Scheme of Teaching & Examination

And

Syllabus for III & VIII Semester

(2015-2016)

Department of Civil Engineering
NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY
(An Autonomous Institution under Visvesvaraya Technological University, Belgaum)
YELAHANKA, BANGALORE - 560 064

2015 - 16

Scheme of Teaching & Examination

And

Syllabus for III & IV Semester

Department of Civil Engineering
NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY
(An Autonomous Institution under Visvesvaraya Technological University, Belgaum)
YELAHANKA, BANGALORE - 560 064

2014 - 2016

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Abbreviations & Notations

L	Lecture
CIE	Continuous Internal Evaluation
T	Tutorial
P	Practical
S	Self Study
D	Drawing
SEE	Semester End Examination

Department of Civil Engineering

NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution under Visvesvaraya Technological University, Belgaum)

YELAHANKA, BANGALORE - 560 064

SCHEME OF TEACHING & EXAMINATION

III SEMESTER B.E Civil Engineering

L – Lecture CIE – Continuous Internal Evaluation

Sl.No.	Subject Code	Subject Name	Teaching Dept	Teaching Hours/week				Examination			Credits
				L	T	P/D	S	CIE	SEE	Total	
1	14MAT31	Engineering Mathematics- III	Maths	3	2	0	0	50	50	100	4
2	14CV32	Strength of Materials	CIVIL	3	2	0	0	50	50	100	4
3	14CV33	Surveying Theory-I	CIVIL	4	0	0	0	50	50	100	4
4	14CV34	Fluid Mechanics	CIVIL	4	0	0	0	50	50	100	4
5	14CV35	Building Materials and Construction	CIVIL	4	0	0	0	50	50	100	4
6	14CV36	Engineering Geology	CIVIL	3	0	0	0	50	50	100	3
7	14CVL37	Material Testing Lab	CIVIL	0	0	3	0	50	50	100	1.5
8	14CVL38	Survey Practice-I	CIVIL	0	0	3	0	50	50	100	1.5
TOTAL								400	400	800	26/29

T – Tutorial SEE – Semester End Examination

P – Practical D - Drawing

S - Self Study

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SCHEME OF TEACHING & EXAMINATION

IV SEMESTER B.E Civil Engineering

Sl. No.	Subject Code	Subject Name	Teaching Dept	Teaching Hours/week				Examination			Credits
				L	T	P/D	S	CIE	SEE	Total	
1	14MAT41	Engineering Mathematics- IV	Maths	4	0	0	0	50	50	100	4
2	14CV42	Structural Analysis-I	CIVIL	3	2	0	0	50	50	100	4
3	14CV43	Hydraulics & Hydraulic Machines	CIVIL	4	0	0	0	50	50	100	4
4	14CV44	Concrete Technology	CIVIL	4	0	0	0	50	50	100	4
5	14CV45	Surveying Theory -II	CIVIL	4	0	0	0	50	50	100	4
6	14CV46	Building Planning & Drawing	CIVIL	3	0	2	0	50	50	100	4
7	14CVL47	Geology Lab	CIVIL	0	0	3	0	50	50	100	1.5
8	14CVL48	Surveying Practice - II	CIVIL	0	0	3	0	50	50	100	1.5
TOTAL								400	400	800	27

L – Lecture
T – Tutorial
P – Practical
S - Self Study

CIE – Continuous Internal Evaluation
SEE – Semester End Examination
D-Drawing

III SEMESTER BE CIVIL ENGG
ENGINEERING MATHEMATICS – III

Subject code	**:14MAT31**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

UNIT-I

Fourier series: Euler's Formulae, Dirichlet's Conditions for Fourier Series Expansion, Change of Interval, Even and Odd function, half range series, Practical Harmonic Analysis.

Text1: Ch 10 **10 Hrs**

UNIT-II

Fourier Transforms: Definition, Complex Fourier transforms, Cosine and Sine transforms, Properties, Inverse Fourier transform, Application to boundary value problems.

Text1: Ch 22.22.1, 22.5, Ch. 22.22.11 **10 Hrs**

UNIT– III

Partial Differential equations: Formation of PDE, Solution by direct integration, Lagrange's linear PDE of the form $Pp + Qq = R$, Charpit's method, Method of separation of variables, Derivation of one dimensional heat and wave equation, Solution by variable separable method, Solution of two dimensional Laplace equations by variable separable method

Text1: Ch 17, 17.1 to 17.5, 17.7, Ch 18.18.2 to 18.6 **10 Hrs**

UNIT – IV

Finite differences and interpolation: Finite differences, Forward & Backward differences, Interpolation, Newton's forward and backward formulae, Newton's divided difference formulae and Lagrange's formula for unequal intervals and inverse interpolation by Lagrange's formula.

Z- Transforms: Transform of standard functions, Linearity property, Damping rule, Initial and final value theorems, Convolution theorem, Inverse z transforms, Application of z- transform to difference equations.

Text1: Ch 25. 25.1, 25.5, 25.12, 25.13, Ch 26.26.9 to 26.21 **10Hrs**

UNIT-V

Linear Algebra: Elementary row transformation, Echelon form, Rank of a matrix, Consistency of linear system of equation, Gauss elimination, Gauss Siedel methods, Eigen values and Eigen vectors, Largest Eigen value by Power method.

Numerical Analysis: Solution of algebraic and transcendental equations by regula-falsi method and Newton-Raphson methods. Evaluation of derivatives using Newton's forward and backward difference interpolation formulae, Numerical Integration by Trapezoidal, Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule, Weddle's rule.

Text1: Ch 24.24.2, Ch 25. 25.14, 25.16 **12 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publication, 36th Edition, 2002
2. Erwin E Kreyszig, "Advanced Engineering Mathematics", Wiley, 8th Edition, 1999

Reference Books:

1. Erwin E Kreyszig, "Advanced Engineering Mathematics", Wiley, 8th Edition, 1999
2. Iyengar and Jain, "Numerical Methods ", New age International, 2002
3. Denis G Zill, Michael R Cullen, "Advanced Engineering Mathematics", Narola Publication, 3rd Edition , 2006

STRENGTH OF MATERIALS

Subject Code	**:14CV32**	**Exam hours**	**:03 hr.**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. The concept of simple and compound stress, strain and elastic constants.
2. To draw SFD and BMD for simple beams with different types of Loads.
3. To draw Bending stress diagram and shear stress diagram for various cross sections of the beam.
4. The effect of twisting moment on shaft and to learn the deflection calculations of beam.
5. The concept of short and long column and their failure pattern, also to learn the calculations stresses in the thick and thin cylinders subjected to fluid pressure.

Course Outcome

On successful completion of the course, students will be able to

1. Calculate simple stresses and strains and elastic constants
2. Calculate normal and tangential stresses, principle stresses using both analytical and graphical methods and to draw SFD and BMD for simple beams.
3. Calculate bending and shear stresses at various points across the section of the beam and to plot stress diagrams.
4. Derive simple Torque equation and to sketch the variation of the shear stress across the shaft cross-section. Students should also be able to calculate the deflections and slopes of simple beams.
5. Distinguish short column from the long column and need to calculate buckling load for long columns and also to calculate the stresses in thin and thick cylinders.

UNIT- 1

Simple Stresses and Strains

Introduction, Properties of Materials, Stress, Strain, Hook's law, Poisson's Ratio, Stress-Strain Diagram for Mild Steel, Principle of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Thermal stress and strains. **12Hrs**

UNIT- II

Compound Stresses

Introduction, Stress components on inclined planes, General two-dimensional stress system, Principal planes and stresses, maximum shear stresses and their planes, shear planes. Graphical solutions for the compound stress using Mohr's circle method. **04Hrs**

Bending Moment and Shear Force in Beams

Introduction, Different Type of beams, loads and support, Shear force , Bending Moment, Sign convention, Relationship between load, shear force and bending moment. Equation of Shear Force and Bending Moment, Shear Force Diagram and Bending Moment Diagram with values at salient points for cantilever beam, simply supported beam and overhanging beams with point loads, UDL - Uniformly Distributed load, UVL - Uniformly Varying Load, Moment and Couple **06 Hrs**

UNIT- III

Bending Stress, Shear Stress in Beams of Various Cross Sections

Introduction, Bending stress in beams of various cross sections, Assumptions in simple bending theory, Pure bending derivation of Bernoulli's equation, Modulus of rupture, section modulus, Flexural rigidity. **05 Hrs**

Shear Stress in Beams

Introduction, Derivation of Shear stress intensity equations, Derivation of Expressions of the shear stress intensity at various points across rectangular, triangular and circular cross sections of the beams. Problems on calculation of the shear stress intensities at various critical levels of T, I,L and Hollow rectangular cross sections of the beam. Sketching the variation of shear stress across the section of beams. **04 Hrs**

UNIT- IV

Torsion

Introduction, Definition of Shaft, Torsion/twisting moment, simple torque theory, derivation of simple torque equation, torsional rigidly, polar modulus, shear stress variation across solid circular and hollow circular sections and related problems **04Hrs**

Deflection of Beams

Introduction, Definitions of slope, deflection, elastic curve derivation of differential equation of flexure, expression for relation between deflection, slope, bending moment, shear force and load. Sign convention, Slope and deflection for standard load cases using Macaulay's method for prismatic beams for simply supported, cantilever and overhanging beams subjected to point loads, UDL and Couple. **05Hrs**

UNIT- V

Elastic Stability of Columns

Introduction , Short and long columns, Euler's theory on columns, concept of Effective length, slenderness ration, radius of gyration, crushing load, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems . **05 Hrs**

Thin and Thick Cylinders

Introduction, Longitudinal, circumferential (hoop) stress in thin cylinders. Derivations of expressions for longitudinal and circumferential stresses. Efficiency of longitudinal and circumferential joints. Derivations of the expressions for change in length, diameter and volume when a thin cylinder is subjected to internal fluid pressure. **04 Hrs**

Thick cylinders:

Derivations of Lame's equations applicable to thick cylinders, calculation of longitudinal, circumferential and radial stresses. Estimation of variation of radial stress (pressure) and circumferential stress across the wall of thick cylinder and drawing stress diagram. **03Hrs**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Subramanyam, Strength of Materials, Oxford University Press, Edition 2005
2. B.C Punmia Ashok Jain, Arun Jain, Mechanics of Materials, Lakshmi Publications, New Delhi.

Reference books:

1. Singer ,Strength of Materials, Harper and Row Publications.
2. Timoshenko and Young, Elements of Strength of Materials, Affiliated East-West Press.
3. James M. Gere ,Mechanics of Materials, (5th Edition), Thomson Learning.
4. Basavarajaiah and Mahadevappa ,Strength of Materials, Khanna Publishers, New Delhi.

SURVEYING THEORY – I

Sub Code	**:14CV 33**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE Marks**	**:50**
Total Teaching hrs	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. Surveying, classifications, units, different types of linear measurement using instruments namely different types of chain and different types of tape.
2. Details of angular measurements in terms of bearing of a line using compass surveying
3. Concepts of leveling, reduction of elevation of a point using Levelling instruments and its applications
4. The plane Table surveying and concept, different methods, different types of Traversing and field applications of Plane table surveying.

Course Outcome

On successful completion of the course, students will be able to

1. Define surveying, understand units , classify various types of survey, linear measurements by chain and tape and concept of horizontal measurements.
2. Make angular measurements as bearing of lines using compass surveying and various methods of angular measurements.
3. Reduce a level of a point using different types of levelling instruments namely Dumpy Level, Auto level, estimate difference in elevation between different points, plotting contours of a given area by various methods.
4. Use Plane table for conduction field and site work simultaneously and use different methods of plane table surveying and its practical applications in the field.

UNIT- I

Introduction

Definition of Surveying, Classification of Survey, Uses of Surveying, Units of Measurements, Map & Classification, Survey of India topographical Maps and their numbering, Basic principles of surveying, Errors, Classification, Precision and accuracy. **3 Hrs**

Measurement of Horizontal Distances

Chain Surveying

Introduction, Measurement of Horizontal distance by Chain and types, Tape and types, Electro-Magnetic Distance Measuring-EDM devices, Ranging of lines, Direct and Indirect, measurement of distances over sloping ground, Corrections for measurements with Chain and Tape - Numerical problems. **4 Hrs**

Accessories required, Selection of stations and lines, Offsets and types, Setting out of right angles, Principle of Surveying, use of optical square, prism square, cross staff for setting out perpendicular, Linear methods of setting out right angles, Booking of chain survey work, Field

book, entries, conventional symbols. Obstacles in chain survey, Numerical problems, Errors in chain survey and precautions to be taken. **5 Hrs**

UNIT- II

Compass Surveying

Introduction, Angular measurements. Meridians and bearings, Principle, working and use of Prismatic compass, Surveyor's compass, Magnetic bearing, true bearings, WCB-Whole Circle Bearing and Quandrantal Bearing. Dip and Declination, Accessories required for compass surveying, Traverse surveying, closed and open traverse. Computation of bearings of legs of closed traverse given the bearing of one of the legs. Computation of included angles given the bearings of legs of a closed traverse. Local attraction, determination and corrections. Dependent and independent co-ordinates, Checks for closed traverse and determination of closing error and its direction ,Bowditch's graphical method of adjustment of closed traverse, Bowditch's rule and Transit rule. Omitted measurements (Only Length and corresponding bearing of one line). **12Hrs**

UNIT- III

Introduction to Levelling

Introduction, Principles of levelling and basic definitions. Fundamental axes and part of a dumpy level, Types of adjustments and objectives, Temporary adjustments of a dumpy level, Sensitiveness of bubble tube, Curvature and refraction correction, Type of leveling, Simple leveling, Reciprocal leveling, Profile leveling, Cross sectioning, Fly leveling. **11 Hrs**

UNIT- IV

Reduction of Levelling

Booking of levels, Rise and fall method and Height of Instrument method, comparison of Arithmetic checks, Fly back leveling, Errors and precautions.

Contouring

Introduction**,** Contours, and their characteristics, Types of contouring, Interpolation techniques, direct and indirect methods, Uses of contours, Numerical problems on determining, intervisibility, Grade contours and uses. **8Hrs**

UNIT- V

Plane Table Surveying

Introduction, Plane table and accessories, Advantages and limitations of plane table survey, Orientation and methods of orientation, Methods of plotting, Radiation, Intersection, Traversing, Resection method, Two point and three point problems, Solution to two point problem by graphical method, Solution to three point problem by Bessel's graphical method, Errors in plane table survey. **9Hrs**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. 'Surveying' Vol.1, B.C. Punmia, Laxmi Publications, New Delhi.
2. 'Plane Surveying' Vol.1, A.M. Chandra , Newage International ® Ltd.
3. Kanetkar.T.P. & S.V.Kulkarni, "Surveying and levelling part I & II ", Puna Vidyarthi Griha, Prakashan

Reference books:

1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson
2. 'Plane Surveying' – ALAK , S. Chand and Company Ltd., New Delhi.
1. Punmia.B.C., "Surveying Volume-1 & Volume-2", ",Laxmi Publications(p)Ltd.
2. Duggal .S.K.,"Surveying volume I & II ",Tata Mc Graw hill newdelhi,1996,1st Edition

FLUID MECHANICS

Subject Code	**:14CV34**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**: 50**

Course Objective

The objectives of learning the subject are to understand

1. The Importance of Fluid Mechanics, Fluid Properties and its classification
2. Definition of Fluid pressure and its measurements, Hydrostatics
3. In detail the Kinematics of fluids
4. The Dynamics of fluid flow and flow through pipes and flow measurements

Course Outcome

On successful completion of the course, students will be able to

1. Define of fluid , analyse its properties and classify the fluids
2. Define Fluid pressure and write the units of measurements
3. Summarize different approaches and equations of Kinematics of fluid flow
4. Understand the concept of dynamics of fluid flow, use of various equations and analyse flow through pipes and Enumerate in detail the flow measurements.

UNIT- I

Introduction

Scope and importance of the subject in civil engineering, Definition of Fluid, Distinction between solids & fluid, Distinction between liquid & gas, fluid continuum.

Fluid properties and classification of fluid Mass density, Specific Volume, Specific Weight Relative density, Definition, units and Dimensions, Viscosity, Newton's law of viscosity, Newtonian and Non-Newtonian Fluids, Ideal and Real fluids, Compressibility, Vapour pressure, surface tension, Definitions, units and dimensions, Equation for stability of bubble, Capillarity, theory and problems, Problems on Newton's law of viscosity. **10Hrs**

UNIT- II

Fluid Pressure and Pressure Measurements

Definition of pressure, units and dimensions, Pressure at a point, Pascal's law, Hydrostatic pressure law, Absolute and Gauge pressure, Measurement of pressure, Simple Manometer theory and problems, Differential manometer theory & Problems, Mechanical pressure gauges.

Hydrostatics, Definition of total pressure, center of pressure, centroid, centroidal depth, depth of center of pressure, Equation for hydrostatic force and depth of center of pressure on plane surfaces (vertical and inclined), Problems on hydrostatic force vertically submerged surfaces, Problems on inclined submerged surfaces, Hydrostatic force on submerged curved surfaces, problems, Pressure diagram, problems **12 Hrs**

UNIT- III

Kinematics of Fluids

Description of fluid flow, Lagrangian and Eulerian approaches. Classification of flow, steady & unsteady, uniform and non-uniform, Definition of path line, streamline, streak line, stream tube, one, two, three dimensional flows. Rotational and irrotational flow, Acceleration of flow, One dimensional flow, derivation of continuity equation in differential form, Definition of velocity potential, stream functions, stream line, equipotential line, Relation between velocity potential and stream function, Laplace equation, Problem on continuity equation, Problem on velocity potential and stream function. **8Hrs**

UNIT- IV

Dynamics of Fluid Flow

Concept of Inertia force and other forces causing motion, Derivation of Euler's equation and Bernoulli's equation with assumption and limitation, Modification of Bernoulli's equation, problem on Bernoulli's equation without and with losses, Application of Bernoulli's equation - Pitot tube, problems ,Venturimeter, problems, Momentum equation, problems

Flow through pipes: Flow through pipes, Reynolds number, classification of flow, Definition of hydraulic gradient, energy gradient, Major and minor losses in pipe flow, Equation for head loss due to friction (Darcy-Weishbach equation).–Friction factor for commercial pipes, Minor losses (types),equation for head loss due to sudden expansion. – Problem on minor losses, Pipes in series, pipes in parallel and equivalent pipe, Problems. **12 Hrs**

UNIT- V

Flow Measurements

Flow through Orifices; classification, Hydraulic coefficients of an Orifice and relation between them, Equation for co-efficient of velocity, problems, Submerged and large rectangular Orifices, Flow through mouth pieces, classification, equation for discharge and pressure head for an external cylindrical mouth piece.

Flow over notches, classification, Equation for discharge over rectangular and trapezoidal notches, Equation for discharge over V notch, problems, Cippoletti notch, problems. Types of Nappe, ventilation of weirs, Broad crested weirs, problems, Submerged weirs, equation for discharge, problems. **10 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. P.N. Modi and S.M. Seth ,Hydraulics and Fluid Mechanics , Standard Book House, New Delhi.
2. Dr. R.K. Bansal ,Fluid Mechanics and Hydraulic Machines, Lakshmi Publications, New Delhi.

Reference books

1. James F Cruise, Vijay P. Singh, Mohsan M. Sherif ,Elementary Hydraulics (1st Edition), Thomson Learning.
2. K.R. Arora ,Fluid Mechanics, Hydraulic and Hydraulics, Standard Book House, New Delhi.
3. John F. Douglas et al ,Fluid Mechanics, Pearson Education, India.
4. Jain, A.K ,"Fluid Mechanics", Khanna Publishers, New Delhi

BUILDING CONSTRUCTIONS

Subject Code	**:14CV35**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Building stones, Bricks & tiles
2. Timber, lime and Cement,: Types and uses
3. Fresh concrete and its workability factor, various tests on workability and manufacture of fresh concrete
4. Introduction to foundation, types of foundation
5. Definition of terms in masonry, study on bricks, lintels, chejja, canopy, scaffolding etc
6. Plastering and its purpose, methods in plastering, study on floors and roofs

Course Outcome

On successful completion of this course, students will be able to enumerate

1. Properties and types of Building stones, Bricks & tiles
2. Properties of Timber, lime and Cement,: Types and uses
3. Foundation as a basic component for structure, types of foundation
4. Masonry with related terms, study on bricks, lintels, chejja, canopy, scaffolding
5. Plastering and its purpose, methods in plastering, study on floors and roofs

UNIT- I

Building Stones

Common building stones and their uses, Quarrying of stones,Deterioration of stones,Preservation of stones, Dressing of stones

Bricks & Tiles

Classification of bricks, Manufacture of bricks,Tests on bricks,Types of tiles,Quality of tiles & their uses. **10 Hrs**

UNIT- II

Timber

Varieties & uses, Defects in Timber, Tests for good Timber, Seasoning of timber, Plywood & its uses, Wood wool boards.

Lime & Cement

Types of lime, Manufacture of Hydraulic & Fat Limes, Activated Lime – Pozzolana mixture 4.4. Chemical Composition of Portland Cement and Hydration of Cement, Manufacture of Portland Pozzolana Cement, Types of Cements and their uses, Lime & cement mortar. **12 Hrs**

UNIT- III

Foundation

Preliminary Investigation of Soil, Bearing Capacity of Soil Bearing Capacity of Soil, Safe Bearing Capacity of Soil Classification of Foundations, Introduction to Different type of foundation, Masonry footings, Isolated footings, Combined and strap RCC footings, Raft footing, Pile foundations. (Friction and Load bearing piles), **10Hrs**

UNIT- IV

Masonry

Definition of terms used in masonry, Masonry arches, Classification
Bricks: Bonds in Brickwork, English Bond, Flemish Bond, Reinforced brickwork,
Lintels: Types and classifications, Functions.
Chejja: Canopy: Balcony: Shoring, Underpinning, Scaffolding. **10Hrs**

UNIT- V

Plastering

Purpose of Plastering, Materials of plastering, Lime mortar, Cement Mortar, Methods of plastering, Stucco plastering, Lath plastering

Floors and Roofs

Types of flooring (Materials and method of laying), Granolithic, Mosaic, Ceramic, Marble, Polished Granite, Industrial flooring, 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, Weather proof course for RCC Roof. Form Work, Form work Details, RCC columns, Beams, Floors, Slip forming, Damp proof construction. **10Hrs**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Rangawala P.C,Engineering Materials, Charter Publishing House, Anand, India.
2. Sushil Kumar, Engineering Materials, Standard Publication and Distributors, New Delhi.

Reference books

1. P.G. Varghese ,AText Book Building Materials,Prentice-Hall of India Pvt. Ltd., Publication.
2. Mohan Rai and M.P. Jain ,Advances in Building Materials and Construction, Singh – publication by CBRI, Roorkee.
3. Neville A.M and Brooks J.J, Concrete Technology,— ELBS Edition.London
4. Gambhir M.L, Concrete Technology –Dhanpat Rai and Sons, New Delhi.

5.. M..S. Shetty, Concrete technology – Theory and practice, S. Chand and Co, New Delhi, 2002.
6. S.G. Rangwala ,Building Construction, Charter Publishing House, Anand, India.
7. Sushil Kumar ,Building Construction, Standard Publication and Distributors, New Delhi
8. Punmia B.C ,Building Construction Lakshmi Publications, New Delhi.
9. Mohan Rai and Jai Sing ,Advanced Building Materials and Construction ,CBRI Publications, Roorkee,

ENGINEERING GEOLOGY

Subject Code	**:14CV36**	**Exam hours**	**:03**
No. of hrs/week	**:03**	**CIE marks**	**:50**
Total Teaching hours	**:42**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Importance of geology, mineralogy in civil engineering
2. Petrology and its importance in relevance to civil engineering
3. Need, importance of geological site investigation and its methodology
4. The structural geology and ground water geology
5. Geomorphology, geodynamics and geometrics

Course Outcome

On successful completion of the course, students will be able to explain

1. The Structure of earth and composition, rock formation, physical and chemical properties of various minerals
2. The igneous and sedimentary rocks and its classification
3. Site investigation based on geological condition
4. Definition of dip and strike, other descriptions of ground water geology
5. Geomorphology, geodynamics and geomatics

UNIT- I

Introduction

Geology and its importance in Civil Practices – Internal structure of the earth and its Composition. Mineralogy: Rock forming and economic minerals, - Physical properties of minerals, chemical composition and uses of the following minerals.

Description: Quartz varieties, Rock crystal, Rose quartz, Milky quartz, Amethyst, Agate, Flint, chert, chalcedony, jasper, bloodstone and opal. Feldspars: orthoclase, plagioclase & Mirocline.

Mica group: Muscovite, Biotite. Amphibole Group: Hornblende, Pyroxene Group: Augite, Silicates: Olivine, serpentine, Asbestos, Kaoline,Talc, Garnete, Sulphites: Barite, Gypsum, Oxides: Corundum. Carbonate Group:Calcite, Dolomite, Magnesite., Ore- Minerals: Magnetite, Haematite, Limonite, Iron pyrite, Chalcopyrite, Pyrolusite, Chromite, Galena & Bauxite.

9 Hrs

UNIT- II

Petrology

Introduction, Definition and Classification, – IGNEOUS ROCKS: Forms, Classifications, Textures, Descriptions and Engineering uses of Granite, Syenite, Dionite, Gabbro, Dunite, Porphyries, Pegmatite, Dolerite, Basalt, Rhyolite, and Pumice – SEDIMENTARY ROCKS: Definition Classification, Primary structures. Description and engineering uses of Sandstones, Limestones, shale, Conglomerate, Breccia, & Laterite. –METAMORPHIC ROCKS: Definition

kinds of Metamorphism, Description and Engineering uses of Gneiss, Quartzite, Marble, Slate, Phyllite,. **9 Hrs**

UNIT- III

Geological Site Investigation

Selection of sites for Dams and Reservoir, Silting up of Reservoirs and remedies. – Selection of sites for Tunnels, – Selection of sites for Bridges and Highways **7Hrs**

UNIT- IV

Structural Geology

Definition – Outcrops, Dip and strike, Compass clinometer. – Description of Folds, Faults, Joints, Unconformities and their recognition in field and Considerations in Civil engineering Projects.

Ground water Geology

Hydrological cycle, water Bearing Properties of Rocks and Soils. Aquifer and its types, Selection of Well sites, Artificial Recharge of Ground Water by different method. **8 Hrs**

UNIT- V

Geomorphology and Geodynamics

Epigine and Hypogene geological agents, weathering of Rocks, Kinds weathering, Soil and Soil Profile, Classification, Erosion, Conservation, Geological work of Rivers. – Land slides - Causes and Remedial measures, –Earth Quakes - Causes and effects, Concept of Plate tectonics, Engineering consideration and Seismic resistant structures.

Geomatics and Environmental Geology

Application of Remote Sensing and GIS Techniques in Civil Engineering Projects. – GPS (Global Positioning System) and its uses, Study of Toposheets – Impact of Mining, Quarring and Reservoirs on Environment. **9 Hrs**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. EGH Blyth and M.H. de Freitas ,A Geology for Engineers (7th Edition)– Elsevier Science
2. P.K. Mukerjee, A Text Book of Geology ,World Press Pvt., Ltd., Calcutta.

Reference books

1. D. Venkat Reddy ,Engineering Geology for Civil Engineers, Oxford &IBH Publishing Co.
2. Krynine and Judd ,Principles of Engineering Geology and Geotechniques
3. Todd. D.K., "Ground Water Hydrology", John Wiley & sons - New York
4. G.W. Tyrrell, Principles of Petrology, Asia Publishing House - Bombay
5. Ravi P. Gupta, Remote Sensing Geology, Springer Veriag (NY).
6. M.P. Billings ,Structural Geology
7. Arthur Holmes, Physical Geology

MATERIAL TESTING LABORATORY

Subject code	**:14CVL37**	**Exam hours**	**:03**
No. of hrs/week	**:03**	**CIE marks**	**:50**
Total Teaching hours	**:42**	**SEE marks**	**:50**

List of Experiments

1. Tension test on Mild steel.
2. Compression test of cast iron and Mild Steel
3. Bending Test on Wood (Two point loading.)
4. Compressive Strength of Brick and Flexural test on clay roof tile
5. Initial and Final Setting time on Cement
6. Soundness test and Specific gravity of Cement
7. Fineness Test and Standard consistency of Cement
8. Compressive Strength on Cement
9. Water absorption and Moisture content of Coarse and Fine Aggregate
10. Bulk Density and void ratio of Coarse and Fine Aggregate
11. Specific gravity and Fineness modulus of Coarse and Fine Aggregate
12. Bulking of fine aggregate
13. Test
14. Test

Note: All Experiments should be conducted as per IS codes

Reference Books

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

Codes of References

1. IS 383 - 1970 Specification for Coarse and Fine Aggregates from Natural Sources for Concrete (second revision)
2. IS 383 - 1970 - Specifications for Coarse And Fine Aggregates From Natural Sources For Concrete).
3. IS 456 - 2000 "Plain and reinforced concrete – code of practice" (third revision).

4. IS 2386 Part I “Specifications for Method of Test of Aggregates”
5. IS 2386 Part I - Method of Test for Aggregates for Concrete.
6. IS 3495 - Part 1 to 4 (1992) “Methods of Tests of Burnt Clay Building Bricks
   Part 1 - Determination of Compressive Strength,
   Part 2 - Determination of Water Absorption,
   Part 3 - Determination of Efflorescence

SURVEY PRACTICE – I

Subject code	**:10CVL38**	**Exam hours**	**: 03**
No. of hrs/week	**:03**	**CIE marks**	**: 50**
Total Teaching hours	**:42**	**SEE**	**:50**

Course Objective

Students should study

1. Direct ranging, Setting out perpendiculars,
2. Set out the regular polygons like rectangle, hexagon etc by chain and tape
3. Traversing by Bowditch method and transit method
4. Set out the regular polygons like rectangle, hexagon etc by use of compass
5. Different methods of plane table survey
6. Introduction to leveling, Fly leveling and Reciprocal leveling

Course Outcome

From surveying practice – I Lab students learn

1. Use of simple instruments, finding horizontal distances between two points and setting perpendiculars by various methods
2. Setting out regular polygons by use of chain, tape and also by compass
3. Close Traversing by different methods
4. Detail study of plane table survey
5. Basic concepts of leveling, Fly leveling and Reciprocal leveling

Contents

Exercise – 1

a) To measure distance between two points using direct ranging

b) To set out perpendiculars at various points on given line using cross staff, optical square and tape.

Exercise – 2

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

Exercise – 3

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

Exercise – 4

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

Exercise – 5

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

Exercise – 6

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

Exercise – 7

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

Exercise –8

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

Exercise – 9

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

Exercise – 10

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

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

Text books

1. B.C. Punmia, 'Surveying' Vol.–1, Laxmi Publications, New Delhi.
2. A.M. Chandra, "Plane Surveying' Vol-1- Newage International ®Ltd.

Reference books

1. S.K. Roy, Fundamentals of Surveying – Prentice Hall of India.
2. Milton O. Schimidt ,Fundamentals of Surveying – Wong, Thomson Learning.
3. S.K. Duggal ,Surveying Vol. I.
4. ALAK ,'Plane Surveying' – S. Chand and Company Ltd., New Delhi.

IV SEMESTER BE CIVIL ENGG

ENGINEERING MATHEMATICS – IV

Subject code	**:14MAT41**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

UNIT- I

Complex Analysis

Functions of complex variables, definitions of limit, continuity and differentiability, Analytic function, C-R equations in polar and Cartesian forms, construction of analytic functions, Conformal mapping, mapping of the form z^2, e^z, $z+\frac{a}{z}$, bilinear transformation.

Complex integration, Cauchy's theorem, consequences, Cauchy's integral formula, Taylor's and Laurent's series, singularities, poles, residue, residue theorem. **12 Hrs**

UNIT- II

Numerical Solution of Ordinary Differential Equations

Taylor's series method, Modified Euler's method, Runge-Kutta 4^{th} order method, Milne's Predictor –corrector method.

Classification of 2^{nd} order PDE, Finite difference scheme, approximate solution of Laplace equation by five point formula, parabolic and hyperbolic equations by explicit method. **10 Hrs**

UNIT- III

Series Solution of Differential Equations and Special Functions

Frobeneous method, Bessel's equation, Bessel's function, orthogonality property.

Legendre's equation, Rodrigue's formula, Legendre polynomials, orthogonality. **10 Hrs**

UNIT- IV

Statistics and Probability

Curve fitting by least square method $y = ax+b, y = ax^2 + bx + c$, $y = ae^{bx}$, correlation, regression, lines of regression, Probability, axiomatic definition, addition rule, independent events, multiplication rule, conditional probability, Baye's theorem, Random variable, discrete and continuous random variables, probability distribution. **10Hrs**

UNIT- V

Theoretical Distributions

Binomial distribution, Poisson distribution, Exponential distribution and Normal distribution

Joint Probability for discrete random variables, Stochastic matrix, Regular stochastic matrix, Markov process, transitional probability matrix (t.p.m), higher transitional probability matrices,

stationary vector, absorbing & cyclic states of a t.p.m. **10 Hrs**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. Grewal, Higher engineering Mathematics, 36th edition, Khanna Publications
2. Seymour Lipschutz ,Probability, Schaum series

Reference

1.Erwin E Kreyszig ,Advanced Engg. Mathematics, 8th edition, Wiley.
2. Jain, Iyengar and Jain, Numerical methods for Scientists and Engineers, Prentice Hall

STRUCTURAL ANALYSIS –I

Subject Code	**:14CV42**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to estimate bending moment, shear force, deflection and displacements by analyzing the beams for various types of loads using various methods namely

1) Deflection of beams by moment area and conjugate beam methods.
2) Analysis of arches (three hinged and two hinged) and cables with supports at same and different levels.
3) Strain energy definitions, theorems based on strain energy, deflection of beams using strain energy and unit load method.
4) Analysis of indeterminate beams by Consistent deformation method and Clapeyron's theorem of three moments.
5) Analysis of beams, portal frames, two hinged parabolic arches for various loading cases using method of least work

Course Outcome

On successful completion of the course, students will be able to

1) Analyze deflection of beams by moment area and conjugate beam methods.
2) Analyze arches (three hinged and two hinged) and cables with supports at same and different levels.
3) Estimate the deflection of beams using strain energy and unit load method.
4) Analyze indeterminate beams by Consistent deformation method and Clapeyron's theorem of three moments.
5) Analyze beams, portal frames, two hinged parabolic arches for various loading cases using method of least work

UNIT- I

Structural Systems

Forms of structures, Conditions of equilibrium, Degree of freedom, Linear and Non linear structures, One, two, three dimensional structural systems, Determinate and indeterminate structures.

Deflections of Beams

Moment area method, Conjugate beam method. **10 Hrs**

UNIT- II

Arches and Cables

Three hinged circular and parabolic arches with supports at same levels and different levels,

Determination of thrust, shear and bending moment, Analysis of cables under point loads and UDL, length of cables (Supports at same levels and at different levels). **10Hrs**

UNIT- III

Strain Energy Method

Definitions of Strain energy due to axial load, bending and shear, theorem of minimum potential energy, law of conservation of energy, Principle of virtual work, The first and second theorem of Castigliano, problems on beams, frames and trusses, Betti's law, Clarke - Maxwell's theorem of reciprocal deflection. Deflection of beams using strain energy method **10 Hrs**

UNIT- IV

Deflection

Deflection of trusses using unit load methods.

Two Hinged Arches

Analysis of two hinged arches for various loading cases. **12Hrs**

UNIT- V

Consistent Deformation Method

Analysis of single span beams with various loading and boundary conditions. Analysis of Continuous beams using Clapeyron's theorem of three moments. **10Hrs**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Pandit and Guptha, Theory of Structures, Vol. – I, Tata McGraw Hill,New Delhi.
2. Reddy C. S., Basic Structural Analysis,Tata McGraw Hill, New Delhi.

Reference books

1. Norris and Wilbur, Elementary Structural Analysis, International Student Edition. McGraw Hill Book Co: New York
2. Aslam Kassimali, Structural Analysis,Thomson Learning.
3. Thandava Murthy ,Analysis of Structures, Oxford University Press.
4. B.C. Pumia, R.K., Strength of Materials and theory of structures Vol I & II, Jain Laxmi Publication, New Delhi.

HYDRAULICS & HYDRAULIC MACHINES

Subject Code	**: 14CV43**	**Exam hours**	**: 03**
No. of hrs/week	**: 04**	**CIE marks**	**: 50**
Total Teaching hours	**: 52**	**SEE marks**	**: 50**

Course Objective

The objectives of learning the subject are to understand

1. Detail concept of Flow in open channels
2. Water hammer in pipes, Dimensional analysis and model similitude
3. Impact of jet on flat vanes, curved vanes, study on impulse turbines
4. Concept of different reaction turbines
5. Hydraulic turbines and its performance, Principle of centrifugal pumps

Course Outcome

On successful completion of the course, students will be able to

1. Understand flow in open channels: Definition, classification, properties and derivations of conditions for various sections
2. Definition for water hammer in pipes, equations for pressure under various conditions, detail study on dimensional analysis
3. Impact of jet on flat vanes, curved vanes, study on impulse turbines
4. Concept of different reaction turbines
5. Hydraulic turbines and its performance, Principle of centrifugal pumps

UNIT- I

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.

Flow in open channels

Specific energy, definitions, specific energy curve, conditions for minimum specific energy and maximum discharge, Critical flow in rectangular channels, problems, Hydraulic jump in rectangular channels, derivations with Froude number concept, Problems on Hydraulic Jump, venture flume. **12Hrs**

UNIT- II

Water Hammer in Pipes

Definition, Equation for pressure rise due to gradual closure of valves. Equation for pressure due to sudden closure of valves in rigid & Elastic pipes, problems, Surge tanks, their functions & types.

Dimensional Analysis & Model Similitude

Introduction to Dimensional Analysis, units & dimensions, table of Dimensions, Dimensional Homogeneity, Methods of Analysis (Raleigh's & Buckingham's method, Problems on Raleigh's &Buckingham's methods, Model Studies, Introduction, comparison with Dimensional Analysis, Similitude, Dimensionless parameters. Types of models, Froude's models theory & problems, Reynold's models, Theory problems, Scale effects. **10 Hrs**

UNIT- III

Impact of Jet on Flat 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.

Impact of jet on curved vanes

Force exerted by a jet on a series of curved vanes, Concept of velocity triangles, Equation for work done & efficiency, Problems o force exerted by a Jet on a series of curved valves.

Hydraulic turbines (Impulse turbines)

Introduction, Types and classifications, Pelton Wheel, theory, equation for work done and efficiency, design parameters, Problems on Pelton Wheel.

10 Hrs

UNIT- IV

Hydraulic Turbines - Reaction Turbines

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. **10Hrs**

UNIT -V

Hydraulic Turbines - Performance

Draft tubes: types, Equation for efficiency problems, Cavitations in turbines, Governing of turbines, Governing of turbines, Specific speed of a turbine, Equation for the specific speed, problems, Unit quantities of a turbine, definitions, equations and problems, Characteristics curves of a turbine, general layout of an hydroelectric plant.

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. **10Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. Modi & Seth ,Hydraulics & Fluid Mechanics, Standard Book House, New Delhi

2. Raghunath. H M, Fluid Mechanics & Machinery, CBS Publishers

Reference Books

1. S.C. Gupta ,Fluid Mechanics and Hydraulic Machines, Pearson Education, India
2. James F Cruise, Vijay P. Singh, Mohsan M. Sherif, Elementary Hydraulics', (1st Edition), Thomson Learning.
3. K.R. Arora ,Hydraulics & Fluid Mechanics, Standard Book house, New Delhi
4. Bansal R.K, Text Book on Fluid mechanics & Hydraulic Machines,Laxmi publication

CONCRETE TECHNOLOGY

Subject Code	**:14CV44**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course objectives

The objectives of learning the subject are to understand

1. Properties of cement, sand and coarse aggregate and admixtures
2. Workability as Fresh Properties of concrete and Properties of hardened concrete
3. Shrinkage, creep of concrete
4. Durability of concrete and mix design procedure for concrete

Course Outcome

On successful completion of course, students will be able to identify good materials and

1. Enumerate the properties of cement, sand and coarse aggregate
2. Estimate workability as Fresh Properties of concrete and Properties of hardened concrete
3. Understand Shrinkage, creep of concrete as long term durability criteria
4. Durability of concrete and mix design procedure for concrete

UNIT- I

Ingredients of Concrete and Properties

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. Fine aggregate - grading, analysis, Specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – Importance of size, shape and texture. Grading of aggregates - Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. **12 Hours**

UNIT- II

Chemical admixtures

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

Properties of Fresh Concrete

Introduction, Workability**,** Factors affecting workability, Measurement of workability - Slump, Flow Tests, Compaction factor and Vee-Bee Consistometer tests, Segregation and bleeding, Process of manufactures of concrete : Batching, Mixing, Transporting, Placing, Compaction, Curing. **10 Hours**

UNIT- III

Properties of Hardened Concrete

Introduction, 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, Relation between modulus of elasticity and Strength, factors affecting modulus of elasticity, Poisson Ratio. **9Hours**

UNIT- IV

Shrinkage of Concrete

Shrinkage - plastic shrinkage and drying shrinkage, Factors affecting shrinkage, Creep - Measurement of creep, factors affecting creep, effect of creep. **9Hours**

UNIT- V

Durability of Concrete

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, Concept of Concrete Mix design, variables in proportioning , exposure conditions, Procedure of mix design as per IS 10262-1982, Numerical examples of Mix Design. **12Hours**

Question paper pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. M.S.Shetty , "Concrete Technology" - Theory and Practice, , S.Chand and Company, New Delhi, 2002.

2.Neville, A.M. , Properties of Concrete": , ELBS, London

References

1. A.R.Santakumar , "Concrete Technology" –. Oxford University Press (2007)'

2. Gambhir Dhanpat Rai & Sons , "Concrete Manual" -, New Delhi.

3. N.Krishna Raju, "Concrete Mix Design" -, Sehgal - publishers.

4.IS:10262-2009 , "Recommended guidelines for concrete mix design", Bureau of Indian Standards, New Delhi

SURVEYING THEORY– II

Subject Code	**:14CV45**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Angular measurements [Horizontal & Vertical] using theodolite and its applications.
2. Application of theodolite survey for Trigonometric levelling and estimation of distances using techeometric survey. Use of Total station as EDM.
3. Different type of curves [Horizontal & Vertical], elements of compound , reverse and transition curves and its estimation, and setting out of simple curves for the given field condition.
4. Estimation of areas and volumes [of earthwork] by various methods

Course Outcome

On successful completion of the course, students will be able to

1. Use theodolite, carryout measurement of horizontal angles /vertical angles by different methods.
2. Estimate angle and horizontal distances by Single and double plane method using both trigonometric survey and Tacheometric survey and Advantages of using total station.
3. Calculate the required data for setting out simple, compound, reverse and transition curves and also vertical curves.
4. Estimation of areas by planimeter and volumes by various methods.

UNIT- I

Theodolite survey

Theodolite and types, Fundamental axes and parts of a transit theodolite, Uses of theodolite, temporary adjustments of a transit theodolite, Measurement of horizontal angles – Method of repetitions and reiterations, Measurements of vertical angles, Prolonging a straight-line by a theodolite in adjustment and theodolite not in adjustment.

Permanent adjustment of Dumpy level and Transit Theodolite

Interrelationship between fundamental axes for instrument to be in adjustment and step by step procedure of obtaining permanent adjustments. **12Hrs**

UNIT- II

Trigonometric leveling

Introduction, Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method, 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. **8Hrs**

UNIT- III

Tacheometry

Basic principle, Types of tacheometric survey. Tacheometric equation for horizontal line of sight and inclined line of sight in fixed hair method, Anallactic lens in external focusing telescopes, Reducing the constants in internal focusing telescope, Moving hair method and tangential method, Substance bar, Beaman stadia arc.

Curve setting - Simple curves

Curves – Necessity – Types, Simple curves, Elements, Designation of curves, Setting out simple curves by linear methods, Setting out curves by Rankine's deflection angle method. **12Hrs**

UNIT- IV

Curve setting - Compound and Reverse curves

Compound curves, Elements, Design of compound curves, setting out of compound curves, Reverse curve between two parallel straights (Equal radius and unequal radius).

Curve setting (Transition curves)

Transition curves, Characteristics Length of Transition curve, Setting out cubic Parabola and Bernoulli's Lemniscates– Simple numerical problems. **10 Hrs**

UNIT- V

Curve setting-Vertical curves

Vertical curves –Types – Simple numerical problems.

Areas and Volumes

Calculation of area from cross staff surveying, Calculation of area of a closed traverse by coordinates method Planimeter – principle of working and use of planimeter to measure areas, digital planimter, Computations of volumes by trapezoidal and prismoidal rule, Capacity Contours. **10 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

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

Reference books

1. Milton O. Schimidt, Fundamentals of Surveying– Wong, Thomson Learning.
2. S.K. Roy ,Fundamentals of Surveying– Prentice Hall of India
3. Arther Bannister et al, Surveying, Pearson Education, India
4. A.M. Chandra ,'Higher Surveying', New age international (P) Ltd
5. Arora and R C Badjatio, Geomatics Engineering, Nem chand & Bros, Roorkee -247667
6.Y R Nagaraja and A Veeraraghavan Surveying – 1, Nem chand & Bros, Roorkee -247667

BUILDING PLANNING AND DRAWING

Subject code	**:14CV46**	**Exam hours**	**:03**
No. of hrs/week	**:02(Theory) + 03 (Drawing)**	**CIE marks**	**:50**
Total hours	**:42**	**SEE**	**:50**

Course Objective

The objectives of learning the subject are to

1 Be fluent while using AUTOCADD software to prepare drawings of Civil Engineering components, plans, sections & elevations of Buildings.

2. Drawing details of Doors, Windows, Footings, Staircases & Steel Truss.

3. To prepare plan of a building catering to Functional and structural requirements of Residential & Public Buildings as per Building Standards and Building Bye Laws.

4. Area calculations [FAR, Plint Area, Carpet Area] , Bubble and Line diagrams for School, Hospitals, Canteen and other offices Buildings.

5. Preparing drawings in single line diagram showing Building services namely water supply, sanitary and electrical layouts.

Course Outcome

On successful completion of course, students will have

1 Proficiency in Auto cad to draw Civil Engg components

2 Drawing details of Doors, Windows, Staircases, footings and steel trusses.

3 Knowing Building Standards, bye laws, setbacks, area calculations and Function design of Residential and Public Buildings by bubble and line diagrams

4 Developing Plan, Sections, Elevation & schedules for Two Bed room residential buildings and two storey residential Buildings, preparing layouts of building services.

Syllabus

Introduction to standard drawing software

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, View tools, Layers concept, Dimension tools, Hatching, Customising toolbars, Working with multiple drawings **3Hrs**

1. To prepare working drawing of component of buildings

i) Stepped wall footing and isolated RCC column footing,

ii) Fully paneled and flush doors,

iii)Half paneled and half-glazed window

iv) RCC dog legged and open well stairs

v) Steel truss. **8 Hrs**

2. Functional design of building (Residential, Public and Industrial),positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio. **7 Hrs**

3.Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Two bed room building, ii) Two storied building. **12Hrs**

4.Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following buildings: i) Primary health centre, ii) Primary school building, iii) College canteen iv) Office building. **7 Hrs**

5. For a given single line diagram, preparation of water supply, sanitary and electrical layouts. **5Hrs**

Term works details

1. Introduction on Drawing Software - 1 Class
2. Drawing elevation/plan of Door & Windows – 1 Class
3. Drawing of Stair case – Plan elevation (doglegged) – 2 Class
4. Drawing of Footing & Foundation (Isolated & wall footing) – 1 Class
5. Drawing of Steel structures & Joints (Truss & Joints) – 2 Class
6. Developing & drawing of plan, Schemes Elevation & Schedules for two bedroom residential building (one only) – 3 Class
7. Developing drawing of plan, schemes, elevation & schedules for two storey residential building (one only) – 2 Class

Evaluation Process

1. Regular class sketching : 10
2. Drawing using software : 15
3. One main Test
   a. Viva voce: 5
   b. Sketching: 10
   c. Drawing using software : 10

Text books

1. Shah M.H and Kale C.M ,“Building Drawing”,Tata Mc Graw Hill Publishing co. Ltd., New Delhi.

2. Gurucharan Singh,“Building Construction”, Standard Publishers &distributors,New Delhi.

Reference books

1. National Building Code, BIS, New Delhi.

GEOLOGY LABORATORY

Subject Code	**:14CVL47**	**Exam hours**	**:03**
No. of hrs/week	**:03**	**CIE marks**	**:50**
Total hours	**:42**	**SEE marks**	**:50**

Learning Objectives and Practices

Identification of Minerals based on their Physical Properties, Chemical composition and uses.

P1 Quartz and its varieties : Rock crystal, Rose quartz, Milkyquartz, Amethyst, Grey quartz, Blood stone, Flint, Agate, Chert, Jasper, Chalcedony and Opal.

P2 Feldspar group - Orthoclase, Microcline, Plagioclase. Muscovite, Biotite, Hornblende, Augite, Olivine, Serpentine, Asbestos, Kaolin, Talc, Garnet, Corundum, Gypsum and Baryte

P3 Carbonates – Calcite, Dolomite, Magnesite.Ore-minerals – Magnetite, Hematite, Limonite, Chromite, Ironpyrite, Chalcopyrite, Pyrolusite, Psilomelane, Bauxite and Galena.

Identification of rocks based on their Geological properties.

P4 Igneous rocks : Granite, Syenite, Diorite, Gabbro, Dunite, Porphyres, Dolerite, Pegmatite, Basalt, Rhyolite, and Pumice.

P5 Sedimentary rocks : Sandstone, Limestone, Shale, Breccia, Conglomerate and Laterite.

P6 Metamorphic Rocks : Gneiss, Quartzite, Marble, Slate, Phyllite, Schists and Charnockite.

P7 Thickness problems - 3 Types.

P8 Dip and strike problems – 3 Types.

P9 Bore hole problems (On level ground).

P10 Study and interpretation of standard structural geological maps.

P11 Lab Internal Test.

SURVEY PRACTICE – II

Subject code	**:14CVL48**	**Exam hours**	**:03**
No. of hrs/week	**:03**	**CIE marks**	**:50**
Total Teaching hours	**:42**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Measurement of horizontal angles repetition and reiteration methods using theodolite, Measurement of vertical angles using theodolite.
2. Determine the elevation of an object using single plane method when base is accessible and inaccessible.
3. Determine the distance and difference in elevation between two inaccessible points using double plane method.
4. Determine the tacheometric constants using horizontal and inclined line of sights.
5. Set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced also simple curves by using Rankine's deflection angles method.
6. To set out compound curve with angular methods uing theodolite only.
7. To set out the center line of a simple rectangular room suing offset from base line.
8. To set out center lines of columns of a building using two base lines at right angles.
9. Exposure to use of Total Station. Traversing, Longitudinal sections, Block levelling, Usage of relevant softwares for preparation of the contour drawings.

Course Outcome

From Surveying – II Laboratory students learn

1. Measurement of horizontal angles repetition and reiteration methods using theodolite, Measurement of vertical angles using theodolite.
2. Determine the elevation of an object using single plane method when base is accessible and inaccessible.
3. Determine the distance and difference in elevation between two inaccessible points using double plane method.
4. Determine the tacheometric constants using horizontal and inclined line of sights.
5. Set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced also simple curves by using Rankine's deflection angles method.
6. To set out compound curve with angular methods using theodolite only.
7. To set out the center line of a simple rectangular room suing offset from base line.
8. To set out center lines of columns of a building using two base lines at right angles.
9. Exposure to use of Total Station. Traversing, Longitudinal sections, Block levelling, Usage of relevant softwares for preparation of the contour drawings.

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 tacheometric constants using horizontal and inclined line of sights.

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 Teaching & Examination

And

Syllabus for V – VIII Semester

(2010-2014 Batch)

Department of Civil Engineering
NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY
(An Autonomous Institution under Visvesvaraya Technological University, Belgaum)
YELAHANKA, BANGALORE - 560 064

2010 - 2011

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Abbreviations & Notations

L	Lecture
CIE	Continuous Internal Evaluation
T	Tutorial
P	Practical
S	Self Study
D	Drawing
SEE	Semester End Examination

Department of Civil Engineering
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YELAHANKA, BANGALORE - 560 064

SCHEME OF TEACHING & EXAMINATION

V SEMESTER B.E Civil Engineering

Sl. No.	Subject Code	Subject Name	Teaching Dept	Teaching Hours/week				Examination			Credits
				L	T	P/D	S	CIE	SEE	Total	
1	10CV51	Design of RC Structures	CIVIL	4	1	0	0	50	50	100	4
2	10CV52	Structural Analysis - II	CIVIL	4	1	0	0	50	50	100	4
3	10CV53	Transportation Engg- I	CIVIL	4	0	0	0	50	50	100	4
4	10CV54	Geotechnical Engg. – I	CIVIL	4	0	0	0	50	50	100	4
5	10CVE55x	GROUP - A (Program Electives)	CIVIL	4	0	0	0	50	50	100	4
6	10CVO56x	GROUP - B (Open Electives)	CIVIL	3	0	0	0	50	50	100	3
7	10CVL57	Hydraulic &Hydraulic Machinery Lab	CIVIL	0	0	3	0	50	50	100	1.5
8	10CVL58	Civil CAD Lab	CIVIL	0	0	3	0	50	50	100	1.5
TOTAL								400	400	800	26

L – Lecture
T – Tutorial
P – Practical
S - Self Study

CIE – Continuous Internal Evaluation
SEE – Semester End Examination
D-Drawing

Department of Civil Engineering

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SCHEME OF TEACHING & EXAMINATION

VI SEMESTER B.E Civil Engineering

@ Marks carried to VIII semester

Sl. No.	Subject Code	Subject Name	Teaching Dept	Teaching Hours/week				Examination			Credits
				L	T	P/D	S	CIE	SEE	Total	
1	10CV61	Geo Technical Engg. –II	CIVIL	3	2	0	0	50	50	100	4
2	10CV62	Transportation Engg –II	CIVIL	3	2	0	0	50	50	100	4
3	10CV63	Environmental Engg - I	CIVIL	4	0	0	0	50	50	100	4
4	10CVH64	Environmental Impact Assessment	CIVIL	3	0	0	0	50	50	100	4
5	10CVE65x	GROUP-C (Program Electives)	CIVIL	4	0	0	0	50	50	100	4
6	10CVO66x	GROUP-D (Open Electives)	CIVIL	3	0	0	0	50	50	100	3
7	10CVL67	Geotechnical Engg. Lab	CIVIL	0	0	3	0	50	50	100	1.5
8	10CVL68	Extensive Survey Project	CIVIL	0	0	3	0	50	50	100	1.5
9	10CVP69	Seminar	CIVIL	0	0	3	0	25@	--	25@	--
TOTAL								400	400	800	26

L – Lecture CIE – Continuous Internal Evaluation

T – Tutorial SEE – Semester End Examination

P – Practical D-Drawing (using Software), S - Self Study

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SCHEME OF TEACHING & EXAMINATION

VII SEMESTER B.E Civil Engineering

@ Marks carried to VIII semester

Sl.No.	Subject Code	Subject Name	Teaching Dept	Teaching Hours/week				Examination			Credits
				L	T	P/D	S	CIE	SEE	Total	
1	10CV71	Quantity Surveying and Estimation	CIVIL	4	0	0	0	50	50	100	4
2	10CV72	Design of Steel Structures	CIVIL	4	0	0	0	50	50	100	4
3	10CVH73	Entrepreneurship and IPR	CIVIL	4	0	0	0	50	50	100	4
4	10CV74	Environmental Engg - II	CIVIL	2	0	4	0	50	50	100	3
5	10CVE75x	GROUP – E (Program Electives)	CIVIL	4	0	0	0	50	50	100	4
6	10CVO76x	GROUP – F (Open Electives)	CIVIL	4	0	0	0	50	50	100	4
7	10CVL77	Concrete & Highway Engg Lab	CIVIL	0	0	3	0	50	50	100	1.5
8	10CVL78	Environmental Engineering Lab	CIVIL	0	0	3	0	50	50	100	1.5
9	10CVP79	Major Project phase – I	CIVIL	0	0	4	0	25@	-	25@	-
TOTAL								400	400	800	26

L – Lecture
T – Tutorial
P – Practical

CIE – Continuous Internal Evaluation
SEE – Semester End Examination
D-Drawing (using Software), S - Self Study

Department of Civil Engineering
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SCHEME OF TEACHING & EXAMINATION

VIII SEMESTER B.E Civil Engineering

Sl.No.	Subject Code	Subject Name	Teaching Dept	Teaching Hours/week				Examination			Credits
				L	T	P/D	S	CIE	SEE	Total	
1	10CV81	Quantity Surveying & Estimation	CIVIL	4	0	0	0	50	50	100	4
2	10CVE82x	GROUP – G (Program Electives) Design and Drawing of RC & Steel Structures	CIVIL	4	0	0	0	50	50	100	4
3	10CVA83	Add on Course / Mini Project/Internship/Self Study Course	CIVIL	0	0	0	8	50	50	100	2*
3	10CVP84	Project work including Project Seminar	CIVIL	0	0	0	0	50+50	100	200	13
TOTAL								250	250	500	23

L - Lecture CIE - Continuous Internal Evaluation
T - Tutorial SEE - Semester End Examination
P - Practical D-Drawing
S - Self Study
* For lateral entry students, this will be a non-credit mandatory course.

Dept of Civil Engineering

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List of Electives

Group - A (Program Electives) V Sem		**Group - B (Program Electives) V Sem**	
Subject Code	**Subjects**	**Subject Code**	**Subjects**
10CVE561	Rural Water Supply & Sanitation	10CVE651	Advanced Reinforced Concrete
10CVE562	Traffic Engineering	10CVE652	Reinforced Earth Structures
10CVE563	Alternative Building Materials and Technologies	10CVE653	Pavement Design

Group - C (Open Electives) VI Sem		**Group - D (Program Electives) VII Sem**	
Subject Code	**Subjects**	**Subject Code**	**Subjects**
10CVO661	Theory of Elasticity	10CVE751	Industrial Waste Water Treatment
10CVO662	Air Pollution and Control Engg	10CVE752	Ground Improvement Technique
10CVO663	Advanced Strength of Materials	10CVE753	Design of Pre-stressed Concrete structures
Group - E (Open Electives) VII Sem		**Group - F (Program Electives) VIII Sem**	
Subject Code	**Subjects**	**SWubject Code**	**Subjects**
10CVO761	Solid Waste Management	10CVE 821	Design of Masonry Structures
10CVO762	Finite Element Analysis	10CVE 822	Environmental Engineering-II
10CVO763	Project Management	10CVE823	Photogrammetric and Remote Sensing.

V SEMESTER B.E (CIVIL ENGG)

DESIGN OF RC STRUCTURES

Subject Code	**:10CV51**	**Exam hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE marks**	**:50**

Course Objectives

Students are required to learn

1. Principles of limit state , ultimate strength of rectangular and flanged RC sections
2. Limit state of serviceability, design of simple beams: singly and doubly reinforced.
3. Design of one way, two way and continuous slabs.
4. Design of columns and isolated and sloped footings.
5. Design of stair cases

Course Outcomes:

At the end of the semester students should be able to

1. Understand principles of limit state , ultimate strength of rectangular and flanged RC sections
2. Limit state of serviceability, design of simple beams: singly and doubly reinforced.
3. Design of one way, two way and continuous slabs.
4. Design of columns and isolated and sloped footings.
5. Design of stair cases

UNIT – I

General Features of Reinforced Concrete

Introduction, Design Loads, Materials for Reinforced Concrete and Code requirements. Design Philosophy – Limit State Design principles, Factor of Safety, Characteristic of design loads, and design strengths. **6 Hours**

Limit State 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, doubly reinforced rectangular sections, Ultimate flexural strength of flanged sections, Ultimate shear strength and 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. **6 Hours**

UNIT – II

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, Cracking in structural concrete members, and related problems. **5 Hrs**

Design of Beams

Design procedures of critical sections for moment and shears. Check for anchorage value, development length, steel requirements, and lateral stability of beam, Design examples for simply supported and Cantilever beams with rectangular and flanged sections. **6 Hrs**

UNIT - III

Design of Slabs

General consideration of design of slabs, spanning in one direction, two directions for various boundary conditions. Design examples of simply supported, cantilever and continuous slabs as per code. **10 Hrs**

UNIT – IV

Design of Columns

General aspects, effective length, loads, slenderness ratio, minimum eccentricity. Design of short columns subjected to axial load, uniaxial and biaxial bending moment using SP16 charts. **5 Hrs**

Design of Footings: Introduction, load consideration. Design of isolated rectangular and sloped footing for axial load and uniaxial moment. **5 Hrs**

UNIT - V

Design of Stairs

General features, types, loads consideration, effective span as per IS code provisions, distribution of loading on stairs, Design of stair cases with waist slabs. Dog legged and Open well Stairs **9 Hrs**

Industrial visit: It is compulsory for all the students. It carries a component of CIE marks

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books:

1. P.C. Varghese, Limit State Design of Reinforced Concrete-, PHI Learning Private Limited.
2. Pallai and Menon, Reinforced Concrete Design-, TMH Education Private Limited

Reference books:

1. M.L.Gambhir, Fundamentals of Reinforced Concrete Design, PHI Learning Private Limited.
2. N Krishnaraju,Design of reinforced concrete structures.
3. S.N.Shinha, Reinforced Concrete Design- TMH Education Private Limited.
4. Karve & Shaha, Reinforced Concrete Design-, Structures Publishers Pune.
5. S. S. Bhavikatti, Design of RCC Structural Elements, Vol-I, New Age International Publications, New Delhi. .
6. IS: 456-2000, Indian standard code of practice for plain and reinforced concrete, Bureau of Indian Standards, New Delhi.
7. SP:16, Supplementary Code for IS:456-2000

STRUCTURAL ANALYSIS –II

Subject Code	**:10CV52**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objective

Students should study

1 Analysis of beams and frames (Non sway and sway) by slope deflection method.
2 Analysis of beams and frames (Non sway and sway) by moment distribution method.
3 Analysis of beams and frames (Non sway and sway) by Kani's method.
4 Analysis of plane truss and plane frames by stiffness matrix method.
5 Rolling load analysis and influence line diagrams for S.S. beams, basic concepts of structural dynamics.

Course Outcome

At the end of the semester students should be able to

1 Analyze beams and frames (Non sway and sway) by slope deflection method.
2 Analyze beams and frames (Non sway and sway) by moment distribution method.
3 Analyze beams and frames (Non sway and sway) by Kani's method.
4 Analyze plane truss and plane frames by stiffness matrix method.
5 Draw influence line diagrams for S.S. beams.

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 of a simply supported girder. Determination of absolute maximum live shear and live bending moment for the cases of udl and several point loads. **10 Hours**

UNIT- II

Slope Deflection Method

Introduction, Sign convention, Development of slope-deflection equations and Analysis of beams and orthogonal rigid jointed plane frames (non-sway, members assumed to be axially rigid).

Sway Analysis

Analysis of rigid jointed plane frames. (sway, members assumed to be axially rigid). **10Hours**

UNIT- III

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, members assumed to be axially rigid).

Sway Analysis

Analysis of rigid jointed plane frames. (sway, members assumed to be axially rigid). **10 Hrs**

UNIT- IV

Kani's Method

Introduction, Basic Concept, Analysis of beams and rigid jointed plane frames (non-sway, members assumed to be axially rigid).

Sway Analysis

Analysis of rigid jointed plane frames. (sway, members assumed to be axially rigid). **12 Hrs**

UNIT- V

Matrix Methods of Analysis

flexibility method, Stiffness matrix method, 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 direct stiffness method. **10 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Reddy C. S, Basic Structural Analysis , Tata McGraw Hill Publication Company Ltd.
2. Menon, Structural Analysis-II.

Reference books

1. S. S. Bhavikatti, Structural Analysis-II,– Vikas Publishers, New Delhi.
2. S.P. Gupta, G.S. Pandit and R. Gupta ,Theory of Structures Vol. 2 , Tata McGraw Hill Publication Company Ltd. .
3. D.S. Prakash Rao, Structural Analysis-, A Unified Approach, University Press
4. Amit Prasanth & Aslam Kassimali, Structural Analysis, 4th SI Edition, Thomson Learning.

TRANSPORTATION ENGINEERING I

Subject Code	**:10CV53**	**Exam hours**	**:03**
No. of lecture Hours/week	**:04**	**CIE marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE marks**	**:50**

Course Objective

Students should study

1. Importance and characteristics of road transport and various committee

2. Recommendations, various road patterns and road development programes in India
2. Requirements of Ideal alignment and various geometrical design factors
3. Pavement materials and its properties

4. Pavement design as per IRC and details of pavement construction
5. Importance of Highway Drainage system and Highway Economics

Course Outcome

From Transportation Engineering- I Students learn

1. Detailed study of road transport that includes characteristics features, various committee recommendations, different road patterns and road development programes in India
2. Factors influencing road alignment, different types of road surveys and factors influencing geometric design
3. Horizontal and vertical alignment, Pavement materials and its properties
4. Pavement design as per IRC and details of pavement construction
5. Importance of Highway Drainage system and Highway Economics

UNIT – I

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. **04Hrs**

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 , Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCL), Road development plan - vision 2021. **06 Hrs**

UNIT – II

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**

Pavement Materials

Desirable properties of Sub grade soil, 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-Difference between Tar and bitumen, Tests on bituminous materials . **06 Hrs**

UNIT – III

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**

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**

UNIT – IV

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- **06Hrs**

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 **05Hrs**

UNIT –V

Highway Drainage

Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, design of filter materials **03 Hrs**

Highway Economics

Highway user benefits, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods- Examples, Highway financing-BOT-BOOT concepts **06Hrs**

Industrial visit

It is compulsory for all the students. It carries a component of CIE marks

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Dr.S.K. Khanna, Dr. C.E.G Justo, Highway Engineering, Nem chand & Bros, Roorkee

2. L.R. Kadiyali ,Principles of Highway Engineering, Khanna Publishers, New Delhi

Reference books

1. IRC Codes – No?

2. Specifications for Roads and Bridges-MoRT&H Specifications
3. C. Jotin Khisty, B. Kent lal, Transportation Engineering, PHI Learning Pvt. Ltd. New Delhi
4. James H Banks ,Transportation Engineering, McGraw. Hill Pub. New Delhi

GEOTECHNICAL ENGINEERING – I

Subject Code	**:10CV54**	**Exam hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE marks**	**:50**

Course Objective

Students should study

1. Origin of soil and their inert relationship and Index properties of soil.
2. Classification of soil and clay mineralogy
3. Permeability of soil and shear strength of soil
4. Compaction and consolidation of soil
5. Determination of shear strength parameter of soil

Course Outcome

From Geotechnical Engineering – I students learn

1. Origin of soil, Various definitions related to soil features and Index properties of soil
2. Classification of soil and the importance of soil structure
3. Permeability, various lab and field tests on permeability, shear strength of soil.
4. Determination of max density and optimum moisture content in lab and field.
5. Test on soil to calculate the shear parameters

UNIT- I

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**

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. **6 Hours**

UNIT - II

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. **4 Hours**

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**.** **4 Hrs**

UNIT – III

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 condition. **6 Hrs**

Shear Strength of Soil

Concept of shear strength, Mohr-coulomb theory, conventional and modified failure envelops, Effective stress concept total stress, effective stress and Neutral stress, Concept of pore water pressure, Total and effective shear strength parameters, factors affecting shear strength of soils. **6Hrs**

UNIT - IV

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, Proctor's needle method, Compacting equipment. **6 Hrs**

Consolidation of soil

Definition, Mass-spring analogy, Terzaghi'sone 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 (Cc, av, mv and Cv) **6 Hrs**

UNIT-V

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. Determination of consolidation characteristics of soils-compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method. **8 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Punmia B.C, Soil Mechanics and Foundation Engg, (2005), Laxmi Publications Co. New Delhi.
2. Murthy V.N.S, Principles of Soil Mechanics and Foundation Engineering, (1996), UBS Publishers and Distributors, New Delhi.43

References books:

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

HYDROLOGY AND WATER RESOURCES ENGINEERING

Sub Code	**:10CV55**	**Exam hours**	**:03**
Hrs/ Week	**:04**	**CIE marks**	**:50**
Total Hrs.	**:52**	**SEE marks**	**:50**

Course Objective

Students should study

1. Introduction to hydrology, precipitation and its measurements, losses from precipitation
2. Definition and components of hydrographs, definition and estimation of flood and flood routing
3. Introduction to Irrigation and soil water crop relationship
4. Assessment of water requirement for crops
5. Definition, types and alignment of canals, design of canals by different methods

Course Outcome

From Hydrology and Irrigation students learn

1. Basic concept of hydrology and hydrologic cycle, types of precipitation and its measurements, losses from precipitation
2. Components, definition and units of hydrograph, definition and estimation of flood and flood routing
3. Need for irrigation, systems of irrigation and soil water crop relationship
4. Definitions, crop seasons of India , Assessment of water requirement for crops and irrigation efficiencies
5. Definition, types and alignment of canals, design of canals by different methods

UNIT -I

Introduction

Definition of Hydrology. Importance of Hydrology. Global water availability. India's water availability. Practical applications of Hydrology. Hydrologic cycle (Horton's qualitative and engineering representations)

Precipitation

Definition. Forms and types of precipitation. Measurement of rain fall using Symon's and Siphon type of rain gauges. Optimum number of rain gauge stations. Consistency of rainfall data (double mass curve method). Computation of mean rainfall (arithmetic average, Thiessen's polygon and Isohyetal methods). Estimation of missing rainfall data (Arithmetic average, normal ratio and regression methods). **09 Hours**

UNIT -II

Losses from Precipitation

Introduction. Evaporation: Definition, Process, factors affecting, measurement using IS Class A Pan. Estimation using empirical formulae. Infiltration: Definition, factors affecting infiltration capacity, measurement (double ring infiltrometer). Horton's infiltration equation, infiltration indices.

Runoff

Definition. Concept of catchment. Water budget equation. Components. Factors affecting. Rainfall - runoff relationship using simple regression analysis. **10 Hrs**

UNIT -III

Stream Flow Measurement

Introduction. Measurement of stage. Measurement of discharge by Area – Velocity method and slope area method. Simple stage discharge relation.

Hydrographs: Definition. Components of Hydrograph. Unit hydrograph and its derivation from simple storm hydrographs. Base flow separation. S – Curve and its uses. **10 Hrs**

UNIT-IV

Ground Water Hydrology and Well Hydraulics

Scope and importance of ground water hydrology. Aquifer parameters. Steady radial flow into wells in unconfined and confined aquifers. Types of wells, Methods of construction.

Water Resources

Introduction. Water wealth. River basins and their potential. Importance of water resources projects in India. Water resources development in Karnataka. **12 Hrs**

UNIT -V

Hydropower Plants

Classification of hydropower plants - Run of river plants, Storage or Valley dam plants, Pumped storage plants, Introduction to micro hydro, Base load and Peak load plants, advantages & disadvantages, Components of hydropower plants

Powerhouse

Types of Powerhouses, Typical layout of powerhouse, Components, Power plant equipments, Instrumentation and control. **11 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Subramanya.K, Engineering Hydrology ,Tata Mcgraw Hill NewDelhi
2. Jayarami Reddy, A Text Book Of Hydrology, Laksmi Publications, New Delhi.

Reference books

1. H.M. Raghunath, Hydrology, Wiley Eastern Publication, New Delhi.

2. Ven Te Chow, Hand Book of Hydrology, Mc Graw Hill Publications.
3. R.K. Sharma and Sharma, Hydrology and Water Resources Engineering, Oxford and IBH, New Delhi.
4. Garg S.K., Hydrology and Water Resources Engineering, Khanna Publishers, New Delhi.
5. Linsley, Kohler and Paulhus, Applied Hydrology, Wiley Eastern Publication, New Delhi.

GROUP- A - PROGRAM ELECTIVES
RURAL WATER SUPPLY AND SANITATION

Subject Code	**:10CVE561**	**Exam hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objective

Students should study

1. Introduction to good and protected water supply, water quality standards, types of pumps
2. Rural sanitation and drainage systems
3. Various communicable diseases, refuse collection and disposal
4. Milk sanitation
5. Insect control

Course Outcome

From Rural Water Supply and Sanitation Students learn

1. Introduction to rural water supply, water borne diseases and quality standards, types of pumps and water treatment methods
2. Rural sanitation and drainage systems
3. Various communicable diseases and methods of control, refuse collection and disposal
4. Milk sanitation
5. Insect control

UNIT - I

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 Types of pumps, supply systems viz., BWS MWS, PWS, water treatment methods – disinfection, deflouridation, hardness and iron removal, ground water contamination and control. **12 Hrs**

UNIT - II

Rural Sanitation

public latrine, concept of Eco-sanitation, trenching and composting methods, Two pit latrines, aqua privy, W.C, septic tank, soak pit. Drainage systems: Storm water and sullage disposal, rain water harvesting and uses. **10 Hrs**

UNIT - III

Communicable diseases: Terminology, classifications, methods of communication, general methods of control. Refuse collection and disposal: collection methods, transportation, disposal

– salvaging, dumping, manure pits, dumping in low lands , composting, dung disposal – digester, biogas plant. **10 Hrs**

UNIT - IV

Milk sanitation: Essentials, test for milk quality, pasteurization, quality control, cattle borne diseases, planning for a cow shed. **10 Hrs**

UNIT - V

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

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

10Hrs

Text Books

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

Reference Book

1. Preventive & Social Medicine - Park & Park
2.

TRAFFIC ENGINEERING

Subject Code	**:10CVE562**	**Exam hours**	**03**
No. of Lecture Hours/Week	**:04**	**CIE marks**	**50**
Total No. of Lecture Hours	**:52**	**SEE marks**	**50**

Course objective

Student should study

1. The scope of traffic engineering and traffic characteristics.
2. Various traffic engineering studies.
3. The interpretation of the traffic study and traffic flow theory.
4. Intersection design and Rotary intersection.
5. The traffic regulation and control and ITS.

Course outcome

Students learn to

1. The objective and scope of traffic engineering and traffic characteristics.
2. Different traffic engineering studies.
3. Understand interpretation of the traffic study and traffic flow theory.
4. Do the Intersection design and Rotary intersection.
5. Understand traffic regulation and control and ITS.

UNIT - I

Introduction

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

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 **10Hrs**

UNIT - II

Traffic Studies

Various types of traffic engineering studies-Traffic volume study, speed studies-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. PCU.

10 Hrs

UNIT - III

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. **12Hrs**

UNIT - IV

Intersection Design

Principle At grade and Grade separated junctions – Types – channelization –Features of channelizing Island – median opening – Gap in median at junction

Rotary intersection: Elements – Advantages – Disadvantages – Design guide lines — Grade separated intersection – Three legged inter section – Diamond inter change – Half clover leaf – clover leaf- Advantages- Disadvantages only **10 Hours**

UNIT - V

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

Intelligent Transport system: Definition, Necessities, Application in the present traffic scenario **10Hours**

Text books

1. L.R. Kadiyali, Traffic Engineering & Transport Planning , Khanna Publishers.
2. Khanna & Justo, Highway Engineering , Nemchand & Bros,Roorkee.

Reference books

1. Pignataro, Traffic Engineerin, Prentice Hall.
2. Highway Capacity Manual – 2000.
3. Jotin Khistey and Kentlal, An introduction to traffic engineering – PHI Pulications
4. Mc Shane & Roess, Traffic Engineering- PHI Pulications
5. Matson & Smith, Traffic Engg. Mc.Graw Hill and Co.
6. Drew, Traffic flow theory, - Mc. Graw Hill and Co.
7. IRC-SP41, Guidelines for design of At-grade intersection.

ALTERNATIVE BUILDING MATERIALS AND TECHNOLOGIES

Sub Code	**:10CVE563**	**Exam Hours**	**:03**
Hrs/ Week	**:04**	**CIE Marks**	**:50**
Total Hrs	**:52**	**SEE marks**	**:50**

Course Objective

Students should study

1. Introduction to cost effective constructions
2. Present alternate building materials
3. Concept of Lime-puzzolana cements
4. Alternative building technologies
5. Equipment for production of alternative materials

Course Outcome

From Concrete Technology and Alternative building materials Students learn

1.Necessity, Advantages, Pre fabrication techniques and cost effective constructions

2.Characteristics features of alternate building materials

3. Detail study on Lime-puzzolana cements

4.Alternative building technologies

5.Equipment for production of alternative materials

UNIT - I

Introduction

Cost effective constructions- Necessity, Advantages, Pre fabrication techniques

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. **10 Hrs**

UNIT - II

Alternative Building materials

1. Characteristics of building blocks for walls
2. Stones and Laterite blocks
3. Bricks and hollow clay blocks
4. Hollow Concrete blocks
5. Micro concrete tiles
6. Stabilized Mud blocks: Mud Blocks, Steam Cured Blocks, Fal-G Blocksand Stone Masonry Block Precast roofing elements, blended cement. Fiber plastic doors and windows, Polymer concrete. Pre cast doors and windows. **10 Hrs**

UNIT – III

Lime-Pozzolana Cements

Raw materials,Manufacturing process, Properties and uses, Fibre reinforced concretes, Matrix materials, Fibers : metal and synthetic, Properties and applications, Fibre reinforced plastics,Matrix materials, Fibers : organic and synthetic, Properties and applications,

Building materials from agro and industrial wastes, Types of agro wastes,Types of industrial and mine wastes, Properties and applications,Field quality control test methods. **10 Hrs**

UNIT - IV

Alternative Building Technologies

Alternative for wall construction, Types, Construction method, Masonry mortars, Types, Preparation, Properties, Ferrocement and ferroconcrete building components, Materials and specifications, Properties, Construction methods, Applications, Alternative roofing systems, Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes. **10Hrs**

UNIT - V

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. **12 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

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

Reference books

1. Relevant IS Codes on 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.,

HYDRAULIC AND HYDRAULICS MACHINERY LABORATORY

Sub Code	**:10CVL 57**	**Exam hours**	**:03**
No. of Lab Hours/Week	**:03**	**CIE marks**	**:50**
Total No. of Lab Hours	**:42**	**SEE marks**	**:50**

1. Calibration of collecting tank (gravimetric method)
2. Calibration of pressure gauge (dead weight method)
3. Verification of Bernoulli's equation
4. Calibration of 90^0 V-notch
5. Calibration of Rectangular and Cipolletti notch
6. Calibration of Broad- crested weir
7. Calibration of Venturiflume
8. Calibration of Venturimeter
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 50
12. Performance characteristics of a single stage centrifugal pump
13. Performance characteristics of a Pelton wheel
14. Performance characteristics of a Kaplan turbine

Reference

1.Sarbjit Singh ,Experiments in Fluid Mechanics –- PHI Pvt. Ltd.- NewDelhi- 2009.

2.N. Balasubramanya ,Hydraulics and Hydraulic Mechines Laboratory Manual

CIVIL ENGG CAD LABORATORY

Subject Code	**:10CVL58**	**Exam hours**	**:03**
No. of Hours/Week	**:03**	**CIE marks**	**:50**
Total No. of Hours	**:42**	**SEE marks**	**:50**

A. Drawing and drafting using Auto cad:

1. Plan, section & elevation of:
   - a) Residential building — 6 Hours
   - b) Commercial building — 3 Hours

A. Analysis using FEM software:

2. Introduction to software — 3 Hours
3. Analysis of:
   - a) Plane frame — 6 Hours
   - b) Beams — 6 Hours
   - c) Portal frame — 6 Hours

B. Spread sheet:

1. Computation of Earthwork — 3 Hours
2. Design of Horizontal curve by offset method — 3 Hours
3. Design of Super elevation — 3 Hours

C. Test:

4. Internal Test — 3 Hours

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Reference books

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

VI SEMESTER B.E (CIVIL ENGG)
GEOTECHNICAL ENGINEERING – II

Subject Code	**:10CV 61**	**Exam hours**	**:03**
No. of Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Hours	**:52**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. The subsurface exploration and different dewatering methods
2. The stresses in soil due to different loads and flow net characteristics
3. The stability of slopes and lateral earth pressure for retaining wall in different soil conditions
4. Bearing capacity of foundation
5. Settlement of foundation and classification of pile foundation

Course Outcome

On successful completion of the course, students will be able to

1. Different exploration and dewatering methods
2. Stresses in soils due to different load conditions
3. Using different methods to find Stability of slopes in soil
4. Bearing capacity for different types of footings
5. Different types of Settlement in foundation and classification of pile foundation

UNIT-I

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, static cone penetration test

Stabilization of boreholes - Typical bore log. Number and depth of borings for various civil engineering structures, soil exploration report. **9 Hrs**

UNIT-II

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.

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.**10Hrs**

UNIT-III

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.

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. **12 Hrs**

UNIT-IV

Bearing Capacity

Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure. Terzaghi'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 valuation of bearing capacity - Plate load test. **9 Hrs**

UNIT-V

Foundation Settlement

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

Shallow and Pile Foundations

Factors influencing the selection of depth of foundation, Factors influencing Allowable Bearing Pressure, Factors influencing the choice of foundation, Classification of pile foundation, Pile load capacity, static formulae and problems, pile efficiency, grouping of piles. 12**Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Alam Singh and Chowdhary G.R, Soil Engineering in Theory and Practice. (1994), CBS Publishers and Distributors Ltd., New Delhi.

2. Punmia B.C ,Soil Mechanics and Foundation Engg. (2005), 16th Edition Laxmi Publications Co. New Delhi

References Books

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

TRANSPORTATION ENGINEERING II

Subject Code	**:10CV 62**	**Exam hours**	**:03**
No. of Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Hours	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1 Importance of Railway Engg and rail requirements in India
2 Importance of Sleepers and Ballast
3 Geometric design of rails and crossing details
4 Introduction to airport and runway design
5 Importance of tunnel engg and methods of tunneling

Course Outcomes

On successful completion of the course, students will be able to

1. Introduction to Railway Engg and its importance in transportation sector
2. Importance of Geometric Design in Railways
3. Importance of Airport Engg and Basic Runway Design in Airport Engg
4. Definition of Tunnel, Different types of tunnels and methods of tunneling

Special Note

Railway Engineering	UNIT – I ,II & III
Airport Engineering	UNIT – IV
Tunnel Engineering	UNIT- V

UNIT – I

Introduction: Role of railways in transportation, Selection of Routes, Permanent way and its requirements, Gauges and types, Typical cross sections-single and double line B G track in cutting, embankment and electrified tracks, Coning of wheels and tilting of rails, Rails-Functions-requirements—types and sections length-defects-wear-creep-welding-joints, creep of rails **05 Hrs**

Sleepers and Ballast: Functions, requirements, Track fitting and fasteners- 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 – II

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. **09 Hrs**

UNIT-III

Points and crossing: Components of a turnout, Details of Points and Crossing, Design of turnouts with examples (No derivations) types of switches, Definition and list of crossings, track junctions Stations and Types, Types of yards, Signaling-Objects and types of signals, station and

yard Equipment-Turn table, Fouling mark, buffer stop, level crossing, track defects, and maintenance. **10 Hrs**

UNIT – IV

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**

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**

UNIT – V

Tunnels

Advantages and disadvantages, Different shapes of tunnels, Surveying-Transferring centre line, and gradient from surface to inside the tunnel working face, Weisbach triangle-Examples, Tunneling in rocks-Drift method, Heading and benching method, Tunneling methods in soils-Needle beam, Liner plate, Tunnel lining, Tunnel ventilation, vertical shaft sand faces of operation for tunneling, Pilot tunneling, definition of mucking and in steep grade tunneling and hauling methods, drilling and drilling pattern. **10 Hrs**

Industrial visit

Industrial visit is mandatory and it is included in CIE component.

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. S C Saxena and S P Arora, Railway Engineering, Dhanpat Rai & Sons, New Delhi
2. S K Khanna, M G Arora and S S Jain, Airport Planning and Design, Nem Chand Bros, Roorkee
3. R Srinivasan, Doks and Tunnel Engineering, Charaotar Publishing House

Reference Book

1. J S Mundery, Railway Track Engineering ,Fourth Edition,Year 2009
2. James H Banks, Introduction to transportation Engg, Tata MC Graw Hill Education private Ltd New Delhi

IRRIGATION ENGINEERING AND HYDRAULIC STRUCTURES

Subject Code	**:10CV63**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Methods of irrigation system.
2. Water requirement of crops.
3. Types of canals and canal design.
4. Reservoirs and diversion systems.
5. Design of gravity and earthen dams .

Course Outcome

On successful completion of the course, students will be able to

1.Understand Basic Requirements for irrigation system and water for seasonal crops.
2. Do Basic design and alignment of canal
3.Do Preliminary survey for construction of reservoirs and diversion structures.
4. Do detailed study of gravity dam.
5. Design of earthen dams and spillways

UNIT - I

Introduction

Definition. Benefits and ill effects of irrigation. Sources of water for irrigation. Systems of irrigation : Surface and ground water, flow irrigation, Lift irrigation, Bhandhara irrigation. Methods of irrigation in India – Potential and development. **6 Hrs**

Irrigation and water requirements of crops: Definition of duty, Delta and Base period, Relationship between Duty, Delta and Base period, Factors affecting duty of water. Crops and crop seasons in India, Crops grown in Karnataka, their seasons, local names. Agro-climatic zones of Karnataka. Irrigation efficiency, Frequency of **i**rrigation**.**

6 Hours

UNIT - II

Canals

Definition. Types of canals, Alignment of canals. Design of canals by Kennedy's and Lacey's methods **5 Hrs**

Canal Works

Canal regulators: Classification and suitability. *C*anal drops*:* Classification. Hydraulic design principles for notch type drop. Cross drainage works: Classification. Hydraulic design principles for an aqueduct. **5 Hrs**

UNIT - III

Reservoirs

Definitions. Investigation for reservoir sites. Storage zones. Determination of storage capacity and yield of a reservoir using mass curve. **5 Hrs**

Diversion Works

Definition. Layout. Types of weirs and Barrages. Design of Impermeable floors – Bligh's and Lane's theories – Simple design problems. Khosla's theory – Method of independent variables, Exit gradient (No design problem). **5 Hrs**

UNIT - IV

Gravity Dams

Definition. Forces acting on a Gravity dam. Modes of failures. Elementary and practical profile. Low and high gravity dams. Simple analysis problems, Principal stresses. Drainage galleries **10 Hrs**

UNIT – V

Earthen Dams

Introduction. Types of earthen dams. Failure of earthen dams. Preliminary design. Drainage arrangements. Phreatic line. Stability analysis under sudden draw down using Sweedish slip circle method. **6Hrs**

Spillways

Definition. Types of Spillways. Design Principles for an Ogee Spillway. Energy dissipaters: Types and introduction to IS Stilling basins (No design problems). **4Hrs**

Industrial visit

Industrial visit is mandatory and it is included in CIE component.

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. P.N. Modi, Irrigation, Water Resources, and Water Power Engineering, Standard Book House, New Delhil..
2. B.C. Punmia and Pande Lal, Irrigation and Water Power Engineering, Laxhmi Publications, New Delhi.

Reference Books

1.S.K. Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publications, New Delhi.

2.Michael A.M, Irrigaiotn Theory and Practices , Vikas Publications, New Delhi.

3.Sahasra Budhe, Irrigation Engineering and Hydraulic Structures, Dhanpath Rai Publications, New Delhi.

4.R.K. Sharma, Text Book of Irrigation Engineering and Hydraulic Structures, Oxford and IBH Publishing Co., New Delhi

ENVIRONMENTAL IMPACT ASSESSMENT

Subject Code	**:10CVH64**	**Exam Hours**	**:03**
No. of Lecture Hours/ Week	**:03**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:42**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Different ecological factors influencing environment
2. Frame work of Impact Assessment and various development projects
3. Assessment and Impact prediction on various features like air,water
4. Public Interest in Environmental Decision making.
5. Salient Features of various Project Activity

Course Outcome

On successful completion of the course, students will be able to

1. Various ecological components influencing environment
2. Different methodologies, outlook of Impact assessment and development of many projects
3. Impact prediction of many components on environment
4. Public Interest in Environmental Decisions
5. Important features of different project activities

UNIT - I

Development Activity and Ecological Factors EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA. **8 Hrs**

UNIT - II

Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA. **8 Hrs**

UNIT - III

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. EIA guidelines for Development Projects, Rapid and Comprehensive EIA **10Hrs**

UNIT - IV

Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Relationship between EIA,EIS & FONSI **8Hrs**

UNIT – V

Salient Features of the Project Activity-Environmental Parameter Activity Relationships-Matrices. EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore). **8Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Jain R.K, Environmental Impact Analysis, Van Nostrand Reinhold Co.
2. Anjaneyalu. Y, Environment Impact Assessment, BS Publications, Hyderabad.

Reference books:

1. GOI, Guidelines for EIA of developmental Projects Ministry of Environment and Forests.

Larry W. Canter, Environment Impact Assessment, McGraw Hill Publication, New York.

GROUP-B (Program Electives)
ADVANCED REINFORCED CONCRETE

Subject Code	**:10CVE651**	**Exam hours**	**:03**
No. of Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Hours	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1.To analyse and design simple portal frame
2.To design flat slab
3.To design grid floors
4.To design silos and bunkers
5.To design overhead circular and rectangular water tank

Course Outcomes

On successful completion of the course, students will be able to

1. To analyse and design simple portal frame
2. To design flat slab
3. To design grid floors
4. To design silos and bunkers
5. To design overhead circular and rectangular water tank

UNIT -I

Analysis and design of simple portal frame with the column ends fixed or hinged using limit state method. **10hrs**

UNIT -II

Design of flat slabs. **10hrs**

UNIT – III

Design of grid floors. **10hrs**

UNIT – IV

Design of silos with circular cross section and bunkers with circular or rectangular cross section. **10hrs**

UNIT-V

Design of overhead circular or rectangular water tank using relevant IS codes **12 hrs**

Text books

1. Krishnaraju N., “Advanced Reinforced Concrete Design”, CBI Publishers, New Delhi.
2. Punmia B.C., “Reinforced Concrete Structures”, Volume II, 5th Edition Lakshmi Publications Pvt. Ltd., New Delhi.

Reference books

1. Verghese P.C. , “Advanced Reinforced Concrete”, Prentice Hall India, New Delhi.
2. Shah H.J., "Reinforced Concrete Structures", Charotar Publishers, Anand.

3. Unnikrishna Pillai and Devadas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Limited, New Delhi.
4. IS: 456-2000, Plain and Reinforced Cement Concrete Code of Practice, Bureau of Indian Standards, New Delhi, 2000.
5. SP16:1980, Design Aids For Reinforced Concrete to IS: 456-1978, Bureau of Indian Standards, New Delhi, 1992

REINFORCED EARTH STRUCTURES

Subject Code	**:10CVE652**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. The basic components of soil and reinforcement in soil
2. Design of reinforced earth structure
3. Soil nailing techniques and Introduction to geosynthetics
4. Different methods of manufacturing geo synthetics and application of reinforced earth structures
5. Fiber reinforced soil

Course Outcome

On successful completion of the course, students will be able to

1. The introduction to basic components of soil and reinforcement in soil
2. Design of reinforced earth structure
3. Soil nailing techniques and Introduction to geosynthetics
4. Different methods of manufacturing geo synthetics and application of reinforced earth structures
5. Introduction to fiber reinforced soil and different types of fibres

UNIT- I

Basic Components of Reinforced Soil

Introduction, General, basic mechanism of reinforced earth. Soil or fill-matrix, reinforcement bars, Metallic strips, Metallic grids, Facing Elements, concrete panel facing etc. **06 Hrs**

Reinforced Earth constructions

Introduction, Historical background, Principles of reinforced earth, Effect of reinforcement of soil. Mechanism of reinforced earth, Anchors, Tiebacks, Economic advantage of reinforced earth structure over similar structures **06 Hrs**

UNIT- II

Design of Reinforced Earth Structure

Introduction, Internal and overall stability, Reinforced earth dams, slopes, Reinforced Earth foundation, typical design of retaining walls and embankments. **08 Hrs**

UNIT- III

Soil nailing techniques

Introduction, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, -construction sequence components of system, design aspects. **06 Hrs**

Geosynthetics (part–1)

Introduction and overview. Historical developments, Recent developments. Classification based on materials. Geosynthetics – geotextiles, geogrids, geomembranes, geocomposites, geonets and other products, geomats, geomeshes, geowebs etc. **06 Hrs**

UNIT- IV

Geosynthetics (part – 2)

Methods of manufacturing process. Raw materials – polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Elastomers etc, Testing & Evaluation- Hydrodynamic sieving test, Permeability test, Transmissivity test, Geotextile-Soil Filtration test etc,. **06 Hrs**

Application of Reinforced Earth

Introduction, General, Reinforcement, Drainage, Filtration, Seperation, Jacketing, Erosion control and Slope protection, Advantages & elimitations, Applications of soil nailing techniques. **06 Hrs**

UNIT- V

Fiber Reinforced Soil

General, soil stabilization, reinforced soil, soil nailing, texsol, ply soil, comparison of ply soil with reinforced soil and soil nailing, types of fibers – synthetic fibers, natural fibers, plant roots, direction of placements. **08 Hrs**

Text Books

1. Koerner. R.M, Design with geosynthetics, Prince Hall Publication, 1994.
2. Koerner. R.M. & Wesh, J.P, Construction and Geotechnical Engineering using synthetic fabrics, Wiley Inter Science, New York, 1980.
3. Venkattappa Rao, G., & Suryanarayana Raju, Engineering with Geosynthetics, G. V.S. - Tata Mc Graw Hill publishing Company Limited., New Delhi.

Reference Books

1. Jones CJEP, Earth reinforcement and Soil structure, Butterworths, London, 1996.
2. Ingold, T.S. & Millar, K.S, Geotextile Hand Book, Thomas, Telford, .
3. Hidetoshi Octial, Shigenori Hayshi & Jen Otani, Earth Reinforcement Practices , Vol. I, A.A. Balkema, Rotterdam, 1992.
4. Bell F.G, Ground Engineer's reference Book, Butterworths, London, 1987.
5. Ingold, T.S, Reinforced Earth, Thomas, Telford, London.

PAVEMENT DESIGN

Subject Code	**:10CVE653**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Characteristics of pavement, and fundamental design parameters
2. Different design methods of flexible pavement and design factors
3. Various stresses developed in rigid pavement
4. Failures and maintenance of flexible and rigid pavement
5. Pavement Overlays and Design

Course Outcome

On successful completion of the course, students will be able to

1. Different pavement components and design parameters
2. Concept of ESWL and design methods for flexible pavements
3. Different stresses developed in rigid pavement
4. Different failures and maintenance for flexible and rigid pavement
5. Designing of pavement overlays

UNIT - I

Introduction

Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement – Design strategies of variables – Functions of sub-grade, sub base – Base course – surface course – comparison between Rigid and flexible pavement. **5 Hrs**

Fundamental of Design of Pavements

Design life – Traffic factors – climatic factors – Road geometry – Subgrade strength and drainage, Stresses and deflections, Boussinesqs theory – principle, Assumptions – Limitations and problems on above - Burmister theory – Two layered analysis – Assumptions – problems on above **5Hrs**

UNIT - II

Design Factors

Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EWL concept. **5Hrs**

Flexible Pavement Design

Assumptions – McLeod Method – Kansas method – Tri-axial method - CBR method – IRC Method (old) - CSA Method using IRC 37-2001, problems on above. **5 Hrs**

UNIT - III

Stresses in Rigid Pavements

Principle – Factors– Analysis of stresses – Assumptions – Westergaard's Analysis – Modified Westergaard equations – Critical stresses – Wheel load stresses, Warping stress – Frictional

stress – combined stresses (using chart / equations) - problems onabove. –joints-reinforcement-slab Design. **9 Hrs**

UNIT - IV

Flexible Pavement Failures, Maintenance and Evaluation

Types of failures, causes, remedial/maintenance measures in flexible pavements – Functional Evaluation by visual inspection and unevenness measurements - Structural Evaluation by Benkelman Beam Deflection Method, Falling weight deflectometer. **6 Hrs**

Rigid Pavement Failures, Maintenance and Evaluation

Types of failures, causes, remedial/maintainance measures in regid pavements – Functional Evaluation by visual inspection and unevenness measurements. **6Hrs**

UNIT – V

Pavement Overlays and Design

Pavement overlays, design of flexible overlay over flexible pavement by Benkelman Beam Deflection method. flexible overlay and rigid overlay over rigid pavements. **11Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. S K Khanna, C E G Justo,& A Veeraraghavan Highway Engineering, 10th Edition – 2012, Nem Chand Bros. ,Roorkee.
2. L R Kadiyalli & N B. Lal, Principles & Practices of Highway Engineering.

Reference books:

1. Yoder and Witzack , principles of pavement design, 2nd edition, John wileys and sons
2. Subha rao, Principles of pavement design.
3. Yang H. Huang, Pavement Analysis & Design, II edition.
4. IRC codes: IRC -37-2001, IRC-58-2002

GROUP –C (Open electives)
THEORY OF ELASTICITY

Subject Code	**:10CVO661**	**Exam hours**	**:03**
No. of Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Hours	**:42**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. Concept of stress and strain at a point, Equilibrium equations (3D), Boundary conditions principal stresses and principal planes(3D)
2. Concept strain at a point, principal strains, maximum shear strains
3. Hook's law, Stress-strain relations(3D)
4. Strain-displacement relations, equations of equilibrium, compatibility equation in Polar coordinates.
5. Stress concentration, torsion of thin walled tubes.

Course outcome

On successful completion of the course, students will be able to

1. Understand Concept of stress and strain at a point, Equilibrium equations (3D), Boundary conditions principal stresses and principal planes(3D)
2. Calculate principal strains, maximum shear strains
3. Derive Stress-strain relations(3D)
4. Derive Strain-displacement relations, equations of equilibrium, compatibility equation in Polar coordinates.
5. Solve problems related to Stress concentration, torsion of thin walled tubes.

UNIT -I

Cartesian coordinates, Concept of stress and strain at a point – generalised Hook's law, Homogeneity, Isotropy, Orthotropy, Analysis of stress at a point, Equilibrium equations (3D), Boundary conditions, Normal, tangential stresses on oblique plane in 3D problems. Principal stresses and principal planes(3D) , Maximum shear stresses and shear planes, Octahedral normal and shear stresses in 3D problems. **10 hrs**

UNIT –II

Analysis of strain at a point, principal strains, maximum shear strains and their directions (3D). Pure shear, deviatoric strains, Octahedral normal and shear strains, strain-displacement relations. **8 hrs**

UNIT – III

Stress-strain relations (3D), plane stress and plane strain (2D), Compatibility conditions. Airy's stress function, bi-harmonic equation, two-dimensional problems in rectangular coordinates using Airy's stress function **8 hrs**

UNIT – IV

Two-dimensional problems in polar coordinates, strain-displacement relations, equations of equilibrium, compatibility equation, stress function. Axi Symmetric stress distribution **8 hrs**

UNIT-V

Effect of circular hole on stress distribution in plates, stress concentration factor.
Torsion:, Torsion of circular and elliptical sections, and thin walled tube sections **8 hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. Timoshenko. S.P. and Goodier. J.N., "Theory of Elasticity" - International Student Edition, McGraw Hill Book Co. Inc.
2. Wang. P.C, Applied Elasticity
3. Sadhu Singh, Theory of Elasticity Khanna Pulishers, Delhi.
4. Seetharam and Govinda Raju , Applied Elasticity , Interline publishing company, Bangalore

Reference Books

1. Valliappan. C, Contiuum Mechanics Fundamentals-: Oxford and IBH Publishing Co. Ltd., New Delhi.
2. Srinath.L.S , Advanced Mechanics of Solids-. : Tata McGraw Hill Publications Co.Ltd., New Delhi.
3. Borsi and Sidebottom, "Advanced Mechanics of Materials", John Wiley and Sons, New York
4.Fenner R.T., (1986), "Engineering Elasticity", Ellis Horwood Limited, England
5. Venkataraman and Patel , Structural Mechanics with Introduction to Elasticity and Plasticity-: McGraw Hill Book Inc., New York.
6. Arbind Kumar Singh , Mechanics of Solids-: Prentice Hall of India Pvt. Ltd. New Delhi - 2007.

AIR POLLUTION AND CONTROL

Subject Code	**:10CVO662**	**Exam Hours**	**:03**
No. of Lecture ours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:42**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Classification and characteristics of air pollution and its effects
2. Meteorology details
3. Sampling analysis and its controls
4. Air pollution caused due to automobiles
5. Effects of Gaseous hazards on environment.

Course Outcome

On successful completion of the course, students will be able to

1. Characteristic features of air pollution affecting the environment
2. The Meteorological variables, Wind rose and Meteorological Models
3. Sample measurement and air pollution control methods.
4. Direct and Indirect methods to control air pollution
5. Various environmental effects due to air pollution

UNIT - I

Introduction

Definition, Classification and Characterization of Air Pollutants, Emission Sources, Behavior and Fate of air Pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced smog, Air Pollution Inventories.

Effects of air pollution: On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes – London Smog, Los Angeles Smog & Bhopal Gas Tragedy.

08Hrs

UNIT – II

Meteorology

Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Windrose, General Characteristics of Stack Plumes, Meterological Models.

08 Hrs

UNIT - III

Sampling, Analysis and Control

Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement, Air Pollution Control Methods – Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment,

Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odours and their control. **09Hrs**

UNIT – IV

Air Pollution due to Automobiles

Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. Industrial Plant Location and Planning. **08Hrs**

UNIT – V

Burning Environmental Issues

Acid Rain, Global Warming, Ozone Depletion in Stratosphere, Indoor Air Pollution

Standards and Legislation

Air Quality and Emission Standards – Legislation and Regulation, Air Pollution Index **9Hours**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Reference Books

1. Henry C. Perkins, Air Pollution, McGraw Hill Ltd.
2. Air Pollution – Sampling and Analysis – APHA.
3. Harper and Row, Air Pollution – Its origin and control, Wark. K. and Warner. F. publishers, NY.

ADVANCED STRENGTH OF MATERIALS

Subject Code :	**:10CVO663**	**CIE Marks :**	**:50**
No. of Hours/Week :	**:03**	**SEE Marks :**	**:50**
Total No. of Hours :	**:42**	**Exam hours:**	**:03**

Course Objective

The objectives of learning the subject are to understand

1. To draw bending moment and shear force diagrams and to calculate bending and shear stresses in beams
2. The concept of analyzing torsion problems of noncircular and thin walled sections
3. The unsymmetrical bending of beams
4. To analyze Cranes hooks, closed rings
5. To analyze bending of beams curved in plan

Course Outcome

On successful completion of the course, students will be able to

1. draw bending moment and shear force diagrams and to calculate bending and shear stresses in beams
2. understand the concept of analyzing torsion problems of noncircular and thin walled sections
3. analyze unsymmetrical bending of beams
4. analyze Cranes hooks, closed rings
5. analyze bending of beams curved in plan

UNIT- I

Review of elementary strength of materials, bending moment and shear force diagrams, bending and shear stresses in beams **10Hrs**

UNIT- II

Torsion of non-circular sections-Torsion of thin walled sections. **8Hrs**

UNIT- III

Unsymmetrical bending of straight beams –stress distribution- shear centre – shear flow in thin walled beam cross sections –shear center for thin walled sections. **8Hrs**

UNIT- IV

Bending of curved beams: Cranes hooks, closed rings- correction factor for flanged cross sections **8Hrs**

UNIT- V

Analysis of Bending of beams curved in plan **8Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. Srinath L S , Advanced Solid Mechnics Tata McGraw Hill , Publication
2. Den Hartog, Advanced Strength of Materials, McGraw Hill , New York

3. Boresi A P and Sidebottom O M, Advanced Mechanics Materials, John Wiley and Sons New York

References

1. Theory of Elasticity Stephen Timoshenko,J. N. Goodier. McGraw Hill Education (India) Private Limited; 3 edition (2 February 2010).
2.

GEOTECHNICAL ENGINEERING LABORATORY

Subject Code	**:10CVL67**	**CIE Marks**	**:50**
No. of Hours/Week	**:03**	**SEE Marks**	**:50**
Total No. of Hours	**:42**	**Exam hours**	**:03**

Course Objective

The objectives of learning the experiments in laboratory are to understand the methods for

1. determination of Specific gravity for coarse and fine grained soils and Water content
2. Different methods of Sieve analysis
3. Consistency limits and compaction test
4. Pearmeability and shear strength for different soil condition
5. Consolidation of soil

Course Outcome

On successful completion of the Laboratory practical course, students will be able to assess

1. specific gravity and water content for soil by different methods
2. Different methods of sieve analysis for soil
3. Consistency tests , standard proctor test and modified proctor test
4. Falling head, Variable head and different shear test on soil
5. Consolidation test on soil and miscellaneous test used in soil

1. Field Identification of soil -visual classification of soil, 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 Hrs**

2. Grain size analysis of soil sample (sieve analysis). **2 Hrs**

3. In situ density by core cutter and sand replacement methods. **3 Hrs**

4. Consistency Limits – Liquid Limit (Casagrande and Cone Penetration Methods), plastic limit and shrinkage limit. **3 Hrs**

5. Standard Proctor Compaction Test and Modified Proctor Compaction Test. **3 Hrs**

6. Coefficient of permeability by constant head and variable head methods. **2 Hrs**

7. Strength Tests

a. Unconfined Compression Test **3Hrs**

b. Direct Shear Test **2Hrs**

c. Triaxial Compression Test (undrained) **3Hrs**

8. Hydrometer Test. **3Hrs**

9. Determination of Relative density of sand. **2Hrs**

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

11. Determination of CBR value **3Hrs**

12. b) Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor's needle. **2Hrs**

b)Consolidation Test- Determination of compression index and coefficient of consolidation. **3 Hours**

c) Demonstration of Free Swell Index and Swell Pressure Test. **2 Hours**

Reference books

1. Punmia B.C, Soil Mechanics and Foundation Engg, (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. Lambe T.W , Soil Testing for Engineers, Wiley Eastern Ltd., New Delhi.

5. Head K.H., Manual of Soil Laboratory Testing, (1986)- Vol. I, II, III, Princeton Press, London.

6. Bowles J.E, Engineering Properties of Soil and Their Measurements-. (1988), - McGraw Hill Book Co. New York

EXTENSIVE SURVEY PROJECT

Subject Code	**:14CVL68**	**Exam hours**	**:03**
No. of Hours/Week	**:02**	**CIE Marks**	**:50**
Total No. of Hours	**:28**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Reconnaissance of the sites and fly leveling to establish bench marks.
2. Design of New water tank Village
3. Water supply and sanitary project for village
4. Design of Road for Village.
5. Restoration of Old tank.

Course Outcome

On successful completion of the course, students will be able to

1. Reconnaissance of the sites and fly leveling to establish bench marks.
2. alignment of bund, Longitudinal and cross sections of the center line for a new tank
3. Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population.
4. detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road.
5. Alignment of bund, Longitudinal and cross sections of the center line for a old tank

Note

- An extensive survey training involving investigation and design of the following projects to be conducted immediately after 5th Semester.
- Viva voce to be conducted along with 6th semester exams
- The student shall submit a project report consisting of designs and drawings.
- Each batch shall carry out at least one project using TOTAL STATION.
- Drawings should be done using CAD or any other suitable drawing software.

1.General instructions,

2.Reconnaissance of the sites and fly leveling to establish bench marks.

3. New tank project

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.

4. 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.

5. Highway project

Preliminary and detailed investigations to align a new road (minimum 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**.**

VII SEMESTER B.E (CIVIL ENGG)

ENVIRONMENTAL ENGINEERING-I

Subject Code	**:10CV71**	**Exam hours**	**:03**
No. of Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Hours	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. Types of water demands, Design period calculations.
2. Different types of intake structures, Pumps
3. Water quality analysis, water treatment flowchart
4. Mechanism of a filtration and their types, theory of disinfection and their types.
5. Softening, Miscellaneous treatment, Distribution systems, Pipe appurtenances

Course Outcomes

On successful completion of the course, students will be able to

1. Types of water demands, Design period calculations.
2. Different types of intake structures – selection and location, different types of pumps
3. Water quality analysis, water treatment flowchart
4. Filtration methods, theory of disinfection and their types.
5. Softening method, Miscellaneous treatment, Distribution systems, Pipe appurtenances

UNIT -I

Introduction

Human activities and environmental pollution. Water for various beneficial uses and quality requirement. 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 &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.

09 hrs

UNIT-II

Sources

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

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 9**hrs**

UNIT -III

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. Layout of water supply pipes.

Water Treatment

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

Sedimentation

Theory, settling tanks, types, design. Coagulant aided sedimentation, jar test, chemical feeding, flash mixing, and clariflocculator. **12 hrs**

UNIT-IV

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.

Disinfection

Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. UV irradiation treatment – treatment of swimming pool water **10 hrs**

UNIT-V

Softening

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

Miscellaneous treatment

Removal of color, odor, taste, use of copper sulfate, adsorption technique, fluoridation and de-fluoridation.

Distribution systems

System of supply, service reservoirs and their capacity determination, methods of layout of distribution systems 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. **12 hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. S.K.Garg ,Water supply Engineering, Khanna Publishers, New Delhi.
2. B C Punima and Ashok Jain ,Environmental Engineering I, Laxmi Publications, New Delhi.

References

1. Hammer, M.J, Water and Wastewater Technology –SI Version, John Wiley and Sons.

2. Karia, G.L., and Christian, R.A., Wastewater Treatment – Concepts and Design Approach, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Metcalf and Eddy, Wastewater Engineering, Treatment and Reuse,Tata McGraw Hill Edition, Tata McGraw Hill Publishing Co. Ltd. New York.
4. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G.,Environmental Engineering–Mc Graw Hill Book Co.New York.
5. Raju, B.S.N., Water Supply and Wastewater Engineering, Tata McGraw Hill Pvt. Ltd., New Delhi.
6. Sincero, A.P., and Sincero, G.A., Environmental Engineering – A Design Approach–Prentice Hall of India Pvt. Ltd., New Delhi.
7. CPHEEO, Minstry of Urban Development ,Manual on Water supply and treatment – New Delhi.

DESIGN OF STEEL STRUCTURES

Subject Code	**:10CV72**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. Advantages and Disadvantages of Steel structures, steel code provisions, bolted connections.
2. Welded connections, plastic analysis of steel structures.
3. Design of compression members, built-up columns and columns splices.
4. Design of tension members, simple slab base and gusseted base.
5. Design of laterally supported and un-supported steel beams.

Course Outcome

On successful completion of the course, students will be able to

1. Understand Advantages and Disadvantages of Steel structures, steel code provisions, bolted connections.
2. Welded connections, plastic analysis of steel structures.
3. Design of compression members, built-up columns and columns splices.
4. Design of tension members, simple slab base and gusseted base.
5. Design of laterally supported and un-supported steel beams.

UNIT-I

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. **6Hrs**

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 Hrs**

UNIT-II

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 **6Hrs**

Plastic Behaviour of Structural Steel: Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorem of Plastic collapse, Methods of Plastic analysis, Plastic analysis of continuous beams. **6Hrs**

UNIT-III

Design of Compression Members: Introduction, Failure modes, Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression

members, Effective length of compression members, Design of compression members, Built up compression members. **9Hrs**

UNIT-IV

Design of Tension 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, other sections, Design of tension member, Lug angles, Splices, Gussets. **6Hrs**

Design of Column Bases

Design of simple slab base and gusseted base **5Hrs**

UNIT-V

Design of Beams: Introduction, Beam types, , Lateral stability of beams, factors affecting lateral stability, Behaviour of simple and built-up beams in bending(without vertical stiffeners), Design strength of laterally supported beams in Bending, Design strength of laterally unsupported beams, Shear strength of steel beams, Maximum deflection, Design of beams and purlins **8Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Subramanian N., "Design of Steel Structures", (2008), Oxford University press, New Delhi.
2. Duggal S.K., "Limit State method of design of steel structures", (2010), Tata McGraw-Hill, New Delhi

Reference books

1. Arya A.S and Ajmani J.L, "Design of Steel Structures", (1996), Nemchand Bros., Roorkee.
2. Kazim S.M.A. and Jindal R.S, "Design of Steel Structures", (1990), Prentice Hall of India, New Delhi.
3. Dayarathnam P., (1996), "Design of Steel structures", S. Chand and Company Ltd., Ram Nagar, New Delhi.
4. Ramachandra , Design of Steel structures Vol1, Standard Book House
5. Shiyekar,M.R, Limit state design in structural steel, PHI Publications New Dehli.
6. Martin L.H and Purkiss J.A., " Structural Design of Steelworks to BS 5950", (1992), Edward Arnold, London
7. IS 800-2007: General construction in steel-Code of practice (third revision), Bureau of Indian Standards, New Delhi.
8. IS 875-1987 (Part III): Code of practice for design loads (other than earthquake) for building structures, Bureau of Indian Standards, New Delhi.
9. BS 5950 (part I) - 1985: Structural us of steelwork in buildings, British Standards Institution, London.
10. SP: (6)-1964: Hand book for Structural Engineers, Bureau of Indian Standards, New Delhi

DESIGN & DRAWING OF RC AND STEEL STRUCTURES

Subject Code	**:10CV73**	**Exam hours**	**:03**
No. of Hours/Week	**:02 (Theory) +03(Lab)**	**CIE Marks**	**:50**
Total No. of Hours	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. To draw Reinforcement details of beam and slab floor systems, continuous beams. Dog legged and open well staircase.
2. To draw Reinforcement details of rectangular combined footing, retaining walls
3. To draw Reinforcement details of water tanks.
4. To draw bolted and welded connections ,column splices, built-up columns with lacing and battens
5. To design and draw roof truss and gantry girder

Course Outcome

On successful completion of the course, students will be able to

1. To draw Reinforcement details of beam and slab floor systems, continuous beams. Dog legged and open well staircase.
2. To draw Reinforcement details of rectangular combined footing, retaining walls
3. To draw Reinforcement details of water tanks and portal frame.
4. To draw bolted and welded connections, column splices, built-up columns with lacing and battens
5. To design and draw roof truss and gantry girder

UNIT - I

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

Detailing of Beam and Slab floor systems, continuous beams.

Detailing of Staircases: Dog legged and Open well. **12 Hrs**

UNIT - II

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

Design and detailing of Retaining walls (Cantilever). **9Hrs**

UNIT - III

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. **9Hrs**

UNIT - IV

Connections

Bolted and welded connections - Preparing drawing / different views of beam-beam, Beam-column, seated, stiffened and un-stiffened for the details given.

Columns

Preparing drawing / different views of splices, column-column Lacing and battens for the details given. **12Hrs**

UNIT-V

Design and drawing of

i. Roof Truss for the Forces in members to be given ii. Gantry girder **10Hrs**

Text Books

1. N. Krishnaraju ,Structural Design & Drawing Reinforced Concrete & Steel-, University Press.
2. Dayarathnam P, Handbook on design and detailing of Structures, Wheeler publication, New Delhi.

Reference Books

1. Krishnamurthy , Structural Design and Drawing, (Concrete Structures), CBS publishers, New Delhi. Tata Mc-Graw Publishers.
2. B.C. Punmia , Reinforced Concrete Structures, Laxmi Publishing Co.
3. S.N.Sinha , Reinforced Concrete Design , McGraw Hill Education,
4. Ramachandra, Design of Steel Structures, Standard Book House, 1705- A, Nai Sarak, Delhi.
5. M Raghupati, Design of Steel Structures, Tata Mc Graw Hill Publishers.
6. IS: 800 – 2007, general construction in Steel – Code of Practice
7. SP 6 (1) – 1984 or Steel Table.

ENTREPRENEURSHIP AND IPR

Subject Code	**:10CVH74**	**Exam hours**	**:03**
No. of Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Hours	**:42**	**SEE Marks**	**:50**

Course Outcomes

On successful completion of the course, students will be able to

1.Students will be able to build course builds confidence to become good managers.

2. Students will understand the importance of IPR in the field of engineering.

3.Entrepreneurship course will be able to motivate the students to start their own enterprise after understanding various steps involved in starting an industry.

UNIT I

Introduction-meaning and importance of entrepreneurship, entrepreneur, types, characteristics, entrepreneur process, role of entrepreneurs in economic development, problems faced by entrepreneurs, scope in India **6 Hrs**

UNIT II

Micro, Small and medium enterprises, Definition of MSMEs as per MSME act, characteristics of small enterprises, need and advantages of small enterprises, Steps in setting up of small enterprises, Institutional support to MSMEs-State supporting agencies-TECSOK, KIADB, KSSIDC, KSFC, National Schemes-MSME-DI, NSIC, SIDBI **08 hrs**

UNIT III

Preparation of Project reports, control variables in project, project lifecycle, project report, need, project identification, project selection, components of project report, formulation of report, planning commission guidelines, project appraisal, feasibility study-market, financial, technical and economic, PERT and CPM, errors in report **08 Hrs**

UNIT IV

Introduction to IP, What is Intellectual Property (IP)?, Historical background of IP, Economic value of IP, Motivation to IP development, IP system strategy, Emerging issues, IPR governance, Institutions for administering the IP system, IP rights and marketing regulations, IPR protection, protecting consumers and protecting competition, IP management framework, Drivers of IP management, IP value chain, IP management framework, IP strategies, Strategic considerations, managing trademarks. **10Hrs**

UNIT V

Intellectual Property Rights -What are IPRs?, Types of IPRs, Indian IPR scenario, Legal use of IP, Global Vs Indian IPR landscape, TRIPS and its implications

Patents-What is a patent, history of patent, Criteria for patent, types of patents, Indian patent act, patents for computer software, business models, incremental innovation, patent infringement

Trademarks-role, as a marketing tool, trademark rights, types, use of trademarks, trademark act, trademark registration in India, Copyrights-meaning, copyright protection in India, enforcement measures, copyright act **10Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. Dynamics of Entrepreneurial Development and Management-Vasanth Desai, Himalaya Publishing House
2. Entrepreneurship and Management, S Nagendra and Manjunath VS, Pearson Publications
3. Managing Intellectual Property, Vinod V. Sople, PHI, 3rd Edition, 2012
4. Intellectual Property-Copyrights, trademarks and patents, Richard Stim, Cengage learning, 2011

GROUP –D (PROGRAM ELECTIVES)
INDUSTRIAL WASTE WATER TREATMENT

Subject Code	**:10CVE751**	**Exam Hours**	**:03**
No of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Different waste water its effects and quality check
2. Different treatment methods
3. Treatment of selected waste generated from Industry
4. Treatment of selected waste generated from Dairy, Canning, steel and cement
5. Treatment of selected waste generated from paper, Pharmaceutical and Food Industry

Course Outcome

On successful completion of the course, students will be able to

1. Various waste water and its effects with quality check
2. Different treatment methods
3. Treatment of selected waste generated from various industries
4. Treatment of selected waste generated from Dairy, Canning, steel and cement
5. Different failures and maintenance for flexible and rigid pavement

UNIT - I

Introduction

Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Sampling, effluent and stream Standards and Legislation to Control Water Pollution **5Hrs**

Stream Quality, Dissolved oxygen Sag Curve in Stream, Streeter– Phelps formulation, Numerical Problems on DO prediction. **5Hrs**

UNIT - II

Treatment methods I

Volume Reduction, Strength Reduction, Neutralization, Equalization and Proportioning. **4Hrs**

Treatment methods II

Removal of Inorganic suspended solids, Removal of Organic Solids, Removal of suspended solids and colloids. Treatment and Disposal of Sludge Solids. **4Hrs**

Combined treatment

Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated Wastes to Streams. **4Hrs**

UNIT - III

Treatment of selected industrial waste

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

The Industries to be covered are

1. Cotton Textile Industry
2. Tanning Industry
3. CaneSugarIndustry & Distillery Industry

10Hrs

UNIT - IV

Treatment of selected industrial waste-i:

1. Dairy Industry
2. Canning Industry
3. Steel and Cement Industry **10Hrs**

UNIT - V

Treatment of selected industrial waste-II:

1. Paper and Pulp Industry
2. Pharmaceutical Industry
3. Food Processing Industry **10 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Nelsol L. Nemerow , Industrial Waste Water Treatment.
2. Rao MN, and Dutta A.K, Industrial Waste Water Treatment.
3. Metcalf and Eddy inc , Waste Water Treatment, Disposal and Reuse , Tata McGraw
4. Hill Publications, 2003.

Reference books

1. Mahajan S.P, Pollution Control Processes in industries.
2. IS Codes.

GROUND IMPROVEMENT TECHNIQUES

Subject Code	**:10CVE752**	**Exam Hours:**	**:03**
No of Lecture Hours/Week	**:04**	**CIE Marks:**	**:50**
Total No. of Lecture Hours	**:52**	**SEE marks :**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1) Introduction to Ground Improvement technique, objectives of soil strength improvement
2) Main factors to be considering the suitable soil improvement programme and types of Mechanical modification and using suitable types.
3) Effect of compaction on soil and Hydraulic modification on soil.
4) Drainage & preloading requirement on soil.
5) Chemical modification on soil and Grouting below the ground level.

Course Outcomes

On successful completion of the course, students will be able to

1) Ground improvement methods
2) Various factors to considered for ground improvement techniques and its outcome.
3) Effect of compaction on soil sample different method of compaction on soil and suitable methods for different soil sample.
4) Modification of soil structures and their good results.
5) Different types of grouting techniques and suitable methods for different conditions.

UNIT - I

Ground Improvement

Definition, Objectives of soil improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique.

Mechanical Modification: Type of mechanical modification, Aim of modification, compaction, Principle of modification for various types of soils. **9 Hrs**

UNIT - II

Compaction

Effect of grain size distribution on compaction for various soil types like BC soil, lateritic soil, coarse-grained soil, micaceous soil. Effect of compaction on engineering behavriour 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. **10Hrs**

UNIT - III

Hydraulic Modification

Definition, aim, principle, techniques. gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering.

Drainage & Preloading

Drainage of slopes., preloading, vertical drains, sand drains. Assessment of ground condition for preloading, Electro kinetic dewatering. **11Hrs**

UNIT - IV

Chemical Modification-i: Definition, aim, special effects, and methods. Techniques – sandwich technique, admixtures, cement stabilization. Hydration – effect of cement stabilization on permeability, Swelling and shrinkage. Criteria for cement stabilization. Stabilization using Fly ash.

Chemical Modification-ii: Lime stabilization – suitability, process, special effects, criteria for lime stabilization. Other chemicals, chlorides, hydroxides, lignin, hydrofluoric acid. Properties of chemical components, reactions and effects. Bitumen, tar or asphalt in stabilization.

11 Hrs

UNIT - V

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

Miscellaneous Methods (Only Concepts): Introduction, Soil reinforcement. Thermal methods.. Ground improvement by confinement – Crib walls, Gabions and Mattresses. . Anchors, Rock bolts and soil nailing. **11 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books:

1. Purushothama Raj P. Ground improvement Techniques Laxmi Publications, New Delhi.
2. Koerner R.M. - Construction and Geotechnical Method in Foundation Engineering- Mc Graw Hill Pub. Co., New York.

Reference Books:

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

DESIGN OF PRE-STRESSED CONCRETE STRUCTURES

Subject Code	**:10CVE753**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:04**	CIE Marks	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. Concept of prestressing, devices and pre and post-tensioning
2. The analysis of the stresses due to prestress and the imposed load
3. The calculation of loss of prestress and deflections in PSC members
4. Limit state of PSC beams in flexure and shear, and anchorage zone stress
5. Design of pre and post tensioned simple PSC beams

Course Outcome

On successful completion of the course, students will be able to

1. Differentiate pre and post tensioned PSC members
2. Calculate stresses due to prestress and the imposed load
3. Calculate loss of prestress and deflections in PSC members
4. Calculate flexural and shear strength and anchorage zone stresses
5. Design of pre and post tensioned simple PSC beams

UNIT – I

Introduction

Definition and scope of pre stressed concrete, its applications**,** High strength concrete and steel, Stress-Strain characteristics and properties.

Basic Principles of Prestressing

Fundamentals, Load balancing concept, Stress concept, centre of Thrust. Pre-tensioning and post-tensioning systems, tensioning methods and end anchorages. 9**Hrs**

UNIT-II

Analysis of Sections for flexure

Stresses in concrete due to pre-stress and loads, stresses in steel due to loads, Cable profiles.

9Hrs

UNIT - III

Losses of Pre-stressing

Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force. **6Hrs**

Deflections

Deflection of a pre-stressed member Short term and long term deflections, Elastic deflections under transfer loads and due to different cable profiles. Deflection limits as per IS 1343. Effect of

creep on deflection, load verses deflection curve, methods of reducing deflection 6 **Hrs**

UNIT - IV

Limit state of collapse

Flexure -IS Code recommendations – Ultimate flexural strength of sections Shear - IS Code recommendations, shear resistance of sections, shear reinforcement. Limit state of serviceability – control of deflections and cracking.

Design of end blocks

Transmission of prestress in pretensioned members, transmission length, Anchorage stress in post-tensioned members. Bearing stress and bursting tensile force-stresses end blocks-Methods, I.S. Code, provision for the design of end block reinforcement. **12 Hrs**

UNIT - V

Design of Beams

Design of pre-tensioned and post-tensioned symmetrical and asymmetrical sections. Permissible stress, design of prestressing force and eccentricity, limiting zone of pre-stressing force cable profile. **10 Hrs**

Industrial visit

It is compulsory for all the students. It carries a component of CIE marks

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Texts books

1.Krishna Raju N., "Pre-stressed Concrete", 2007, Fifth Edition, Tata McGraw Hill, New Delhi.

2. Dayaratnam P., "Pre-stressed Concrete Structures", 1996, Oxford and IBH Publications, New Delhi.

Reference books

1. Mallick S. K. and Gupta A. P., "Pre-stressed Concrete", 1983, Oxford and IBH, New Delhi

2. Lin T.Y. and Ned. Burns H., "Design of Pre-stressed Concrete Structures", 1982, John Wiley and Sons, New York.

3. Natarajan V., "Fundamentals of Pre-Stressed Concrete", 1976, BIP, Bombay.

4. Libby J.R., "Modern Pre-stressed Concrete", 1986, CBS Publishers, New Delhi.

5. IS:1343-1980, Code of Practice For Prestressed concrete, Bureau of Indian Standards, New Delhi, 1981.

GROUP –E (OPEN ELECTIVES)
SOLID WASTE MANAGEMENT

Subject Code	**:10CVO761**	**Exam hours**	**:03**
No. of Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Hours	**:42**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Scope and importance of solid waste management and transportation system
2. Treatment techniques for solid waste and incineration process
3. Composting methods
4. Sanitary and methods of land filling
5. Disposal methods and recycling of wastes

Course Outcome

On successful completion of the course, students will be able to

1 Scope and importance of solid waste management and transportation system
2.Components of treatment plant and size of treatment plant
3. Methods of composition for solid waste
4.Methods land filling and sanitation
5. Methods for disposing and recycling of waste

UNIT - I

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 hrs**

UNIT - II

Collection and transportation

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

Treatment / processing techniques: Components separation, volume reduction, size reduction, chemical reduction and biological processing problems. **09hrs**

UNIT -III

Incineration

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

Composting

Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting. **09hrs**

UNIT -IV

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 hrs**

UNIT - V

Disposal methods

Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal

Recycle and reuse: Material and energy recovery operations, reusein other industries, plastic wastes, environmental significance and reuse. **08 hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text Books

1. Integrated Solid Waste Management: George.Tchobanoglous : M/c Graw Hill Publisher,1993.
2. Environmental Engineering: Howard.S. Peavy: M/c Graw Hill Company.

References

1. Manual on Municipal Solid Waste Management CPHEO(Ministry of Urban Development), Government of India.
2. Bhide and Sunderashan ,Solid Waste Management in developing countries.
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.

FINITE ELEMENT ANALYSIS

Subject Code	**:10CVO762**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:42**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Energy concepts, fundamentals of theory of elasticity
2. The analysis using Raleigh - Ritz Method, Galerkin's Method
3. Displacement functions and natural coordinate system, analysis of plane truss, beams
4. Analysis of 2D problems using triangular and quadrilateral elements
5. Isoparametric concept, FEM Code

Course Outcomes

On successful completion of the course, students will be able to

1. Clear about Energy concepts, fundamentals of theory of elasticity
2. Be able to do the analysis using Raleigh - Ritz Method, Galerkin's Method
3. Be able to do the analysis of plane truss, beams
4. Be able to do analysis of 2D problems using triangular and quadrilateral elements
5. Clear Isoparametric concept, FEM Code

UNIT - I

Introduction: Basic Concepts, Background Review: Theory of Elasticity, Matrix displacement formulation, Energy concepts, Equilibrium and energy methods for analyzing structures. **8Hrs**

UNIT - II

Raleigh - Ritz Method, Galerkin's Method, Simple applications in structural analysis. **8Hrs**

UNIT - III

Fundamentals of finite element method: Displacement function and natural coordinates, construction of displacement functions for 2 D truss and beam elements. Applications of FEM for the analysis of plane truss. **8 Hrs**

UNIT - IV

Applications of FEM for the analysis continuous beam and simple plane frame problems.

Analysis of 2d continuum problems

Elements and shape functions, Triangular, rectangular and quadrilateral elements, different types of elements, their characteristics and suitability for application. Application to plane stress and plane strain problems.

Polynomial shape functions, Lagrange's and Hermitian polynomials, compatibility and convergence requirements of shape functions. **10Hrs**

UNIT - V

Theory of Isoparametric Elements: Isoparametric, subparametric and super- parametric elements, characteristics of isoparametric quadrilateral elements.

FEM Program: Structure of computer program for FEM analysis, description of different modules, pre and post processing. **8 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Cook R.D., Malkas D.S. and Plesha, M.E., (1989), "Concepts and Applications of Finite Element Analysis", 3rd Edition, John Wiley and Sons, New York.
2. Zinkiewiez O.C., (1979), "The Finite Element Method", 3rd edition, Tata McGraw Hill Book Co, New Delhi.

Reference books

1. Desai C.S. and Abel J.E., "Introduction to the Finite Element Method", Ist Indian Edition, CBS publications, New Delhi.
2. Krishnamoorthy C.S., "Finite Element Analysis", 2nd edition, Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Bathe K.J., "Finite Element Procedures in Engineering Analysis", 2nd Edition, Prentice Hall Engle Wood, Cliffs, New Jersey.
4. Rajasekharan. S, Finite element analysis in engineering design, wheeler pulishers.

PROJECT MANAGEMENT

Subject Code	**:10CVO763**	**Exam hours**	**:03**
No. of Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Hours	**:42**	**SEE Marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1) Concepts, selection, phases of projects.
2) Roles, responsibilities and tools & techniques of project management
3) Project planning steps, feasibility report & preparation of cost estimation.
4) Organizing of staffing of projects team
5) Project scheduling, techniques & project co ordination and control
6) Project evolution & follow up & economic project appraisal.

Course Outcome

On successful completion of the course, students will be able to

1) Concepts, selection, phases of projects.
2) Roles, responsibilities and tools & techniques of project management
3) Project planning steps, feasibility.
4) Organizing & staffing of projects team
5) Project scheduling, techniques & project co ordination and control
6) Project evolution & follow up & economic project appraisal.

UNIT-I

Introduction to project management

Concepts & Categories of projects, Selection of projects, Phases of projects life cycle. Roles and responsibilities of project Manager, tools and techniques of project management. **8 Hrs**

UNIT-II

Project planning and estimating

Feasibility report phased planning, project planning steps, objectives and goals of the project, preparation of cost estimation. **5 Hrs**

Organizing and staffing

The project Team: Skills/abilities required for project manager, Authorities and responsibilities of project manager, project organization and types. **4Hrs**

UNIT-III

Project scheduling

Project implementation scheduling, different scheduling techniques-Bar (GANTT) charts, Bar charts for combined activities. Project Evaluation and Review Techniques (PERT) planning, Simple numerical**.** **9 Hrs**

UNIT-IV

Contract Management

Tendering and selection of contractors. Accountability in project execution, controls. **4 Hrs**

Co-ordination and control

Project direction co-ordination; and communication in a project, Role of MIS in project control, performance control, schedule control, Cost control examples. **4 Hrs**

UNIT-IV

Economic project appraisal: Introduction, evolution, rate of return, net present value, benefit cost ratio, internal rate of return & simple numerical. **8 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books:

1. Timothy J Kloppenborg, Project Management, Cengage Learning, Edition 2009.
2. Harold kerzner, Project Management, A systems approach to planning schuding and controlling, CBS publication.

References:

1. Pennington Lawrence, Project Management Refer, , Mc Graw hill.
2. Project Management, A Moder Joseph and phillips New Yark Van Nostrand, Reinhold.
3. Bhavesh M , Project Management**,** Patal Vikas publishing House.
4. K.R.Sharma**,** Project Management**,** National publishing House, New Delhi,2000
5. S. Choudhury**,** Project Management, McGraw Hill Publications

CONCRETE AND HIGHWAY ENGINEERING LABORATORY

Subject Code	**:10CVL77**	**Exam Hours**	**:03**
No. of Practical Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Practical Hours	**:42**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand the procedure for

1.Various tests on fresh and hardened concrete

2.Properties of aggregates by conducting various tests on aggregates

3.Properties of bitumen by conducting various tests on bitumen

Course Outcome

On successful completion of the course, students will be able to conduct

1. Various tests on fresh and hardened concrete
2. Properties of aggregates by conducting various tests on aggregates
3. Properties of bitumen by conducting various tests on bitumen

List of experiments

1. Blair's Air permeability test
2. Slump test
3. Compaction Factor test
4. Determination of Consistency of Concrete by Vee-bee Consistometer method
5. Compression test on Concrete
6. Split tension test
7. Flexural test on Concrete
8. Determination of Aggregate impact value
9. Determination of los Angles abrasion value
10. Aggregate crushing value test
11. Shape test on coarse aggregate
12. Determination of specific gravity of bitumen
13. Determination of viscosity of bituminous material
14. Determination of softening point of bituminous material
15. Determination of flash point and fire point of bituminous material
16. Determination of ductility of the bitumen
17. Determination of penetration value of bitumen
18. Marshal stability test on bituminous mix

Reference book

1. S K Khanna,CEG Justo & A Veeraraghavan, Highway Materials and Pavement Testing , Revised 5th Edition 2009, Nem chand & Bros, Roorkee -247667
2. Nemi Chand & Bros, Highway material testing laboratory manual.
3. M. L. Gambhir : Concrete Manual : Dhanpat Rai & sons New – Delhi.
4. Relevant IS Codes and IRC Codes.

ENVIRONMENTAL ENGINEERING LABORATORY

Subject Code	**:14CVL78**	**Exam Hours**	**:03**
No. of Practical Hours/Week	**:03**	**CIE Marks**	**:50**
Total No. of Practical Hours	**:42**	**SEE Marks**	**:50**

Course Objective

The objectives of involving in the practical classes are to understand the procedure for

1. Study and estimate on solids in sewage
2. Determination of alkalinity ,acidity ,pH, other chemical components
3. Determination of oxygen and BOD,COD percentage of chlorine in bleaching powder
4. Jar tests , Nitrates by spectrophotometer sodium and potassium by flame photometer
5. Determination of Chlorides and Sulphates.

Course outcome

At the end of the semester student will be able to do following experiments

List of experiments

1. Determination of Solids in Sewage: Total Solids, Suspended Solids, Dissolved Solids, Volatile Solids, Fixed Solids, Settleable Solids.
2. Determination of pH by pH meter, Turbidity by Nephelometer, Electrical conductivity by Conductivity meter.
3. Determination of Chlorides & Sulphates.
4. Determination of Optimum Dosage of Alum.
5. Determination of Alkalinity, and Acidity.
6. Determination of Total Hardness, Calcium and Magnesium.
7. Determination of Dissolved Oxygen.
8. Determination of BOD.
9. Determination of COD.
10. Determination of Fluorides by ion analyzer.
11. Determination Nitrates by spectrophotometer.
12. Determination of Sodium and Potassium by Flame photometer.

Reference books

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

PROJECT PRELIMINARY AND TECHNICAL SEMINAR

Subject Code	**:10CVL79**	**IA Marks**	**:50**
No. of Seminar Hours/Week	**:03**	**Exam Hours**	**:03**

Seminar shall be presented in the department in presence of a committee (Batch of Teachers) constituted by HOD. The seminar marks are to be awarded by the committee. Students shall submit the seminar report in the prescribed standard format. Literature review and preliminary work of the project should be completed by the end of the semester.

VIII SEMESTER B.E (CIVIL ENGG)
QUANTITY SURVEYING & ESTIMATION

Subject Code	**:14CV81**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Study of various drawings & estimates using center line method, long wall and short methods.
2. Estimation of building materials and specification of different items of work.
3. Rate analysis and contracting details.
4. Measurement of earthwork for roads and Valuation.

Course Outcome

On successful completion of the course, students will be able to

1. Drawings with estimates using center line, long wall and short methods.
2. Quantity Estimation of Building Materials and Specifications.
3. Cost analysis and contracting details.
4. Earthwork measurements and methods of valuation.

UNIT – I & II

Estimation

Study of various drawings with estimates, important terms, units of measurement, abstract. Different type of estimates, approximate methods of estimating buildings, cost of materials. 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. **10+10 Hrs**

UNIT – III

Estimate

Estimation of wooden joineries such as doors, windows & ventilators. Steel truss (Fink and Howe truss), manhole and septic tanks.

Specifications: Definition of specifications, objective of writing specifications, essentials in specifications, general and detail specifications of common item of works in buildings. **10 Hrs**

UNIT – IV

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.

Contracts

Types of contracts, essentials of contract agreement, legal aspects, penal provisions on breach of contract. Definition of the terms- Tender and tender forms, earnest money deposit, security deposit, comparative statements, documents and types, acceptance of contract documents and issue of work orders. Duties and liabilities, 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. **10 Hrs**

UNIT –V

Measurement of Earthwork for roads

Methods for computation of earthwork –Mid sectional area method, Mean sectional area method, trapezoidal formula & prismoidal formula with and without cross slopes.

Valuation: Purpose of valuation, different forms of value, factors affecting changes in market value, Ideal investment and opportunities, Methods of Valuation – Open lands, lands with buildings, Methods of estimating cost depreciation, Cost and value depreciation. **12 Hrs**

Text books

1.B.N.Dutta, Estimating and Costing in Civil Engineering, UBSPD, New Delhi.
2.Rangwala, Estimating, Costing & Valuation**,** Charotar publishing house, Anand.

Reference books

1.D.D.Kohli & R.C.Kohli, A text book on Estimating,Costing & Accounts, S.Chand, New Delhi.
2.P.L. Basin, Quantity Surveying, S.Chand, New Delhi.
3.G.S.Birde, Text book of Estimating & Costing, Dhanpath Rai and sons, New Delhi.

GROUP –F (PROGRAM ELECTIVES)
DESIGN OF MASONRY STRUCTURES

Subject code	**:10CVE821**	**Exam hours**	**:03**
No. of hrs/week	**:04**	**CIE marks**	**:50**
Total Teaching hours	**:52**	**SEE marks**	**:50**

Course Objectives

The objectives of learning the subject are to understand

1. Types and defects of masonry constructions
2. Allowable stresses, strength and stability of masonry structures
3. Load and design consideration of masonry structures
4. The design of masonry wall
5. The design of composite masonry wall and reinforced masonry

Course Outcomes

On successful completion of the course, students will be able to

1. Understand the types of masonry and defects of masonry constructions
2. Understand allowable stresses, strength and stability of masonry structures
3. Load and design consideration of masonry structures
4. The design of masonry wall
5. The design of composite masonry wall and reinforced masonry

UNIT -I

Masonry units, materials, types & masonry construction

Brick, stone and block masonry units – strength, modulus of elasticity and water absorption of masonry materials – classification and properties of mortars, selection of mortars. Defects and errors in masonry construction, cracks in masonry, types, reasons for cracking, methods of avoiding cracks. **10 Hrs**

UNIT - II

Strength and Stability

Strength and Stability of concentrically loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing, workmanship, strength formulae and mechanism of failure for masonry subjected to direct compression. **5 Hrs**

Permissible Stresses

Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses **5Hrs**

UNIT - III

Design considerations

Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels. **5 Hrs**

Load considerations for masonry

Wall carrying axial load, eccentric load with different eccentricity ratios, walls with openings, free standing wall. **5 Hrs**

UNIT - IV

Design of masonry walls

Design of load bearing masonry for building up to 3 storeys using IS: 1905 and SP: 20 procedure. **10Hrs**

UNIT - V

Reinforced masonry

Application, flexural and compression elements, shear walls. **6 Hrs**

Masonry walls in composite action

Composite wall-beam elements, infilled frames. **6 Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1.Hendry, A.W, Structural Masonry, Macmillan Education Ltd., 1997.

2.Dayaratnam P , Brick and Reinforced Brick Structures, Oxford & IBH, 1987.

Reference books

1. Sinha B.P. Davies S.R, Design of masonry structures, E&FN spon 1997

2. IS 1905–1987 "Code of practice for structural use of un-reinforced masonry- (3^{rd} revision) BIS, New Delhi.

3. SP 20 (S&T) – 1991, "Hand book on masonry design and construction (1^{st} revision) BIS, New Delhi

ENVIRONMENTAL ENGINEERING – II

Subject Code	10CVE822	Exam Hours	03
No of Lecture Hours/Week	04	CIE Marks	50
Total No. of Lecture Hours	52	SEE Marks	50

Course Objective

The objectives of learning the subject are to understand

1. The design of sewers and different types of materials used for sewer
2. The physical and chemical properties of waste water
3. The proper disposal of effluents and muncipal waste water treatment
4. The secondary treatment for waste water
5. The purification system for waste water and recycling of waste water

Course Outcome

On successful completion of the course, students will be able to

1. Design of sewers of various materials
2. Determine Physical and Chemical properties of waste water
3. Design Proper disposal of effluents and muncipal waste water treatment
4. Design Secondary treatment for waste water
5. Design Purification system for waste water and recycling of waste water

UNIT-I

Introduction

Necessity for sanitation, methods of domestic waste water disposal, types of sewerage systems and their suitability.

Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system, estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration. **8Hrs**

Design of Sewers

Hydraulic formulae for velocity, effects of flow variations on velocity, self cleansing and non scouring velocities, Design of hydraulic elements for circular sewers flowing full and flowing partially full (No derivations).

Materials of Sewers

Sewer materials, shapes of sewers, laying of sewers, joints and testing of sewers,ventilation and cleaning of sewers. **8Hrs**

UNIT- II

Sewer Appurtenances

Catch basins, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage. **6 Hrs**

Waste water Characterization

Sampling, significance, techniques and frequency. Physical, Chemical and Biological characteristics, Aerobic and Anaerobic activity, CNS cycles. BOD and COD. Their significance & problems. **8 Hrs**

UNIT - III

Disposal of Effluents

Disposal of Effluents by dilution, self-purification phenomenon. Oxygen sag curve, Zones of purification, Sewage farming, sewage sickness, Effluent Disposal standards for land, surface water & ocean. **6Hrs**

Treatment of Waste water

Flow diagram of municipal waste water treatment plant. Preliminary & Primary treatment**:** Screening, grit chambers, skimming tanks, primary sedimentation tanks – Design criteria & Design examples. **6Hrs**

UNIT - IV

Secondary Treatment: Suspended growth and fixed film bioprocess. Trickling filter – theory and operation, types and designs. Activated sludge process- Principle and flow diagram, Modifications of ASP, F/M ratio. Design of ASP. **8Hrs**

UNIT – V

Anaerobic Sludge digestion, Sludge digestion tanks, Design of Sludge drying beds. Low cost treatment methods: Septic tank, oxidation pond and oxidation ditches–design. Reuse and recycle of waste water. **10Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Industrial visit

It is compulsory for all the students. It carries a component of CIE marks

Text books

1. Fair, Geyer and Okun , Water and Wastewater Engineering Vol-II, John Willey Publishers, New York.
2. Metcalf and Eddy inc , Waste Water Treatment, Disposal and Reuse, Tata McGraw Hill Publications, New York.

Reference books

1. Hammer and Hammer , Water Technology. Prntice ind ltd, New delhi.

2. Howard S. Peavy, Donald R. Rowe, Environmental Engineering, George Tchnobanoglous McGraw Hill International Edition, New york.

3. CPHEEO, Manual on Waste Water Treatment, Ministry of Urban Development, New Delhi

PHOTOGRAMMETRY AND REMOTE SENSING

Subject Code	**:10CVE823**	**Exam Hours**	**:03**
No. of Lecture Hours/Week	**:04**	**CIE Marks**	**:50**
Total No. of Lecture Hours	**:52**	**SEE Marks**	**:50**

Course Objective

The objectives of learning the subject are to understand

1. Basic definitions and Importance of photogrammetry
2. Detailed study of Aerial Photogrammetry
3. Introduction to stereoscopy, digital photogrammetry and remote sensing
4. Detailed study on Remote sensing platforms and sensors
5. Classification and application of remote sensing

Course Outcome

On successful completion of the course, students will be able to

1. Requirement definitions and Importance of photogrammetry
2. Detailed study of Aerial Photogrammetry
3. Importance to stereoscopy, digital photogrammetry and remote sensing
4. Detailed study on Remote sensing platforms and sensors
5. Classification and application of remote sensing

UNIT - I

Photogrammetry

Introduction, basic definitions, terrestrial photogrammetry, phototheodolite, horizontal and vertical angles from terrestrial photographs, horizontal position of a point from photographic measurements, elevation of ponts by photographic measurements, determination of focal length. 8**Hrs**

UNIT - II

Aerial Photogrammetry

Advantages, vertical, tilted and oblique photographs, geometry of vertical photographs, scale of vertical photograph over flat and variable terrain, ground coordinates, computation of length of a line, computation of flying height, relief displacement, overlaps, flight planning, computation of required number of photographs for a given area, ground control in photogrammetry**. 9Hrs**

UNIT-III

Basics of stereoscopy, stereoscopes, uses, parallax. Basic elements in photographic interpretation. Introduction to digital photogrammetry**. 6Hrs**

Remote Sensing

Introduction, Ideal remote sensing system, basic principles of electromagnetic remote sensing, electromagnetic energy, electromagnetic spectrum, interaction with earth's atmosphere, interaction with earth- surface materials, spectral reflectance of earth surface materials **6Hrs**

UNIT -IV

Remote Sensing Platforms and Sensors

Introduction, platforms- IRS, Landsat, SPOT, Cartosat, Ikonos, Envisat etc. Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal) **6Hrs**

Properties of digital image data, data formats, Basics of digital image processing- radiometric and geometric corrections, image enhancements, image transforms based on arithmetic operations, image filtering **6Hrs**

UNIT -V

Remote sensing image interpretation, thematic classification (supervised and unsupervised) , maximum likelihood classification, introduction to accuracy assessment of classification **6Hrs**

Applications of Remote sensing: applications in land use land cover analysis, change detection, water resources, urban planning, environmental and geological applications. **5Hrs**

Question Paper Pattern

Question paper should consists of two questions from each unit. Students are required to answer any one full question in each unit.

Text books

1. Mikhail E., J. Bethel, and J.C. McGlone, Introduction to modern photogrammetry. Wiley, 2001.
2. Wolf P.R, and B.A. Dewitt, Elements of photogrammetry : with applications in GIS. 3rd ed, McGraw-Hill, 2000.

Reference Books

1. Lillesand T.M., and R.W. Kiefer, Remote sensing and image interpretation. 4th ed, John Wiley & Sons, 2000.
2. Jensen J.R., Introductory digital image processing: a remote sensing perspective. 2nd ed Prentice Hall, 1996.
3. Richards J.A., and X. Jia, Remote sensing digital image analysis: an introduction. 3rd ed Springer, 1999.
4. Mather P.M., Computer processing of remotely-sensed images: an introduction**.** Wiley,1988.

ADD ON COURSE/ MINI PROJECT / INTERNSHIP / SELF STUDY COURSE

Subject Code	**:10CVA83**	**Exam Hours**	**:03**
No. of Project Hours/Week	**:08**	**CIE Marks**	**:50**
		SEE Marks	**:50**

Students can take self study course or mini project or internship under the supervision of internal or external guide.

PROJECT WORK INCULDING PROJECT SEMINAR

Subject Code	**:10CVP84**	**Exam Hours**	**:03**
No. of Project Hours/Week	**:03**	**CIE Marks**	**:50**
		SEE Marks	**:50**

The project report shall be presented in the following form.

1. Definition of the problem.
2. Exhaustive literature survey.
3. Analysis based on type of problem. (as given above)
4. Conclusions, scope for further work.
5. References.

The Project Report shall be submitted in the prescribed standard format (05 copies) to the HOD, after the certification of the concerned guide and HOD.

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