

V SEMESTER

MANAGEMENT & ENTREPRENEURSHIP

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

PART - A

MANAGEMENT

UNIT - 1

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

7 Hours

UNIT - 2

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

6 Hours

UNIT - 3

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

6 Hours

UNIT - 4

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

7 Hours

PART - B
ENTREPRENEURSHIP

UNIT - 5

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

7 Hours

UNIT - 6

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

7 Hours

UNIT - 7

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

6 Hours

UNIT - 8

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

6 Hours

TEXT BOOKS:

1. **Principles of Management** – P.C. Tripathi, P.N. Reddy, Tata McGraw Hill.
2. **Dynamics of Entrepreneurial Development & Management** – Vasant Desai – Himalaya Publishing House

3. **Entrepreneurship Development** – Small Business Enterprises – Poonnima M. Charantimath – Pearson Education – 2006.

REFERENCE BOOKS:

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

DESIGN OF RCC STRUCTURAL ELEMENTS

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

PART - A

UNIT - 1

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

6 Hours

UNIT - 2

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

7 Hours

UNIT - 3

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

6 Hours

UNIT - 4

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

8 Hours

PART - B

UNIT - 5

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

8 Hours

UNIT - 6

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

5 Hours

UNIT - 7

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

6 Hours

UNIT - 8

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

6 Hours

REFERENCE BOOKS:

1. **Limit State Design of Reinforced concrete**-by P.C. Varghese, PHI Learning Private Limited 2008-2009
2. **Fundamentals of Reinforced concrete Design**-by M.L.Gambhir, PHI Learning Private Limited 2008-2009.
3. **Reinforced concrete Design**-by Pallai and Menon, TMH Education Private Limited,
4. **Reinforced concrete Design**-by S.N.Shinha, TMH Education Private Limited,

5. **Reinforced concrete Design**-by Karve & Shaha, Structures Publishers Pune.
6. **Design of RCC Structural Elements** S. S. Bhavikatti, Vol-I, New Age International Publications, New Delhi.
7. **IS-456-2000 and SP-16**

STRUCTURAL ANALYSIS – II

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

PART - A

UNIT - 1

ROLLING LOAD AND INFLUENCE LINES: 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 $\frac{1}{2}$ 3.

Hours

7

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 $\frac{1}{2}$ 3.

7 Hours

UNIT - 8

BASIC PRINCIPLES OF DYNAMICS: Basic principles of Vibrations and causes, periodic and aperiodic motion, harmonic and non-harmonic motion. Period and frequency.

Forced and Free Vibration, Damping and Equations of Single Degree of Freedom System with and without damping

6 Hours

REFERENCE BOOKS:

1. **Basic Structural Analysis-** Reddy C.S. - Second Edition, Tata McGraw Hill Publication Company Ltd.
2. **Theory of Structures Vol. 2** - S.P. Gupta, G.S. Pandit and R. Gupta, Tata McGraw Hill Publication Company Ltd.
3. Structural Dynamics-by M.Mukhopadhyay,
4. **Structural Analysis-II** -S. S. Bhavikatti – Vikas Publishers, New Delhi.
5. **Basics of Structural Dynamics and Aseismic Design** By Damodhar Swamy and Kavita PHI Learning Private Limited
6. **Structural Analysis-** D.S. Prakash Rao,, A Unified Approach, University Press
7. **Structural Analysis**, 4th SI Edition by Amit Prasanth & Aslam Kassimali, Thomson Learning.

GEOTECHNICAL ENGINEERING – I

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

PART - A

UNIT - 1

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

6 Hours

UNIT - 2

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

7 Hours

UNIT - 3

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

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

8 Hours

UNIT - 4

FLOW OF WATER THROUGH SOILS: Darcy's law- assumption and validity, coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils, Seepage

velocity, Superficial velocity and coefficient of percolation, quick sand phenomena, Capillary Phenomena.

6 Hours

PART - B

UNIT - 5

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

7 Hours

UNIT - 6

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

6 Hours

UNIT - 7

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

UNIT- 8

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

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

6 Hours

TEXT BOOKS:

1. **Soil Mechanics and Foundation Engg.**- Punmia B.C. (2005), 16th Edition Laxmi Publications Co. , New Delhi.
2. **Principles of Soil Mechanics and Foundation Engineering-** Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.

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

REFERENCES BOOKS:

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

Hydrology and Irrigation Engineering

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

PART-A HYDROLOGY

UNIT 1: INTRODUCTION & PRECIPITATION

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

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

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. 07 hrs

UNIT 3: HYDROGRAPHS

Definition, components of hydrographs, unit hydrograph and its derivation from simple storm hydrograph, base flow separation, Propositions of unit hydrograph- problems

06 hrs

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. 07 hrs

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.

06 hrs

UNIT 6: SOIL-WATER-CROP RELATIONSHIP

Introduction, soil profile, physical properties of soil, soil classification. Indian soils, functions of irrigation soils, maintaining soil fertility, soil-water-plant relationship, soil-moisture. Irrigation relationship, frequency of irrigation.

06 hrs

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)
2. Hydrology- Madan Mohan Das, Mim Mohan Das-PHI Learning private Ltd. New Delhi-2009 (Ed)
3. A Text Book Of Hydrology- Jayarami Reddy, Laksmi Publications, New Delhi-2007 (Ed)
4. Irrigation, water Resources and water power Engineering- P.N.Modi- standard book house, New Delhi.
5. Irrigation and Water Power Engineering-Madan Mohan Das & Mimi Das Saikia; PHILearning pvy. Ltd. New Delhi 2009 (Ed).

REFERENCE BOOKS:

1. Hydrology & Soil Conservation Engineering- Ghanshyam Das- PHI Learning Private Ltd., New Delhi-2009 (Ed)
2. Hydrology & Water Resources Engineering- Patra K.C. Narosa Book Distributors Pvt. Ltd. New Delhi-2008 (Ed)
3. Hydrology & Water Resources Engineering- R.K.Sharma & Sharma, Oxford and Ibh, New Delhi
4. Irrigation Engineering and Hydraulic structures- S. K. garg- Khanna Publication, New Delhi.

TRANSPORTATION ENGINEERING I

Subject Code		:10CV56
	I A Marks	:25
No. of lecture	Hours/week	:04
	Exam Hours	:03
Total No. of Lecture	Hours	:52
	Exam Marks	:100

PART – A

UNIT – 1

PRINCIPLES OF TRANSPORTATION ENGINEERING:

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

04 Hrs

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 & KRDCCL) 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:

1. **Highway Engineering** – S K Khanna and C E G Justo, Nem Chand Bros, Roorkee

2. **Highway Engineering** - L R Kadiyali, Khanna Publishers, New Delhi
3. **Transportation Engineering** – K P Subramaniam, Scitech Publications, Chennai
4. **Transportation Engineering** – James H Banks, Mc. Graw. Hill Pub. New Delhi
5. **Highway Engineering** –R. Sreenivasa Kumar, University Press. Pvt.Ltd. Hyderabad

REFERENCE BOOKS:

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

HYDRAULICS AND HYDRAULICS MACHINERY LABORATORY

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

1. Calibration of collecting tank (gravimetric method)
2. Calibration of pressure gauge (dead weight method)
3. Verification of Bernoulli's equation
4. Calibration of 90⁰ 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 Mechines Laboratory Manual – Dr. N. Balasubramanya

COMPUTER AIDED DESIGN LABORATORY

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

1. AUTOCAD

1.1 Basics of AUTOCAD:

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

3 Hours

1.2 Use of AUTOCAD in Civil Engineering Drawings:

Following drawings are to be prepared for the data given using AUTOCAD

- i) Cross section of Foundation - masonry wall, RCC columns (isolated)
- ii) Different types of staircases
- iii) Lintel and chajja
- iv) RCC slabs and beams
- v) Drawing of Plan, elevation and sectional elevation of single storied residential and public buildings given the single line diagram and preparing excavation plan.

18 Hours

2. STRUCTURAL ANALYSIS SOFTWARE

Use of commercially available software for the analysis of

- i) Plane Trusses

- ii) Continuous beams
- iii) 2D Portal frames-single storied and multistoried

9Hours

3. USE OF EXCEL IN CIVIL ENGINEERING PROBLEMS

Use of spread sheet for the following civil engineering problems

- i) SFD and BMD for Cantilever and simply supported beam subjected to uniformly distributed and uniformly varying load acting throughout the span
- ii) Design of singly reinforced and doubly reinforced rectangular beams
- iii) Computation of earthwork
- iv) Design of horizontal curve by offset method
- v) Design of super elevation

12 Hours

REFERENCE BOOKS:

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

VI SEMESTER
ENVIRONMENTAL ENGINEERING-I

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

Part - A

Unit - 1

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

2 Hours

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

6 Hours

Unit - 2

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

3 Hours

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

6 Hours

Unit - 3

QUALITY OF WATER: Objectives of water quality management. wholesomeness & palatability, water borne diseases. Water quality parameters – Physical, chemical and Microbiological. Sampling of water for examination. Water quality analysis (IS: 3025 and IS: 1622) using analytical and instrumental techniques. Drinking water

standards BIS & WHO guidelines. Health significance of Fluoride, Nitrates and heavy metals like Mercury, Cadmium, Arsenic etc. and toxic / trace organics.

6 Hours

Unit - 4

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

2

Hours

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

4

Hours

Part - B

Unit - 5

FILTRATION: Mechanism – theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design – excluding under drainage system – back washing of filters. Operational problems in filters.

6 Hours

Unit - 6

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

4

Hours

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

3 Hours

Unit - 7

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

4 Hours

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

Unit - 8

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

2

Hours

TEXT BOOKS:

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

REFERENCES

1. Hammer, M.J., (1986), **Water and Wastewater Technology** –SI Version, 2nd Edition, John Wiley and Sons.
2. Karia, G.L., and Christian, R.A., (2006), **Wastewater Treatment – Concepts and Design Approach**, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Metcalf and Eddy, (2003), **Wastewater Engineering, Treatment and Reuse** , 4th Edition, Tata McGraw Hill Edition, Tata McGraw Hill Publishing Co. Ltd.
4. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., (1986),**Environmental Engineering**–Mc Graw Hill Book Co.
5. Raju, B.S.N., (1995), **Water Supply and Wastewater Engineering**, Tata McGraw Hill Pvt. Ltd., New Delhi.
6. Sincero, A.P., and Sincero, G.A., (1999), **Environmental Engineering – A Design Approach**–Prentice Hall of India Pvt. Ltd., New Delhi.

DESIGN & DRAWING OF RC STRUCTURES

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

PART - A

UNIT-1

Layout Drawing: General layout of building showing, position of columns, footings, beams and slabs with standard notations.

UNIT-2

Detailing of Beam and Slab floor system, continuous beams.

UNIT-3

Detailing of Staircases: Dog legged and Open well.

UNIT-4

Detailing of Column footings: Column and footing (Square and Rectangle).

13 (T) + 18 (D)

PART - B

UNIT-5

Design and detailing of Rectangular Combined footing slab and beam type.

UNIT-6

Design and detailing of Retaining walls (Cantilever and counter fort type).

UNIT-7

Design and detailing of Circular and Rectangular water tanks resting on ground and free at top (Flexible base and Rigid base), using IS: 3370 (Part IV) only.

UNIT-8

Design and detailing of Simple Portal Frames subjected to gravity loads. (Single bay & Single storey)

13 (T) + 21 (D)

REFERENCE BOOKS:

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

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

SCHEME OF QUESTION PAPER:

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

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

TRANSPORTATION ENGINEERING II

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

PART – A **RAILWAY ENGINEERING**

UNIT – 1

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

06 Hrs

UNIT – 2

SLEEPERS AND BALLAST: Functions, requirements, Types, Track fitting and fasteners-Dog spike, screw spike and Pandrol clip,-Fish plates-bearing plates, Calculation of quantity of materials required for laying a track-Examples, **Tractive resistances** and hauling capacity with examples

06Hrs

UNIT – 3

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

06 Hrs

UNIT – 4

POINTS AND CROSSING: Components of a turnout, Details of Points and Crossing, Design of turnouts with examples (No derivations) types of switches, crossings, track junctions Stations and Types, Types of yards, Signalling-Objects and types of signals, station and yard Equipment-Turn table, Fouling mark, buffer stop, level crossing, track defects, and maintenance.

08 Hrs

PART – B
AIRPORT ENGINEERING

UNIT – 5

INTRODUCTION: Layout of an airport with component parts and functions, Site selection for airport, Aircraft characteristics affecting the design and planning of airport, Airport classification, Runway orientation using wind rose with examples

06 Hrs

UNIT – 6

RUNWAY- Basic runway length-Corrections and examples, Runway geometrics, **Taxiway-**Factors affecting the layout - geometrics of taxiway-Design of exit taxiway with examples, **Visual aids-** Airport marking – lighting-Instrumental Landing System.

06 Hrs

TUNNEL ENGINEERING

UNIT – 7

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

06Hrs

UNIT – 8

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

08 Hrs

TEXT BOOKS

1. **Railway Engineering** - Saxena and Arora, Dhanpat Rai & Sons, New Delhi
2. **Indian Railway Track** – M M Agarwal, Jaico Publications, Bombay
3. **Airport Planning and Design** – Khanna Arora and Jain, Nem Chand Bros, Roorkee

4. **Docks and Tunnel Engineering** – R Srinivasan, Charaotar Publishing House
5. **Docks and Harbour Engineering** –H P Oza and G H Oza Charaotar Publishing House
6. **Surveying** – B C Punmia, Laxmi Publications

REFERENCE BOOK

1. **Railway Engineering – Mundrey, McGraw Hill Publications**

GEOTECHNICAL ENGINEERING – II

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

PART - A

UNIT - 1

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

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

8 Hours

UNIT - 2

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

6

Hours

UNIT - 3

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

5 Hours

UNIT - 4

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

7 Hours

PART - B

UNIT - 5

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

7

Hours

UNIT - 6

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

8 Hours

UNIT - 7

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

5 Hours

UNIT – 8

PROPORTIONING SHALLOW AND PILE FOUNDATIONS

Allowable Bearing Pressure, Factors influencing the selection of depth of foundation, Factors influencing Allowable Bearing Pressure, Factors influencing the choice of foundation, Proportioning isolated, combined, strip and mat foundations, Classification of pile foundation, Pile load capacity, Proportioning pile foundation.

6 Hours

TEXT BOOKS:

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

REFERENCES BOOKS:

1. **Foundation Analysis and Design-** Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. Co. New York.
2. **Soil Mechanics and Foundation Engineering-** Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.
3. **Basic and Applied Soil Mechanics-** Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., Newe Delhi.
4. **Geotechnical Engineering-** Venkatrahmaiah C. (2006), 3rd Edition New Age International (P) Ltd., Newe Delhi.
5. **Soil Mechanics-** Craig R.F. (1987), Van Nostrand Reinhold Co. Ltd.
6. **Principles of Geotechnical Engineering-** Braja M. Das (2002), 5th Edition, Thomson Business Information India (P) Ltd., India.
7. **Text Book of Geotechnical Engineering-** Iqbal H. Khan (2005), 2nd Edition, PHI, India.

HYDRAULIC STRUCTURES & IRRIGATION DESIGN-DRAWING

Subject Code	: 10CV65	IA Marks	: 25
No. of Lecture Hours/Week	: 02+03	Exam Hours	: 04
Total No. of Lecture Hours	: 25+40	Exam Marks	: 100

PART-A

Hydraulic Structures

Unit1: Reservoir Planning

Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, safe yield, problems, density currents, Trap efficiency, Reservoir sedimentation, life of a reservoir, economic height of a dam, problems. environmental effects of reservoirs, **6 hours**

Unit2: Gravity Dams

Introduction, forces on a gravity dam, stress analysis in gravity dam, Problems, combination of forces for design. Elementary & practical profiles of a gravity dam, stability analysis (without earthquake forces), problems, galleries in gravity dams, **7 hours**

Unit3: Earth Dams

Introduction, types of Earth dams, construction methods, Design criteria for Earth dams, causes of failure of earth dams, section of dam, preliminary design criteria, problems, control of seepage through earth dams, Safety measures. **6 hours**

Unit4: Spillways

Introduction, essentials of a spillway, spillway components, factors affecting type & design of spillways. Ogee spillway (simple design problems). Energy dissipation below spillways (hydraulic jump- No design). **6 hours**

PART-B

Irrigation Design- Drawing

Design and Drawing with all the three views of :

1. Surplus weir with stepped apron
2. Tank Plug sluice without tower head
3. Canal gate sluice without tower head
4. Notch type Canal Drop
5. Canal Cross regulator.
6. Aqueduct (Hydraulic Design only)

40 hours

Text Books:

1. Text book of irrigation engineering & Hydraulic Structures- R.K.Sharma, Oxford & IBH publishing Co., New Delhi (2002)
2. Irrigation & Water resources engineering- G.L.Asawa, New Age International Publishers, New Delhi (2005)
3. Irrigation, Water Resources & Water power engineering- Modi . P.N., Standard Book House, New Delhi
4. Design of minor irrigation and Canal structures- C. Sathya Narayana Murthy, Wiley eastern limited, New Delhi (1990)

Reference Books:

1. Irrigation engineering & Hydraulic structures- Garg.S.K., khanna publishers, New Delhi
2. Hydraulic Structures & Irrigation Design Drawing - Dr.N.Balasubramanya, Tata Mcgraw-Hill Education Pvt.Ltd., New Delhi
3. irrigation and Water Power Engineering- Madan Mohan Das & Mimi Das Saikia, PHI Learning Pvt. Ltd., New Delhi (2009)

Question paper pattern:

Four questions are to be set from Part A of which **Two** full questions are to be answered for 40 marks

Two questions are to be set from Part B of which **one** full question is to be answered for 60 marks (25 marks for design + 35 marks for two views)

THEORY OF ELASTICITY

Subject Code	: 10CV661	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 to Mathematical theory of elasticity, definition of continuum, stress and strain at a. point, Generalised Hooke's Law, Strain- displacement relations, St. Venant's principle

**5
Hours**

UNIT - 2

Differential equations of equilibrium, boundary conditions, compatibility equations, Airy's stress function, problems, Stress polynomials – for Two Dimensional cases only.

**8
Hours**

UNIT- 3

Plane stress and plane strain, Principal stresses and strains, measurement of surface strains, strain rosettes, Mohr's circle of stress and strain, analytical method.

4 Hours

UNIT - 4

Two-dimensional problems in rectangular coordinates, bending of a cantilever beam subjected to end load, effect of shear deformation in beams, Simply supported beam subjected to UDL.

**10
Hours**

PART - B**UNIT - 5**

Two-dimensional problems in polar coordinates, strain-displacement relations, equations of equilibrium, compatibility equation, stress function.

**8
Hours**

UNIT - 6

Axi Symmetric stress distribution - Rotating discs, Lamé's equation for thick cylinder.

**5
Hours**

UNIT- 7

Effect of circular hole on stress distribution in plates subjected to tension, compression and shear, stress concentration factor.

**7
Hours**

UNIT - 8

Torsion: Inverse and Semi-inverse methods, stress function, torsion of circular and elliptical sections.

5 Hours

TEXT BOOKS:

1. **“Theory of Elasticity” - International Students-** Timoshenko. S.P. and Goodier. J.N. - Edition, McGraw Hill Book Co. Inc., New Delhi.
2. **Applied Elasticity-** Wang. P.C.

REFERENCE BOOKS:

1. **Contiuum Mechanics Fundamentals-** Valliappan. C : Oxford and IBH Publishing Co. Ltd., New Delhi.
2. **Advanced Mechanics of Solids-** Srinath.L.S. : Tata McGraw Hill Publications Co.Ltd., New Delhi.
3. **Structural Mechanics with Introduction to Elastity and Plasticity-** Venkataraman and Patel : McGraw Hill Book Inc., New York.
4. **Mechanics of Solids-** Arbind Kumar Singh : Prentice hall of India Pvt. Ltd. New Delhi -2007.

ALTERNATIVE BUILDING MATERIALS AND TECHNOLOGIES

Subject Code	: 10CV662	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:

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, 19th to 20th December 2003 @ BVB College of Engineering. & Tech., Hubli.**

GROUND IMPROVEMENT TECHNIQUES

Subject Code	: 10CV663	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

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.

ADVANCED SURVEYING

Subject Code	:10CV664	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

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 measurement

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. Mikhail 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.

GROUND WATER HYDROLOGY

Subject Code	: 10CV665	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: Importance. Vertical distribution of sub-surface water. Occurrence in different types of rocks and soils. Definition of aquifer, Aquifuge, Aquitard and Aquiclude. Confined and unconfined aquifers.

6 Hours

UNIT - 2

AQUIFER PROPERTIES: Aquifer parameters – Specific yield, Specific retention, Porosity, Storage coefficient, derivation of the expression. Determination of specific yield. Land subsidence due to ground water withdrawals.

6 Hours

UNIT - 3

DARCY'S LAW AND HYDRAULIC CONDUCTIVITY: Introduction. Darcy's law. Hydraulic conductivity. Coefficient of permeability and Intrinsic permeability, Transmissibility, Permeability in Isotropic, Unisotropic layered soils. Steady one dimensional flow, different cases with recharge.

7 Hours

UNIT - 4

WELL HYDRAULICS – STEADY FLOW: Introduction. Steady radial flow in confined and unconfined aquifers. Pumping tests.

7 Hours

PART - B

UNIT - 5

WELL HYDRAULICS – UNSTEADY FLOW: Introduction. General equation derivation; Theis method, Cooper and JaCob method, Chow's method. Solution of unsteady flow equations.

7 Hours

UNIT - 6

GROUND WATER DEVELOPMENT: Types of wells. Methods of constructions. Tube well design. Dug wells. Pumps for lifting water: Working principles, Power requirements.

7 Hours

UNIT - 7

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

6 Hours

UNIT - 8

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

6 Hours

TEXT BOOKS:

1. **Ground Water-** H.M. Raghunath, - Wiley Eastern Limited, New Delhi.
2. **Ground Water Hydrology-** K. Todd, - Wiley and Sons, New Delhi.
3. **Numerical Ground Water Hydrology-** A.K. Rastogi, - Penram, International Publishing (India), Pvt. Ltd., Mumbai.

REFERENCE BOOKS:

1. **Ground Water Hydrology-** Bower H.- McGraw Hill, New Delhi.
2. **Ground Water and Tube Wells-** Garg Satya Prakash, - Oxford and IBH, New Delhi.
3. **Ground Water Resource Evaluation-** W.C. Walton, - McGraw Hill - Kogakusha Ltd., New Delhi.
4. **Water wells and Pumps** – Michel D.M., Khepar. S.D., Sondhi. S.K., McGraw Hill Education – 2nd Edition.

RURAL WATER SUPPLY AND SANITATION

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

Part - A

UNIT - 1

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

6

Hours

UNIT - 2

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

6

Hours

UNIT - 3

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

8

Hours

UNIT - 4

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

3

Hours

Part - B

UNIT - 5

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

4 Hours

UNIT - 6

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

10

Hours

UNIT - 7

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

9

Hours

UNIT - 8

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

6

Hours

TEXT BOOKS:

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

REFERENCE BOOK:

1. Preventive & Social Medicine - Park & Park

TRAFFIC ENGINEERING

Subject Code	: 10CV667	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1

INTRODUCTION: Definition, objectives of Traffic Engineering and scope of Traffic Engineering.

2

Hours

UNIT - 2

TRAFFIC CHARACTERISTICS: Road user characteristics, vehicular characteristics – static and dynamic characteristics, power performance of vehicles, Resistance to the motion of vehicles – Reaction time of driver – Problems on above.

6

Hours

UNIT - 3

TRAFFIC STUDIES: Various types of traffic engineering studies, data collection, analysis objectives and method of study – Definition of study area – Sample size and analysis.

6

Hours

UNIT - 4

INTERPRETATION OF TRAFFIC STUDIES: Classified traffic Volume at mid block and intersections, PCU, origin and destination, spot speed, speed and delay, parking – on street parking, off street parking, Accident – causes, analysis measures to reduce accident – problems on above.

6 Hours

PART - B

UNIT - 5

TRAFFIC FLOW THEORIES: Traffic flow theory, Green shield theory – Goodness of fit, - correlation and regression analysis (linear only) – Queuing theory, Car following theory and relevant problems on above.

8 Hours

UNIT - 6

STATISTICAL ANALYSIS: Poisson's distribution and application to traffic engineering. Normal Distribution – Significance tests for observed traffic data, Chi Square test – problems on above. Traffic forecast – simulation technique.

12 Hours

UNIT - 7

TRAFFIC REGULATION AND CONTROL: Driver, vehicle and road controls – Traffic regulations – one way – Traffic markings, Traffic signs, Traffic signals – Vehicle actuated and synchronized signals – Signals co-ordination. Webster's method of signal design, IRC method, traffic rotary elements and designs, traffic operation – Street lighting, Road side furniture, Relevant problems on above.

10
Hours

UNIT - 8

INTELLIGENT TRANSPORT SYSTEM: Definition, Necessities, Application in the present traffic scenario

2

Hours

TEXT BOOKS:

1. **Traffic Engineering & Transport Planning** – L.R. Kadiyali-Khanna Publishers.
2. **Highway Engineering Nemchand & Bros-** Khanna & Justo-Roorkee (UA).
3. **Traffic Engg.** - Matson & Smith:-Mc.Graw Hill and Co.
4. **Traffic flow theory** – Drew- Mc. Graw Hill and Co.

REFERENCE BOOKS:

1. **Traffic Engineering.** Pignataro- Prentice Hall.
2. **Highway Capacity Manual** – 2000.
3. **An introduction to traffic engineering-** Jotin Khistey and Kentlal- PHI.
4. **Traffic Engineering-** Mc Shane & Roess- PHI.

GEOTECHNICAL ENGINEERING LABORATORY

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

1. Identification of gravel type, sand type, silt type and clay types soils, Tests for determination of Specific gravity (for coarse and fine grained soils) and Water content (Oven drying method).
3 Hours
2. Grain size analysis of soil sample (sieve analysis).
3 Hours
3. In situ density by core cutter and sand replacement methods.
3 Hours
4. Consistency Limits – Liquid Limit (Casagrande and Cone Penetration Methods), plastic limit and shrinkage limit.
3 Hours
5. Standard Proctor Compaction Test and Modified Proctor Compaction Test.
3 Hours
6. Coefficient of permeability by constant head and variable head methods.
3 Hours
7. Strength Tests
 - a. Unconfined Compression Test
3 Hours
 - b. Direct Shear Test
3 Hours
 - c. Triaxial Compression Test (undrained)
3 Hours
8. Consolidation Test- Determination of compression index and coefficient of consolidation.

**3
Hours**

9. Laboratory vane shear test
Hours

3

10. Determination of CBR value
Hours

3

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

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

3 Hours

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

3 Hours

REFERENCE BOOKS:

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

EXTENSIVE SURVEY VIVA - VOCE

Subject Code

: **10CVL68**

IA Marks

: 25

No. of Practical	: 03	Exam Hours	: 03
Hours/Week			
Total No. of Practical Hours	: 42	Exam Marks	: 50

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

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

1. General instructions, Reconnaissance of the sites and fly leveling to establish bench marks.
2. **NEW TANK PROJECTS:** The work shall consist of
 - i) Alignment of center line of the proposed bund, Longitudinal and cross sections of the center line.
 - ii) Capacity surveys.
 - iii) Details at Waste weir and sluice points.
 - iv) Canal alignment.

(At least one of the above new tank projects should be done by using TOTAL STATION)
3. **WATER SUPPLY AND SANITARY PROJECT:** Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population. Preparation of village map by any suitable method of surveying (like plane tabling), location of sites for ground level and overhead tanks underground drainage system surveys for laying the sewers.
4. **HIGHWAY PROJECT:** Preliminary and detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road.
5. **OLD TANK PROJECTS:** The work shall consist of

- i) Alignment of center line of the existing bund, Longitudinal and cross sections of the centre line.
- ii) Capacity surveys to explore the quantity.
- iii) Details at existing Waste weir and sluice points.