761 Pavement Materials And Construction (Elective)

## PART - A PAVEMENT MATERIALS

### UNIT - 1

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

**6 Hours**

### UNIT - 2

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

**4 Hours**

### UNIT - 3

**BITUMINOUS EMULSIONS AND CUTBACKS:** Preparation, characteristics, uses and tests. Adhesion of Bituminous Binders to Road Aggregates: Adhesion failure, mechanism of stripping, tests and methods of improving adhesion.

**8 Hours**

### UNIT - 4

**BITUMINOUS MIXES:** Mechanical properties, dense and open textured mixes, flexibility and brittleness, (no Hveem Stabilometer & Hubbar – Field Tests) bituminous mix, design methods using Rothfuch's Method only and specification, Marshal mixed design criteria- voids in mineral aggregates, voids in total mix, density, flow, stability, percentage voids filled with bitumen.

**6 Hours**

## PART - B

### PAVEMENT CONSTRUCTION

### UNIT - 5

**EQUIPMENT IN HIGHWAY CONSTRUCTION:** Various types of equipment for excavation, grading and compaction – their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction.

**6 Hours**

### UNIT - 6

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

**6 Hours**

### UNIT - 7

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

**8 Hours**

### UNIT - 8

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

**8 Hours**

### TEXT BOOKS:

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

### REFERENCES BOOKS:

1. RRL, DSIR, '**Bituminous Materials in Road Construction**', HMSO Publication.



2. RRL, DSIR, '**Soil Mechanics for Road Engineers**', HMSO Publication.
3. Relevant IRC codes and MoRT & H specifications.

## **Part A**

### **Unit - I**

#### **Urban Planning**

Introduction: evolution of planning, objects, principles and necessity of town planning, growth of towns, requirements of new towns, present position of planning in India, land use planning and neighborhood planning.

7 Hrs

### **Unit - II**

Zoning: meaning of the term zoning, objectives, principles, importance, aspects and advantages of zoning, zoning powers, transition zones

6 Hrs

### **Unit - III**

Housing: importance, demand, requirements, low cost housing, slums-causes and effects, clearance of slums, building bye laws

6 Hrs

### **Unit - IV**

Development of master plan-objectives, necessity and features of master plan, data collected, drawings prepare, stages of preparation and method of execution of development plan

6 Hrs

## **Part B**

### **Unit - V**

#### **Modern Architecture**

Introduction: aim and importance of architecture, role of an engineer and an architect

7 Hrs

### **Unit - VI**

Principles and qualities of architecture: the aesthetic and the functional components in architecture

6 Hrs

### **Unit – VII**

Vernacular architecture in India-post independent buildings, planning of new capitals

7 Hrs

## **Unit - VIII**

Study of works of contemporary architects like Le Corbusier, Roche, Kahn, Charles Correa, B.V.Doshi.

7 Hrs

### **Text Books:**

1. Town Planning by Rangwala, Charotar Publishing House Pvt.Ltd
2. Building Planning, Designing, and Scheduling, Gurucharan Singh and Jagadish Singh-Standard Publishers, New Delhi
3. Principles of architecture, Muthu Shoba Mohan, Oxford University Press New Delhi
4. Bran David-Architectural Lighting

### **Reference Books:**

1. Town and Country Planning by K.S.Ramegowda.
2. Urban Design by Gallion & Eisner
3. History of Architecture by Fletcher

# 10CT763 Alternate Building Materials And Technologies (Elective)

## PART - A

### UNIT - 1

#### INTRODUCTION:

1. Energy in building materials
2. Environmental issues concerned to building materials
3. Global warming and construction industry
4. Environmental friendly and cost effective building technologies.
5. Requirements for building of different climatic regions.
6. Traditional building methods and vernacular architecture.

6 Hours

### UNIT - 2

#### ALTERNATIVE BUILDING MATERIALS:

1. Characteristics of building blocks for walls
2. Stones and Laterite blocks
3. Bricks and hollow clay blocks
4. Concrete blocks
5. Stabilized blocks: Mud Blocks, Steam Cured Blocks, Fal-G Blocks and Stone Masonry Block

6 Hours

### UNIT - 3

#### LIME-POZZOLANA CEMENTS

1. Raw materials
2. Manufacturing process
3. Properties and uses
4. Fibre reinforced concretes
5. Matrix materials
6. Fibers : metal and synthetic
7. Properties and applications
8. Fibre reinforced plastics
9. Matrix materials
10. Fibers : organic and synthetic
11. Properties and applications
12. Building materials from agro and industrial wastes
13. Types of agro wastes
14. Types of industrial and mine wastes
15. Properties and applications
16. Field quality control test methods

6 Hours

### UNIT - 4

#### ALTERNATIVE BUILDING TECHNOLOGIES

1. Alternative for wall construction
2. Types
3. Construction method
4. Masonry mortars
5. Types
6. Preparation
7. Properties
8. Ferrocement and ferroconcrete building components
9. Materials and specifications
10. Properties
11. Construction methods

12. Applications
13. Alternative roofing systems
14. Concepts
15. Filler slabs
16. Composite beam panel roofs
17. Masonry vaults and domes

**8 Hours**

## **PART - B**

### **UNIT - 5**

#### **STRUCTURAL MASONRY**

1. Compressive strength of masonry elements
2. Factors affecting compressive strength
3. Strength of units, prisms / wallettes and walls
4. Effect of brick work bond on strength
5. Bond strength of masonry : Flexure and shear
6. Elastic properties of masonry materials and masonry

**6 Hours**

### **UNIT - 6**

1. IS Code provisions
2. Design of masonry compression elements
3. Concepts in lateral load resistance

**8 Hours**

### **UNIT - 7**

#### **COST EFFECTIVE BUILDING DESIGN**

1. Cost concepts in buildings
2. Cost saving techniques in planning, design and construction
3. Cost Analysis : Case studies using alternatives.

**6 Hours**

### **UNIT - 8**

#### **EQUIPMENT FOR PRODUCTION OF ALTERNATIVE MATERIALS**

1. Machines for manufacture of concrete
2. Equipments for production of stabilized blocks
3. Moulds and methods of production of precast elements.

**6 Hours**

#### **TEXT BOOKS:**

1. **Alternative building methodologies for engineers and architects, lecture notes edited:** K.S. Jagadish and B.V. Venkatarama Reddy, Indian Institute of science, Bangalore.
2. **Structural Masonry** by Arnold W. Hendry.

#### **REFERENCE BOOKS:**

1. **Relevant IS Codes.**
2. **Alternative building materials and technologies.**
3. **Proceedings of workshop on Alternative building material and technology, 19<sup>th</sup> to 20<sup>th</sup> December 2003 @ BVB College of Engineering. & Tech., Hubli.**

# 10CT764 Computer Applications In Construction Engineering And Planning (Elective)

## Part – A

### Unit - I

#### Introduction

Introduction to System Hardware – Languages – Data Base Management – Spread Sheets – Applications. 06 hrs

### Unit - II

#### Optimization Techniques

Modern Information System – System Development Life Cycle – Structured Methodologies

08 Hrs

### Unit - III

Designing Computer Based Methods, Procedures, Control – Designing Structured Programs.

06 hrs

### Unit - IV

#### Information System

Integrated Construction Management Information System – Project Management Information System

06 Hrs

## Part - B

### Unit - V

Functional Areas. Finance, Marketing, Production, Personnel – Levels, DSS, EIS, ES – Comparison, Concepts and Knowledge Representation – Managing International Information System.

06 hrs.

### Unit - VI

#### Implementation and Control

Control – Testing Security – Coding Techniques – Defection of Error

06 Hrs

### Unit - VII

Validating – Cost Benefit Analysis – Assessing the value and risk of Information System.

06 hrs

### Unit - VIII

#### System Audit

Software Engineering qualities – Design, Production, Service, Software specification, Software Metrics, Software quality assurance – Software life cycle models – Verification and Validation. 08 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. Marciniah, Software Quality assurance and Management, John Wiley and Sons, 1987.
6. Card and Glass, Measuring Software Design quality, Prentice Hall, 1990.

## **10CTL77 Building Services Laboratory**

1. Drawing and working out of
  - a. Water supply/Sanitary service building details
  - b. Plumbing details
  - c. Electrical details
  - d. Demonstration of electrical, Plumbing and sanitary materials
2. Sanitary and Plumbing line assembly and fittings .
3. Air conditioning system-load calculations.
4. Experiments on measurement of intensity of light.
5. Experiments on measurement of intensity of sound and moisture of wood.
6. Experiments to measure the velocity and quality of air at indoors.

### **Reference Books:**

1. Building Services for Water Supply and Sanitation by Panchdhare.
2. Water Supply and Sanitary Engineering, by Rangawala
3. Architectural Acoustics and Noise Control – Theory, Design, Practice – Allied Publishers.
4. Mechanical and Electrical Systems by McGrainess and Stein, John Willey and Sons, 1977.



## **10CTL78 Construction Study Project**

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

1. Tendering process and awarding the contract .
2. Estimation of the project.
3. Scheduling of various events of the construction project.
4. Geotechnical investigation of the site and report.
5. Study of the structural details (wherever feasible).
6. Study of the constructional process.
7. Quality control measures pertaining to the project under consideration.
8. Construction safety measures pertaining to the project under consideration.

### **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 being given to both the valuers.

**VIII SEMESTER B.E (CT&M)**  
**10CT81 Arbitration**  
**Part - A**

**UNIT -1**

Comparison of Actions and Laws – Agreements – Subject Matter – Violations 6 hrs

**UNIT -2**

Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs. 7 Hrs

**UNIT-3**

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes 7 Hrs

**UNIT-4**

Tax Laws – Income Tax, Sales Tax, Excise Requirements for Planning 6 Hrs

**Part - B**

**UNIT-5**

Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations. 7 Hrs

**UNIT-6**

Social Security – Welfare Legislation – Laws relating to Wages. 6 Hrs

**UNIT-7**

Bonus and Industrial Disputes, Labour Administration. 6 Hrs

**UNIT-8**

Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Child Labour Act – Other Labour Laws. 6 Hrs

**Text Books:**

1. Laws Relating to Building and Engineering Contracts in India by Gajaria G.T., M.M. Tripathi Private Ltd., Bombay, 1982.

**Reference Books:**

1. Construction Contracts by Jimmie Hinze, 2<sup>nd</sup> Edition, McGraw Hill, 2001.
2. Contracats and the Legal Environment for Engineers and Architects by Joseph T. Bockrath, 6<sup>th</sup> Edition, McGraw Hill, 2000.

## **10CT82 Project Safety Management Part - A**

### **Unit - I**

**CONSTRUCTION ACCIDENTS AND SAFETY:** Accident- Causes, Effects and Safety measures, Legal requirements, Responsibility of the employers  
06 Hrs

### **Unit - II**

Reporting occurrence of accidents, Reporting occurrence of hazards, Action to be taken by the Site-in-charge in case of accidents.  
06 Hrs

### **Unit - III**

**FIRE PREVENTION AND CONTROL:** Understanding fire chemistry, Behaviour of fuels in fire, Fire causes, Types of extinguishers and use, Fire prevention planning, Check list for fire prevention.  
06 Hrs

### **Unit -IV**

**SAFETY PROGRAMMES:** Safe working environment, Safety clauses in contract documents, Safety programme, Safety policy, Safety department, safety officers, safety records, safety training  
08 Hrs

## **Part - B**

### **Unit - V**

**DESIGNING FOR SAFETY:** Safety clause in a typical contract document, Scheme for safety, Breach of safety regulations, General safety condition, Safety culture, Company activities and safety, Project co-ordination and safety procedures, Workers compensation.  
08 Hrs

### **Unit - VI**

**SAFETY STANDARDS:** Indian standards for safety in construction, BIS standards, American National Standards. 6 Hrs

### **Unit - VII**

**COMMON HAZARDS:** Dust, Impregnated timber, Lead poisoning, Toxic fumes, Noise  
06 Hrs

### **Unit - VIII**

Code of practice for reducing noise, Vibration, Power supply, Lighting, Maintenance, House-keeping, Materials, Movement, Downing, Openings, Weight.  
06 Hrs

### **Text Books:**

1. Construction Safety Management, NICMAR Publications, Hyderabad, October 2003.

**Reference Books:**

1. Jimmy W. Hinze, construction safety, Prentice hall Inc 1997
2. Richard.J.Coble, Jimmoe and Theoe Hampt, Construction safety and health management, Prentice Hall Inc 2001.

## **10CT831 Repair And Rehabilitation Of Structures(Elective)**

### **Unit - I**

Assessment of Structural Strength – Need and approach, Testing methodology, In situ testing of Structures – Methods.

04 Hrs

### **Unit - II**

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.

08 Hrs

### **Unit - III**

Diagnosis, damage assessment parameters for repair / restoration strategies, specification and detailing.

06Hrs

### **Unit - IV**

Repair methods for concrete structures - slabs, beams, columns and foundations.

06Hrs

### **Unit - V**

Chemicals and materials for repair and restoration – classification – Bonding agents, adhesives Grout fillers, reinforcements polymer infrastructure fibres, etc., Tools for repairs.

08Hrs

### **Unit -VI**

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

08Hrs

### **Unit -VII**

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

08Hrs

### **Unit - VIII**

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

04Hrs

### **Reference Books:**

1. Repair of Concrete Structures by R.T.L. Allen & S.C. Edwards (Ed), Blackie, 1987.
2. Testing during Concrete Construction by Releur Workshop, Chapman & Hall, 1991, Rexom & Maihaganom – Et FN Spon, 1986.

3. Chemical Admixtures for Concrete
4. The Testing of Concrete in Structures by John M. Bungey, Survey Univ Press (Dh & Hall) 1982,
5. Structural Renovation of Buildings Details & Design Examples by Newman P.E., Methods, McGraw Hill, 2001.
6. Rehabilitation of Renovation and Reconstruction Bedle by R. Jagadeesh, ASCE /ACI Journal.

# 10CT832 Solid Waste Management(Elective)

## PART - A

### UNIT - 1

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

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

**08 Hours**

### UNIT - 2

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

**06 Hours**

### UNIT - 3

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

**06 Hours**

### UNIT - 4

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

**07 Hours**

## PART - B

### UNIT - 5

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

**06 Hours**

### UNIT - 6

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

**08 Hours**

### UNIT - 7

**DISPOSAL METHODS:** Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolysis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal.

**06 Hours**

### UNIT - 8

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

**05 Hours**

## REFERENCES

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

# 10CT833 Reinforced Earth Structures( Elective)

## PART - A

### UNIT- 1

**BASICS OF REINFORCED EARTH CONSTRUCTION:** Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil.

**06 Hours**

### UNIT- 2

#### **GEOSYNTHETICS AND THEIR FUNCTIONS**

Historical developments, Recent developments, manufacturing process-woven & non-woven, Raw materials – polypropylene (polyolefin), Polyethylene (Polyolefin), Polyester, Polyvinyl chloride, Elastomers, Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geosynthetics – Geotextiles, Geogrids, Geomembranes, Geocomposites, Geonets, Geofoam, Geomats, Geomeshes, Geowebbs etc.

**06 Hours**

### UNIT- 3

#### **PROPERTIES AND TESTS ON MATERIALS**

Properties – Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties

**07 Hours**

### UNIT - 4

#### **DESIGN OF REINFORCED EARTH RETAINING WALLS**

Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, typical design problems

**07 Hours**

## PART-B

### UNIT- 5

#### **DESIGN OF REINFORCED EARTH FOUNDATIONS AND EMBANKMENTS**

**Foundations** - Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, Bearing capacity improvement in soft soils, General guidelines.

**Embankments** - Concept of Reinforced Embankments, Internal and external stability, Selection of materials, typical design problems

**07 Hours**

### UNIT - 6

#### **SOIL NAILING TECHNIQUES**

Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken.

**06 Hours**

### UNIT- 7

#### **GEOSYNTHETICS - FILTER, DRAIN AND LANDFILLS:**

Filter & Drain – Conventional granular filter design criteria, Geosynthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geosynthetic permeability, anticlogging, survivability and durability.



Landfills – Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps

**07 Hours**

#### **UNIT- 8**

##### **GEOSYNTHETICS FOR ROADS AND SLOPES**

Roads - Applications to Temporary and Permanent roads, Role of Geosynthetic in enhancing properties of road, control of mud pumping, Enhancing properties of subgrade, Design requirements

Slopes – Causes for slope failure, Improvement of slope stability with Geosynthetic, Drainage requirements, Construction technique.

**06 Hours**

#### **TEXT BOOKS:**

1. **Design with geosynthetics-** Koerner. R.M. - Prince Hall Publication, 2005.
2. **Construction and Geotechnical Engineering using synthetic fabrics-** Koerner. R.M. & Wesh, J.P.- Wiley Inter Science, New York, 1980.
3. **An introduction to Soil Reinforcement and Geosynthetics** – Sivakumar Babu G. L., Universities Press, Hyderabad, 2006
4. **Reinforced Soil and its Engineering Applications, Swami Saran, I. K.** International Pvt. Ltd, New Delhi, 2006
5. **Engineering with Geosynthetics-** Venkattappa Rao, G., & Suryanarayana Raju., G. V.S. - Tata Mc Graw Hill publishing Company Limited., New Delhi.

#### **REFERENCE BOOKS:**

1. **Earth reinforcement and Soil structure-** Jones CJEP Butterworths, London, 1996.
2. **Geotextile Hand Book-** Ingold, T.S. & Millar, K.S. - Thomas, Telford, London.
3. **Earth Reinforcement Practises** - Hidetoshi Octial, Shigenori Hayshi & Jen Otani -Vol. I, A.A. Balkema, Rotterdam, 1992.
4. **Ground Engineer's reference Book-** Bell F.G. - Butterworths, London, 1987.
5. **Reinforced Earth-** Ingold, T.S. - Thomas, Telford, London.
6. **Geosynthetics in Civil Engineering,** Editor Sarsby R W, Woodhead Publishing Ltd & CRC Press, 2007

## 10CT834 Bridge Engineering( Elective)

### PART A

#### Unit-I

**INTRODUCTION:** Classification of Bridges – Masonry, Arches, RCC, Prestressed Concrete Steel and Composite Brief Description of different types of bridges – preliminary Design principles.

6Hrs

#### Unit-II

**INVESTIGATIONS:** Selection of sites, Design data to be followed, Hydraulic design, linear waterway afflux – Economic span.

7Hrs

#### Unit-III

**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.

7 Hrs

#### Unit-IV

**SUBSTRUCTURE:** Types of Abutment, piers, wing walls – Forces action on them – Stability consideration and empirical designs – Bank connection and protection works.

6 Hrs

### PART B

#### Unit-V

**STANDARD LOADS:** IRC and Railway Loadings – Equivalent Loading for preliminary design – Impact effect.

6 Hrs

#### Unit-VI

**CONSTRUCTION AND MAINTENANCE OF BRIDGES:** Form work and False work for concrete Bridges – Maintenance of bridges – Maintenance.

7 Hrs

#### Unit-VII

##### **BEARINGS, JOINTS AND APPURTENANCES**

Importance of bearings, bearings for slab bridges, bearings for girder bridges, expansion bearings, fixed bearings, elastomeric bearings, elastomeric pot bearings, bearings for skew bridges, joints and appurtenances.

7Hrs

#### Unit-VIII

##### **TEMPORARY AND MOVABLE BRIDGES**

Temporary bridges, timber bridges, temporary causeways, military bridges, floating bridges, pontoon bridges, movable bridges.

**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

# 10CT841 Environmental Impact Assessment( Elective)

## PART - A

### UNIT - 1

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

**6 Hours**

### UNIT - 2

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

**6 Hours**

### UNIT - 3

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

**8 Hours**

### UNIT - 4

Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.

**6 Hours**

## PART - B

### UNIT - 5

EIA guidelines for Development Projects, Rapid and Comprehensive EIA.

**6 Hours**

### UNIT - 6

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

**6 Hours**

### UNIT - 7

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

**4 Hours**

### UNIT - 8

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

**10 Hours**

## REFERENCES

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

# 10CT842 Urban Transport Planning ( Elective)

## PART A

### UNIT - 1

**INTRODUCTION:** Scope of Urban transport planning – Inter dependency of land use and traffic – System Approach to urban planning.

**6 Hours**

### UNIT - 2

**STAGES IN URBAN TRANSPORT PLANNING:** Trip generation – Trip production - Trip distribution – Modal split – Trip assignment.

**6 Hours**

### UNIT - 3

**URBAN TRANSPORT SURVEY** - Definition of study area-Zoning-Types of Surveys – Inventory of transportation facilities – Expansion of data from sample.

**8 Hours**

### UNIT - 4

**TRIP GENERATION:** Trip purpose – Factors governing trip generation and attraction – Category analysis – Problems on above

**5 Hours**

## PART - B

### UNIT - 5

**TRIP DISTRIBUTION:** Methods – Growth factors methods – Synthetic methods – Fractor and Furness method and problems on the above.

**5 Hours**

### UNIT - 6

**MODAL SPLIT:** Factors affecting – characteristics of split – Model split in urban transport planning – problems on above

**6 Hours**

### UNIT - 7

**TRIP ASSIGNMENT:** Assignment Techniques – Traffic fore casting – Land use transport models – Lowry Model – Garin Lowry model – Applications in India – (No problems on the above)

**8 Hours**

### UNIT - 8

**URBAN TRANSPORT PLANNING FOR SMALL AND MEDIUM CITIES:** Introduction – Difficulties in transport planning – Recent Case Studies

**8 Hours**

### TEXT BOOKS:

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

### REFERENCE BOOKS:

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

# 10CT843 Geographic Information System( Elective)

## PART - A

### UNIT - 1

Geographic Information system concepts and spatial models. Introduction, Spatial information, temporal information, conceptual models of spatial information, representation of geographic information. GIS Functionality – Introduction, data acquisition, preliminary data processing, data storage and retrieval, spatial search and analysis, graphics and interaction.

**7 Hours**

### UNIT - 2

Computer Fundamentals of GIS and Data storage, Fundamentals of computers vector/raster storage character files and binary files, file organization, linked lists, chains, trees. Coordinate systems and map projection : Rectangular polar and spherical coordinates, types of map projections, choosing a map projection.

**8 Hours**

### UNIT - 3

**GIS DATA MODELS AND STRUCTURES** – Cartographic map model, Geo-relation model, vector/raster methods, non-spatial data base structure viz., hierarchal network, relational structures.

**5 Hours**

### UNIT - 4

**DIGITIZING EDITING AND STRUCTURING MAP DATA** – Entering the spatial data (digitizing), the non-spatial, associated attributes, linking spatial and non-spatial data, use of digitizers and scanners of different types.

**5 Hours**

## PART - B

### UNIT - 5

**DATA QUALITY AND SOURCES OF ERROR** – Sources of errors in GIS data, obvious sources, natural variations and the processing errors and accuracy. 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.

**10 Hours**

### UNIT - 6

GIS and remote sensing data integration techniques in spatial decision support system land suitability and multicriteria evaluation, role based systems, network analysis, special interaction modeling, Virtual GIS.

**6 Hours**

### UNIT - 7

Data base positioning systems, desirable characteristics of data base management systems, components of a data base management system, understanding the data conceptual modeling.

**6 Hours**

### UNIT - 8

Global positioning system, hyper spectral remote sensing, DIP techniques, hardware and software requirements for GIS, overview of GIS software.

**5 Hours**

### TEXT BOOKS:

1. **Principles of GIS** - Peter A Burrough Reachael A Mc. Donnel - (Oxford).
2. **The GIS Book** - George B. Korte, P.E. - 5<sup>th</sup> Edn., Thomson Learning.
3. **Remote sensing and image interpretation** - Lillesand - (John Wiley and Sons).
4. **Geographical Information system**: Bemhard Sen-Wiley publications.
5. **GIS and Computer cartography** - Christopher Jones - (Longman).

**REFERENCE BOOKS:**

1. **Fundamentals of Remote Sensing** – George Joseph, Universities Press, Hyderabad.
2. **Introduction to GIS – Kang tsuang Chang** – Tata McGraw Hill, New Delhi 2009.
3. **Geographical Information Science** – Narayan Panigrahi, Universities Press, New Delhi 2010.
4. **Geographical Information system & Environmental Modeling**: Keith C. Clarke, Bradley O Parks, Michel P. Crane, PHI Learning, New Delhi 2009 Edition.
5. **Concepts and Techniques of Geographic Information Systems** – C.P.Lo. Albert K.W. Yeung, PHI Learning, New Delhi – 2009 2<sup>nd</sup> Edition.

# 10CT844 Advanced Foundation Design( Elective)

## PART - A

### UNIT - 1

**BEARING CAPACITY & SETTLEMENT:** Presumptive bearing capacity according to BIS, Factors affecting bearing capacity, Factors influencing selection of depth of foundation, types of shallow foundations, Settlement of

Shallow Foundations: Immediate, consolidation, & differential settlements, Factors influencing settlement, Safe Bearing Capacity and Allowable Bearing Pressure.

**6 Hours**

### UNIT - 2

**SHALLOW FOUNDATIONS:** Principles of Design of foundation, Definition for Shallow and Deep foundation, Requirements for geotechnical and structural aspects of design, Proportioning of isolated footing, combined footing, Strap footing, Strip footing and Raft foundation.

**6 Hours**

### UNIT - 3

**PILE FOUNDATIONS – SINGLE PILE:** Historical Development, Necessity of pile foundations, Classification, Load bearing capacity of single pile by Static formula, Dynamic formula, Pile load test and Penetration tests, Laterally Loaded Pile.

**6 Hours**

### UNIT - 4

**PILE FOUNDATIONS – GROUP EFFECT:** Pile groups, group action of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction, Under reamed piles.

**7 Hours**

## PART - B

### UNIT - 5

**WELL FOUNDATIONS:** Historical Development, Different shapes and characteristics of wells, Components of well foundation. Forces acting on well foundation. Sinking of wells. Causes and remedies for tilts and shifts.

**6 Hours**

### UNIT - 6

**DRILLED PIERS & CAISSONS:** Construction, advantages and disadvantages of drilled piers. Design concepts and Advantages and disadvantages of open, pneumatic and floating caissons.

**7 Hours**

### UNIT - 7

**FOUNDATIONS ON EXPANSIVE SOILS:** Definition, Identification, Mineral Structure, Index properties of expansive soils, Swell potential and Swell pressure, Free swell, Tests on expansive soils, foundation treatment for structures in expansive soil, CNS layer.

**6 Hours**

### UNIT - 8

**MACHINE FOUNDATIONS:** Basic definitions in vibration, free and forced vibrations, determination of natural frequency, types of Machine foundations, general criteria for design of machine foundation.,vibration analysis of a machine foundation, degrees of freedom of a block foundation, vibration isolation and control,

**8 Hours**

**TEXT BOOKS:**



1. **Soil Mechanics & Foundation Engineering** - V.N.S. Murthy - Pub: Sai Tech.
2. **Foundation Engineering** - Braja M. Das – Cengage Learning.
3. **Soil Mechanics Foundations** - Dr. B.C. Punmia - Pub : Laxmi publications, pvt. Ltd.

**REFERENCE BOOKS:**

1. **Foundation Analysis and Design** - Bowles J.E. (1996) - 5<sup>th</sup> Ed, McGraw Hill Pub. Co., New York.
2. **Advanced Foundation Engineering** - V.N.S. Murthy - Pub : Sai Tech.
3. **Pile Foundation**.- Chellies
4. **Geotechnical Engineering**.- P. Purushotham Raj
5. **Geotechnical Engineering** - Dr. C. Venkataramaiah - Pub : New age Publications.
6. **Foundation Engineering** - Dr. P.C. Varghese :- Pub : Prentice Hall of India.

## **10CTP85 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.

## **10CTS86 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.