PART - A
MANAGEMENT

UNIT - 1

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

6 Hours

UNIT - 4

7 Hours
PART - B
ENTREPRENEURSHIP

UNIT - 5
ENTREPRENEUR: Meaning of Entrepreneur, Evolution of Concept, Functions of Entrepreneur, Types of Entrepreneur, Entrepreneur – An emerging class, Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process, Role of Entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

7 Hours

UNIT - 6

7 Hours

UNIT - 7
INSTITUTIONAL SUPPORT: Different Schemes, TECKSOK, KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI, NSIC, SIDBI, KSFC.

6 Hours

UNIT - 8

6 Hours

TEXT BOOKS:

**REFERENCE BOOKS:**

### DESIGN OF RCC STRUCTURAL ELEMENTS

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### PART - A

#### UNIT - 1

**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.

37
UNIT - 4
DESIGN OF BEAMS: Design procedures for critical sections for moment and shears. Anchorages of bars, check for development length, Reinforcement requirements, Slenderness limits for beams to ensure lateral stability, Design examples for Simply supported and Cantilever beams for rectangular and flanged sections.

8 Hours

PART - B
UNIT - 5
DESIGN OF SLABS: General consideration of design of slabs, Rectangular slabs spanning one direction, Rectangular slabs spanning in two directions for various boundary conditions. Design of simply supported, cantilever and continuous slabs as per IS: 456 – 2000.

8 Hours

UNIT - 6
DESIGN OF COLUMNS: General aspects, effective length of column, loads on columns, slenderness ratio for columns, minimum eccentricity, design of short axially loaded columns, design of column subject to combined axial load and uniaxial moment and biaxial moment using SP – 16 charts.

5 Hours

UNIT - 7
DESIGN OF FOOTINGS: Introduction, load for footing, Design basis for limit state method, Design of isolated rectangular footing for axial load and uniaxial moment, design of pedestal.

6 Hours

UNIT - 8
DESIGN OF STAIR CASES: General features, types of stair case, loads on stair cases, effective span as per IS code provisions, distribution of loading on stairs, Design of stair cases. With waistslabs.

6 Hours

REFERENCE BOOKS:
4. Reinforced concrete Design-by S.N. Shinha, TMH Education Private Limited,
7. IS-456-2000 and SP-16

STRUCTURAL ANALYSIS – II

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PART - A

UNIT - 1
ROLLING LOAD AND INFLUENCE LINES: Rolling load analysis for simply supported beams for several point loads and UDL.
Influence line diagram for reaction, SF and BM at a given section for the cases mentioned in above unit 1

6 Hours

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

8 Hours

UNIT - 3
MOMENT DISTRIBUTION METHOD: Introduction, Definition of terms- Distribution factor, Carry over factor, Development of method and Analysis of beams and orthogonal rigid jointed plane frames (non-sway) with kinematic redundancy less than/equal to three. (Members to be axially rigid)

8 Hours

UNIT - 4
SWAY ANALYSIS: Analysis of rigid jointed plane frames (sway, members assumed to be axially rigid and kinematic redundancy ≤ 3) by slope deflection and moment distribution methods.

4 Hours
PART - B

UNIT - 5
**KANIS METHODS:** Introduction, Basic Concept, Analysis of Continuous beams and Analysis of rigid jointed non-sway plane frames.  
6 Hours

UNIT - 6
FLEXIBILITY MATRIX METHOD OF ANALYSIS: Introduction, Development of flexibility matrix for plane truss element and axially rigid plane framed structural elements and Analysis of plane truss and axially rigid plane frames by flexibility method with static indeterminacy ≤3.  
7 Hours

UNIT - 7
STIFFNESS MATRIX METHOD OF ANALYSIS: Introduction, Development of stiffness matrix for plane truss element and axially rigid plane framed structural elements. And Analysis of plane truss and axially rigid plane frames by stiffness method with kinematic indeterminacy ≤3.  
7 Hours

UNIT - 8
6 Hours

REFERENCE BOOKS:
3. Structural Dynamics -by M. Mukhopadhyay,
5. **Basics of Structural Dynamics and Aseismic Design** By Damodhar Swamy and Kavita PHI Learning Private Limited
GEOTECHNICAL ENGINEERING – I

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

PART - A

UNIT - 1
INTRODUCTION: History of soil mechanics, Definition, origin and formation of soil. Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Water content, Specific Gravity of soil solids and soil mass, Densities and Unit weights - Bulk, Dry, Saturated & Submerged and their inter relationships.

6 Hours

UNIT - 2
INDEX PROPERTIES OF SOIL AND THEIR DETERMINATION:
Index Properties of soil- Water content , Specific Gravity, Particle size distribution, Relative Density, Consistency limits and indices, in-situ density, Activity of Clay, Laboratory methods of determination of index properties of soil: Water content (Oven Drying method & Rapid Moisture method), Specific gravity of soil solids (Pycnometer and density bottle method), Particle size distribution (Sieve analysis and Hydrometer analysis only), Liquid Limit- (Casagrande and Cone penetration methods), Plastic limit and shrinkage limit.

7 Hours

UNIT - 3

CLAY MINERALOGY AND SOIL STRUCTURE: Single grained, honey combed, flocculent and dispersed structures, Valence bonds, Soil-Water system, Electrical diffuse double layer, adsorbed water, base-exchange capacity, Isomorphous substitution. Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite.

8 Hours

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

PART - B

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

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

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

UNIT- 8
DETERMINATION OF SHEAR STRENGTH AND CONSOLIDATION OF SOIL: Measurement of shear parameters- Direct shear test, unconfined compression test, Triaxial compression test and vane shear test, Test under different drainage conditions. Laboratory one dimensional consolidation test, Determination of consolidation characteristics of soils-compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method).

TEXT BOOKS:

42
3. **Geotechnical Engineering**: Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India

**REFERENCES BOOKS:**
4. **Geotechnical Engineering**: Donald P Coduto Phi Learning Private Limited, New Delhi

**Hydrology and Irrigation Engineering**

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**PART-A**

**HYDROLOGY**

**UNIT 1: INTRODUCTION & PRECIPITATION**

Introduction, Hydrologic cycle (Horton’s representation). Water budget equation. Precipitation: introduction, forms of precipitation, types of precipitation, measurement of precipitation (Simon’s gauge & Syphon gauge only), selection of rain gauge station. Adequacy of raingauges, methods of computing average rainfall, interpolation of missing data, adjustment of missing data by double mass curve method. Hyetograph and mass curve of rainfall, 07 hrs

**UNIT 2 : LOSSES FROM PRECIPITATION**

43
Evaporation: Definition, factors affecting, measurement (Class A pan). Estimation using empirical methods (Meyer’s and Rohwer’s equation), evaporation control.
Evapo-transpiration: Definition, factors affecting, measurement, estimation (Blaney criddle method)
Infiltration: Definition, factors affecting, measurement (double ring infiltrometer), infiltration indices, Horton’s equation of infiltration.

UNIT 3: HYDROGRAPHS
Definition, components of hydrographs, unit hydrograph and its derivation from simple storm hydrograph, base flow separation, Prepositions of unit hydrograph- problems

UNIT 4: ESTIMATION OF FLOOD & FLOOD ROUTING
Definition of flood, factors affecting flood, methods of estimation (envelope curves, empirical formulae, rational method).
Flood routing: Introduction to hydrological routing, relationship of out flow and storage, general storage equation, Muskingum routing method.

PART-B
IRRIGATION ENGINEERING
UNIT 5 : INTRODUCTION
Introduction, need for irrigation, advantages and disadvantages of irrigation, environmental impacts of irrigation. Systems of irrigation: Gravity irrigation, lift irrigation, well irrigation, tube well irrigation, infiltration galleries, sewage irrigation, supplemental irrigation.

UNIT 6: SOIL-WATER-CROP RELATIONSHIP
UNIT 7: WATER REQUIREMENT OF CROPS
Introduction, definitions, crop seasons of India, water requirement of a crop, duty, delta, base period. Consumptive use. Irrigation efficiencies. Assessment of irrigation water.

07 hrs

Unit 8: Canals
Definition, Types of canals, Alignment of canals, Design of canals by Kenedy’s and Lacey’s methods- Problems

06 hrs

TEXT BOOKS:
1. Engineering Hydrology – Subramanya.K; Tata Mcgraw Hill NewDelhi-2008 (Ed)

REFERENCE BOOKS:

45
TRANSPORTATION ENGINEERING I

UNIT – 1
PRINCIPLES OF TRANSPORTATION ENGINEERING:
Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute

04 Hrs

UNIT – 2
HIGHWAY DEVELOPMENT AND PLANNING: Road types and classification, road patterns, planning surveys, master plan – saturation system of road planning, phasing road development in India, problems on best alignment among alternate proposals Salient Features of 3rd and 4th twenty year
road development plans and Policies, Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDC) Road development plan - vision 2021.  

06 Hrs

UNIT – 3
HIGHWAY ALIGNMENT AND SURVEYS: Ideal Alignment, Factors affecting the alignment, Engineering surveys-Map study, Reconnaissance, Preliminary and Final location & detailed survey, Reports and drawings for new and re-aligned projects 04 Hrs
HIGHWAY GEOMETRIC DESIGN – I: Importance, Terrain classification, Design speed, Factors affecting geometric design, Cross sectional elements-Camber- width of pavement-Shoulders-, Width of formation- Right of way. Typical cross sections 05 Hrs

UNIT – 4
HIGHWAY GEOMETRIC DESIGN – II: Sight Distance- Restrictions to sight distance- Stopping sight distance- Overtaking sight distance- overtaking zones- Examples on SSD and OSD- Sight distance at intersections, Horizontal alignment-Radius of Curve- Superelevation – Extra widening- Transition curve and its length, setback distance – Examples, Vertical alignment-Gradient-summit and valley curves with examples. 07 Hrs

PART - B

UNIT – 5
PAVEMENT MATERIALS: Subgrade soil - desirable properties-HRB soil classification-determination of CBR and modulus of subgrade reaction-Examples on CBR and Modulus of subgrade reaction, Aggregates- Desirable properties and list of tests, Bituminous materials-Explanation on Tar, bitumen,cutback and emulsion-List of tests on bituminous materials 06 Hrs
UNIT – 6
**PAVEMENT DESIGN:** Pavement types, component parts of flexible and rigid pavements and their functions, design factors, ESWL and its determination-Examples, **Flexible pavement**- Design of flexible pavements as per IRC:37-2001-Examples, **Rigid pavement**- Westergaard’s equations for load and temperature stresses- Examples- Design of slab thickness only as per IRC:58-2002

06 Hrs

UNIT – 7
**PAVEMENT CONSTRUCTION:** Earthwork –cutting-Filling, Preparation of subgrade, Specification and construction of i) Granular Subbase, ii) WBM Base, iii) WMM base, iv) Bituminous Macadam, v) Dense Bituminous Macadam vi) Bituminous Concrete, vii) Dry Lean Concrete sub base and PQC viii) concrete roads

05 Hrs

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

03 Hrs

UNIT – 8
**HIGHWAY ECONOMICS:** Highway user benefits, VOC using charts only-Examples, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods- Examples, Highway financing-BOT-BOOT concepts

06 Hrs

**TEXT BOOKS:**
3. **Transportation Engineering** – K P Subramanium, Scitech Publications, Chennai
5. **Highway Engineering** – R. Sreenivasa Kumar, University Press. Pvt.Ltd. Hyderabad

**REFERENCE BOOKS:**
1. Relevant IRC Codes

**HYDRAULICS AND HYDRAULICS MACHINERY LABORATORY**

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1. Calibration of collecting tank (gravimetric method)
2. Calibration of pressure gauge (dead weight method)
3. Verification of Bernoulli’s equation
4. Calibration of 90° V-notch
5. Calibration of Rectangular and Cipolletti notch
6. Calibration of Broad-crested weir
7. Calibration of Venturiflume
8. Calibration of Venturimeter
9. Determination of Darcy’s friction factor for a straight pipe
10. Determination of Hydraulic coefficients of a vertical orifice
11. Determination of vane coefficients for a flat vane & semicircular vane
12. Performance characteristics of a single stage centrifugal pump
13. Performance characteristics of a Pelton wheel
14. Performance characteristics of a Kaplan turbine

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

COMPUTER AIDED DESIGN LABORATORY

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

3 Hours

1.2 Use of AUTOCAD in Civil Engineering Drawings:
Following drawings are to be prepared for the data given using AUTOCAD
i) Cross section of Foundation - masonry wall, RCC columns (isolated)
ii) Different types of staircases
iii) Lintel and chajja
iv) RCC slabs and beams
v) Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan.

18 Hours

2. STRUCTURAL ANALYSIS SOFTWARE
Use of commercially available software for the analysis of
i) Plane Trusses
ii) Continuous beams
iii) 2D Portal frames—single storied and multistoried

9 Hours

3. USE OF EXCEL IN CIVIL ENGINEERING PROBLEMS
Use of spread sheet for the following civil engineering problems
i) SFD and BMD for Cantilever and simply supported beam subjected to uniformly distributed and uniformly varying load acting throughout the span
ii) Design of singly reinforced and doubly reinforced rectangular beams
iii) Computation of earthwork
iv) Design of horizontal curve by offset method
v) Design of super elevation

12 Hours

REFERENCE BOOKS:
1. Computer Aided Design Laboratory- Dr M.N. Shesha Prakash, Dr. G.S. Suresh, Lakshmi Publications
2. CAD Laboratory- M.A. Jayaram, D.S. Rajendra Prasad- Sapna Publications
3. AUTOCAD 2002- Roberts JT, -BPB publications
6. Microsoft Excel- Mathieson SA, Starfire publishers