

B.E. Civil Engineering

THIRD TO EIGHTH SEMESTER SYLLABUS

(For the students admitted from 2009-2010 and subsequently)



COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University and Accredited by NBA)

COIMBATORE – 641 014.

elements - organisation and administration of Planning agencies at national, state, regional, local and metropolitan levels. (9)

Total: 45

TEXT BOOKS:

1. Rangwala.S.C., "Town Planning", Charotar Publishing House, Anand, 2007.
2. Francis.D.K., Ching, "Architecture Form, Space and Order", Oxford University Press, 2005.

REFERENCE BOOKS:

1. Donald Helper and Wallach. "Architectural Drafting and Design", McGraw Hill Book Company, New Delhi, 2004.
2. Arnold Whittick., "Encyclopedia of Urban Planning", McGraw Hill Book, Company, New Delhi, 2003.
3. Pickering.E., "Architectural Design", John Wiley & Sons, London, 2004.
4. Hiraskar, G.K, "Fundamentals of Town Planning", Dhanpat Rai and Sons, Delhi, 2005.
5. Arthur B.Gallion and Simon Eisner, "The Urban Pattern - City Planning and Design", CBS Publishers and distributors, Delhi, 1980.
6. G.K.Hiraskar, "The Great Ages of World Architecture," Dhanpat Rai Publications (P) Ltd., New Delhi, 2004.

09CEE16 TOWN PLANNING AND ARCHITECTURE

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To introduce the fundamental of architecture, development plans and development control rules for the overall development of a city in a scientific and systematic way.

OUTCOME:

The student will understand the various elements of architecture principles of orientation, development plans, planning regulations and development control rules.

ELEMENTS OF ARCHITECTURE

Introduction of architecture - definition - Evaluation of geometric forms - function and history - Sphere, Cube, Pyramid, Cylinder and Cone - aesthetic qualities of Architecture - Proportion, Scale, Balance, Symmetry, Rhythm and axis - Contrast in Form - Harmony. (9)

PRINCIPLES OF ORIENTATION AND PLANNING OF BUILDINGS

Factors affecting orientation - Sun-Wind-Rain - Orientation criteria for Indian conditions - Principles governing the theory of planning - Planning of residential buildings. (9)

DEVELOPMENT PLAN

Principles of city planning - levels of planning- scope and contents of regional plan, master plan, detailed development plan and structure plan - preparation and implementation - planning of new towns - slum clearance and urban renewal. (9)

PLANNING LEGISLATION

Planning legislation and administration - review of planning legislation relating to city planning and housing in India - Tamil Nadu Town and Country planning Act, Tamil Nadu Housing Board Act, Tamil Nadu slum clearance and Improvement Act. (9)

DEVELOPMENT CONTROL RULES:

Zoning regulations - sub division regulations - building regulations - Floor Space Index - minimum plot sizes and building frontage - open spaces - minimum standard dimensions of building

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B.E. CIVIL ENGINEERING - Full Time

SUBJECTS OF STUDY

III Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE31	Mathematics III	3	1	0	4
09CE32	Mechanics of Solids I	3	1	0	4
09CE33	Mechanics of Fluids	3	1	0	4
09CE34	Surveying I	3	0	0	3
09CE35	Concrete Technology	3	0	0	3
09CE36	Engineering Geology	3	0	0	3
09CE49	Science of Creativity and Professional Ethics	2	-	-	-
Practicals					
09CE47	Survey Practical	-	-	-	-
09CE48	Fluid Mechanics and Machinery Laboratory	-	-	-	-
Total Credits					21

IV Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE41	Numerical Methods	3	0	0	3
09CE42	Mechanics of Solids II	3	1	0	4
09CE43	Applied Hydraulics & Hydraulic Machinery	3	1	0	4
09CE44	Surveying II	3	0	0	3
09CE45	Environmental Science and Engineering	3	0	0	3
09CE46	Basic Structural Design (Masonry, Timber and Steel)	3	1	0	4
09CE49	Science of Creativity and Professional Ethics	2	0	0	2
Practicals					
09CE47	Survey Practical	0	0	6	4
09CE48	Fluid Mechanics and Machinery Laboratory	0	0	6	4
Total Credits					31

V Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE51	Transportation Engineering I	3	0	0	3
09CE52	Structural Analysis I	3	1	0	4
09CE53	Mechanics of Soils	3	0	0	3
09CE54	Reinforced Concrete Structures I	3	1	0	4
09CE55	Construction Technology	3	0	0	3
09CE56	Computer Aided Building Drawing	2	0	4	4
Practicals					
09CE67	Strength of Materials and Concrete Lab	-	-	-	-
09CE68	Highway Engineering Lab & Geology Lab	-	-	-	-
09CE69	Mini Project	-	-	2	-
TotalCredits					21

ACTUATORS

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro rheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials. **(6)**

SIGNAL PROCESSING AND CONTROL SYSTEMS

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear. **(6)**

BIOMIMETICS

Characteristics of natural structures, Biomimetic structural design, Biomimetic sensing, Challenges and opportunities for Biomimetics, Chemical and biochemical sensing in structural assessment, Absorptive chemical sensors, Spectroscopes. **(6)**

Total : 45**TEXT BOOKS:**

1. Brian Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.
2. Srinivasan,A.V., and Michael McFarland.D., Smart Structures – Analysis and Design, Cambridge University Press, 2001.

REFERENCE BOOKS:

1. Brian Culshaw, “Smart Structures and Materials” , Artech House, Boston, 1996
2. Gandhi.M.V and Thompson.B.S, “Smart Materials and Structures”, Chapman and Hall, NewYork, 1992
3. Mel. M Schwartz, Encyclopedia of Smart Materials, John Wiley and Sons Inc. 2002

09 CEE 15 SMART MATERIALS AND STRUCTURES

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

This course is designed to give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

OUTCOME:

On completion of this subject, the students will have a clear idea of smart materials, their characteristics and their uses in structures.

INTRODUCTION

Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors. (4)

PROPERTIES OF MATERIALS

Piezoelectric Materials - Piezoelectric properties - Actuation of structural components - Shape Memory Alloys - Constitutive modeling of the shape memory effect - vibration control - Embedded actuators - Applications of shape memory alloys. (5)

ER AND MR FLUIDS

Electro rheological and magneto rheological fluids - Mechanisms and Properties - Applications of ER and MR fluids - Fiber Optics - Fiber characteristics - Fiber optic strain sensors - Applications of optical fibers. (6)

CONTROL OF STRUCTURES

Control modeling of structures - Control strategies and limitations - classification of control systems - Classical control - Modern control - Optimal control and Digital control - Active structures in practice. (6)

SENSORS

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.

Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement. (6)

VI Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE61	Steel Structures	3	1	0	4
09CE62	Structural Analysis II	3	1	0	4
09CE63	Foundation Engineering	3	0	0	3
09CE64	Reinforced Concrete Structures II	3	1	0	4
09CE65	Water Supply Engineering	3	0	0	3
09CE66	Design and Drawing	2	0	4	4
Practicals					
09CE67	Strength of Materials and Concrete Lab	0	0	6	4
09CE68	Highway Engineering Lab & Geology Lab	0	0	6	4
09CE69	Mini Project	0	0	2	2
Total Credits					32

VII Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE71	Transportation Engineering II	3	0	0	3
09CE72	Irrigation Engineering	3	0	0	3
09CE73	Sanitary Engineering	3	0	0	3
09CE74	Elective I	3	0	0	3
09CE75	Elective II	3	0	0	3
Practicals					
09CE86	Computer Applications Laboratory	-	-	-	-
09CE87	Environmental Engineering & Soil Mechanics Lab	-	-	-	-
09CE88	Project Work & Viva Voce	-	-	6	-
Total Credits					15

VIII Semester

Subject Code	Subject	L	T	P	C
Theory					
09CE81	Quantity Surveying & Valuation	2	0	3	4
09CE82	Construction Management	3	0	0	3
09CE83	Earthquake Resistant Design of Structures	3	0	0	3
09CE84	Elective III	3	0	0	3
09CE85	Elective IV	3	0	0	3
Practicals					
09CE86	Computer Applications Laboratory	0	0	6	4
09CE87	Environmental Engineering & Soil Mechanics Lab	0	0	6	4
09CE88	Project Work & Viva Voce	0	0	6	6
Total Credits					30

POWER HOUSE PLANNING:

Surface power stations - Power House structure - Dimensions - Lighting and ventilations - Design variations - Under ground power stations - Location - Types - Advantages - Components - Layout types - Limitations - Environmental impact of Hydel power projects - Introduction to economic analysis of Hydro Power projects. **(9)**

Total : 45**TEXT BOOK:**

1. Dandekar.M.M and Sharma, K.N., "Water Power Engineering", Dandekar Vikas Publishing House Pvt Ltd., New Delhi, 1998.

REFERENCE BOOKS:

1. Creager.W.P and Justin .J.D, "Hydro Electric Hand Book", John Wiley Sons, London, 1981.
2. Desmukh.M.M "Water Power Engineering" , Dhanpat Rai Publications, New Delhi, 1977.

precast construction – Precast connections for seismic resistance –
Provision for non structural fixtures and fastenings. (9)

Total : 45

TEXT BOOKS:

- 1) Glover.C.W, "Structural Precast Concrete" Asia Publishing House, Bombay. 1967.
- 2) Haas.A.M, "Precast Concrete- Design and Applications" Applied Science Publishers, London and NewYark, 1983.

REFERENCE BOOKS:

- 1) Dunham, "Planning of industrial Structures" Metropolitan Book Company, 1980.
- 2) SP32-1986, HandBook on Functional Requirements of Industrial Buildings (Lighting and Ventilation) Bureau of Indian Standards, New Delhi, 1990.
- 3) Structural Design Manual, Precast concrete Connection Details, Society for the Studies in the use of Precast Concrete, Netherland Behor Verlag, 1978.
- 4) Proceedings of the Advanced Course on Design and Construction of Prefabricated Residential Buildings organized by SERC, Madras, 1974.

09CEE13 PREFABRICATED AND INDUSTRIAL STRUCTURES

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To gain knowledge about the modern trends in building construction, role of prefabricated structures and the basic functional requirements of industrial structures.

OUTCOME:

At the end of this course the students will gain basic knowledge in Industrial Prefabricated structures.

GENERAL

Specific requirements for industries like Engineering, Textile, Chemical-site layout and external facilities- classification of industries- minimum standards, internal circulation-materials-works. (9)

FUNCTIONAL REQUIREMENTS

- i) Selection of site
- ii) Lighting – Natural and Artificial-Protection from the sun and sky
- iii) Services, layout, wiring fixtures, cable and pipe bridges-electrical installations-lighting substations-Effluent
- iv) Ventilation and fire protection, air conditioning and air ventilation, Fire escapes and chutes, fire alarms, Extinguishers and hydrants.(9)

GENERAL PRINCIPLES OF PREFABRICATION

Types of prefabrication - Advantages of prefabrication - Site and plant prefabrication - Economy of prefabrication - Modular coordination – Standardisation - Disuniting of structures - Various prefabricated elements roof and floor panels-wall panels. (9)

PRECASTCONCRETE-MANUFACTURING TECHNIQUES

Cycle of precasting - Preparation and transportation of concrete, Reinforcement – Preparation of moulds-Production tolerances - Equipments for handling the precast elements - Standard practices and techniques of handling. (9)

JOINTS AND CONNECTIONS

Types of precast connections - Joints for different structural connections - Effective water proofing at the joints – Expansion joints in

09CE31 MATHEMATICS III

ASSESSMENT: THEORY

L	T	P	C
3	1	0	4

OBJECTIVES:

The objective is to incorporate the ideas of complex variables, partial differential equations and its applications and Fourier transforms that are imperative for effective understanding of Engineering subjects. The topics introduced will serve as basic tools for specialized studies in many engineering fields.

OUTCOME

The students will be familiar in applying complex variable ideas to solve electrical problems, partial differential equation ideas in modeling and solving electrical problems and Fourier transform ideas to analyze and solve communication oriented problem.

COMPLEX DIFFERENTIATION

Analytic functions–Definitions and properties–Cauchy Riemann equations in cartesian and polar coordinates-construction of analytic functions– Conformal mappings–Bilinear Transformation -the mappings of the form $w = z+a, az, 1/z, z^2, e^z, \sin z, \cos z$, -Simple problems.(9)

COMPLEX INTEGRATION

Cauchy's integral theorem-Integral formula-Taylor's and Laurent's series (without proof)-Types of singularities, Poles and residues-Cauchy's residue theorem-Applications-Contour integration using circular and semicircular contours. (9)

PARTIAL DIFFERENTIAL EQUATIONS

Formation by elimination of arbitrary constants and functions-solution by direct method-solution of first order non-linear PDE-standard types- Lagrange's linear equation-Linear higher order homogeneous PDE with constant coefficients. (9)

FOURIER TRANSFORMS

Fourier integral theorem (without proof)-Infinite Fourier transform-infinite Fourier sine and cosine transforms-properties and problems-Convolution theorem-Parseval's identity-Finite Fourier sine and cosine Transforms- properties and problems. (9)

BOUNDARY VALUE PROBLEMS

Vibration of strings-one dimensional wave equations, one dimensional heat flow- unsteady state and steady state -Two dimensional heat flow steady state in Cartesian coordinates-Separation of variables-Fourier series solution. (9)

Theory: 45

Tutorial: 15

Total: 60

TEXT BOOKS

1. Kandasamy P., "Engineering Mathematics", Volume – II & III S.Chand &Co., 2004.
2. Veerarajan T., "Engineering Mathematics", Third Edition, Fifth Reprint, Tata Mc Graw – Hill Publishing Company Ltd, 2008.
3. Venkataraman,M.K., "Engineering Mathematics III", Revised and Enlarged Fourteenth Edition, The National Publishing Company, 2008.
4. Venkataraman.M.K., "Engineering Mathematics III-A", (Eleventh Edition), The National Publishing Company , 2008.

REFERENCE BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", (Eighth Edition) John Wiley & Sons (Asia) Private Limited., - (2008).
2. Grewal, B.S., "Higher Engineering Mathematics", (Fortith Edition) Khanna Publishers – 2007).

Theory and design of tank surplus weir- Tower head sluice –Wing wall type sluice. (9)

Total : 45

TEXT BOOK:

1. Punmia.B.C , Pande, B.B.Lal., "Irrigation and Water Power Engineering", Laxmi Publicatiions, New Delhi, 2001.

REFERENCE BOOKS:

1. Garg.S.K, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi, 2001.
2. Sahasra Budhe S.R., "Irrigation Engineering and Hydraulic Structures Including Hydrology and Water Power Engineering",S.K.Kataria Publications, Sixth Edition ,1996(Reprint 2000).
3. Sharma, R K, T K Sharma, "Irrigation Engineering", S.Chand Publishers, New Delhi, 2001.

09CEE12 HYDRAULIC STRUCTURES

L	T	P	C
3	0	0	3

ASSESSMENT: THEORY

OBJECTIVES:

To impart knowledge of various structures for storage and distribution of water.

OUTCOME:

The students will be able to relish the process of design, construction and maintenance of various hydraulic structure associated with water resources engineering.

DIVERSION STRUCTURES

Diversion Head Works - Brief description of component parts - and their functions - Design principles - Seepage Theories - Weir, Barrage and impervious floor as a part of diversion head work and Their design based on seepage theories – Design of Vertical Drop River Weir. (9)

CANAL AND RIVER STRUCTURES

Canal regulators - Types - Functions - Part of a regulator - Canal falls - Types - Brief Description - Cross Drainage works - Types - selection - Design aspects of syphon - aqueducts. - River Training Works – Types (Theoretical aspects only) (9)

RIGID STORAGE STRUCTURES

Gravity Dams - Description - Forces acting - Elementary and Practical profile - Design (procedure only) of high and low dam - Zoning of gravity dam - Galleries - Types - Joints – Types - Arch and Buttress dams - Types - Description only - Spillways – Types - Functions. (9)

NON RIGID STORAGE STRUCTURES

Earth dams - Design data of components - Causes of failure - Typical cross sections to suit site conditions and available materials - Phreatic line - Determination by graphical method - Seepage control in body and foundation of earthen dams - Slope protection - Rock fill dams. (9)

TANKS AND TANK STRUCTURES

Tanks - Classification – Combined and intercepted catchments – Components of tanks - Types of bunds - Design aspects of bunds-

09CE32 MECHANICS OF SOLIDS I

L	T	P	C
3	1	0	4

ASSESSMENT : THEORY

OBJECTIVES:

At the end of this course the student should be able to understand the properties of solids in terms of its strength. Further he should be able to understand the behaviour of solid elements. All these should be achieved conceptually with worked out examples.

OUTCOME:

The basic knowledge of solids will be learnt by students in terms of axial, bending and tensional forces. They also will understand the concept of strain energy, moment of inertia and complex stress systems.

CONCEPT OF STRESS AND STRAIN

Simple stresses and strains at a point - Normal and shear Stresses - Hooke's Law - Young's modulus - Bars subjected to axial Forces - simple problems - Thermal stresses - Simple statically Indeterminate problems like compound bars. (6)

CHANGES IN DIMENSIONS AND VOLUME

Poisson's ratio - Modulus of Rigidity - Surface and volume strains - Bulk modulus - Relation between Elastic constants - Simple Tension Test on a Mild Steel rod - Stress-strain diagram - Concept of Factor of Safety and permissible stresses. (4)

STRAIN ENERGY PRINCIPLES

Strain energy - Resilience - Stresses due to suddenly applied loads and impact loads. (4)

MOMENT OF INERTIA

Center of Gravity - Mass moment of inertia - Principal axes – Principal moment of inertia - Product of inertia. (6)

COMPLEX STRESSES

Components of stress on inclined planes - Expression for stressed element subjected to two normal stresses with shear – Principal stresses and Principal planes - Mohr's circle of stress. (9)

BEAMS AND BENDING

Types of Beams - Types of loads and loading diagrams – Shear force and Bending Moment -Relationship between loading intensity, shear force and bending moment - Shear force and bending moment diagrams for statically determinate beams - Theory of simple bending - Stress distribution due to shear force and bending moment - Design of beams - Beams of uniform strength - Flitched beams - Beams of Two materials - Leaf springs. (8)

TORSION AND SPRINGS

Torsion of solid and hollow circular shafts - Power transmitted through shafts - Strain energy due to torsion – Combined bending and torsion -Close coiled and open coiled helical springs. (8)

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOK:

1. Rajput,RK., “Strength of Materials”, S.Chand & Company Ltd., New Delhi, 2001.

REFERENCE BOOKS:

1. Sadhu Singh, “Strength of Materials”,Khanna Publishers,New Delhi, 2003.
2. Prakash Rao D.S., “Strength of Materials” Volume I, Universities Press (India) Limited., Hyderabad, 1999.
3. Lehri, RS., Lehri., AS., “Strength of Materials”, S K Kotaria & Press, New Delhi, 2000.
4. Timonshenko, S.P, Gere, J.M., “Mechanics of Materials”, CBS Publishers, New Delhi, 2002. .
5. Egor P.Popov,“Introduction to Mechanics of Solids”, Prentice Hall of India, New Delhi, 2003.
6. Punmia BC, Ashok Jain and Arun Jain, “Strength of Materials and Theory of Structures” Vol 1, Laxmi Publications, New Delhi, 2000.
7. Bansal RK, “Strength of Materials”, Laxmi Publications, New Delhi, 2004.

TIDAL ENERGY PERSPECTIVES

Tidal aspects in coastal India – Tidal energy conversion system: mechanical to electrical and thermal to electrical – Tidal force calculation and power generation – conceptualization and potential of geothermal energy – Geothermal vents. (9)

Total : 45

TEXT BOOK:

1. Sukathme, S.P , “ Solar Energy” , Tata McGraw –Hill Book Co., New Delhi, 1993.

REFERENCE BOOKS

1. Rai, G.D., “Solar Energy Utilization”, Khanna Publishers, New Delhi, 1993.
2. Angrist, S.W, “Direct Enery Conversion”, Allied Publishers Ltd., Boston, 1971.

09CEE11 RENEWABLE ENERGY RESOURCES

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES :

This course aims at expertising the students of civil engineering about the various unconventional and renewable energy resources available in India.

OUTCOME:

After undergoing this course the students of civil engineering assimilate the basic knowledge pertaining to unconventional and renewable energy resources.

ENERGY PERSPECTIVES

Conventional and non conventional energies – Global energy perspectives – Energy and sustainable development – Current energy scenario in India – Energy consumption pattern in rural and urban regions – Energy efficiency and economy – Energy losses and its control – Future of energy in India. (9)

SOLAR ENERGY PERSPECTIVES

Concept of solar energy – Solar energy to light and to thermal conversions – Total energy and necessary infrastructure – Units and measurement of solar radiation – Temperature dependent collecting devices and their efficacies - Design aspects – Typical applications: heating, cooling, lighting, power generation and cooking. (9)

WIND ENERGY PERSPECTIVES

Wind potential in India – Wind machines and their types – Merits and demerits – Wind power and appropriate coefficient – Efficiency and performance of wind machines –Energy conversion and storage - Synchronous invertors – Various storage aspects : battery, fly wheel, hydrogen and compressed air. (9)

BIOMASS ENERGY PERSPECTIVES

Biomass potential in India – Gobar gas and producer gas – Characteristics of biomass – Operation and design of biogas plants – Objectives, principles and operational aspect of biogassifiers – Pyrolysis and incineration – Incineration of MSW and industrial Sludges – Application of biodiesel plants – Fuel cells. (9)

09CE33 MECHANICS OF FLUIDS

ASSESSMENT : THEORY

L	T	P	C
3	1	0	4

OBJECTIVES:

To impart knowledge about different types of flow and their behavior. To have a complete knowledge about the flow in pipeline and also the design of water supply pipeline system.

OUTCOME:

On completion of the course, the basic knowledge in types of flow and in water supply will be accomplished.

PROPERTIES OF FLUIDS

Introduction of Basic properties - Viscosity compressibility, surface tension - Real and ideal -fluids. (3)

FLUID STATICS

Fluid Pressure - various methods of measurement. Total pressure and centre of pressure - determination on plane surfaces only - Equilibrium of floating bodies - conditions and analysis. (6)

KINEMATICS OF FLUID FLOW

Classification of fluid flow - stream function and velocity potential - (Reynolds number and its application) Linear acceleration and constant rotation of fluids in a container - application and simple problems. (9)

DYNAMICS OF FLUID FLOW

Euler's equation of motion - Bernoulli's theorem - Limitation of Bernoulli's theorem - Application - simple problems.- Venturimeter - Flow nozzle meter - Bend meter - Pitot tube - current meter. (9)

FLOW THROUGH PIPES

Laminar and Turbulent flow - friction and minor losses (Study of Moody's diagram).Transmission of power thro' pipes - flow between reservoirs - parallel, series and syphon pipes - water hammer. (9)

UNIFORM FLOW IN CHANNELS

Uniform flow - chezy's equation - Manning's equation hydraulically best section of rectangular trapezoidal and circular sections - circular sections not running full flow measurement using orifices, mouthpieces, notches and weirs.

(9)

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOK:

1. Bansal.R.K., "Text Book of Fluid Mechanics and Hydraulic Machines", M/s.Lakshmi Publications, Madras, 2005.

REFERENCE BOOKS:

1. Kumar.K.L, "Engineering Fluid Mechanics" , M/s.S.Chand Co., Madras.2003.
2. Ramamrutham.S, "Fluid Mechanics, Hydraulics & Fluid Machinery", M/s.Dhanpat Rai & Sons, New Delhi, 1998.
3. Modi.P.N, & Seth.S.M., " Hydraulics, Fluid Mechanics & Hydraulic Machinery", Metropolitan Book Company, New Delhi, 1987.
4. Arora K.R., "Fluid Mechanics, Hydraulics and Hydraulic Machines", Standard Publishers & Distributors, 1998.

TEXT BOOKS:

1. Floyd F.Sabins, J.R., WH, "Remote Sensing Principles Interpretation", Freeman and Company and Francis Company, France, 1996.
2. Lillesand, Thomas.M and Raiph W.Kiefer, "Remote Sensing and Image Interpretation", John Wiley Sons, 2002.

REFERENCE BOOKS:

1. Burrough.P.A., "Principles of GIS for Land Resources Assesment, Oxford Publication, 1998.
2. Thomas.M.Lillesand and Ralph.W.Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, Inc, 2003.

09CEE10 REMOTE SENSING AND GIS

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

At the end of the course the student will possess knowledge of Remote sensing techniques and its applications in the field of civil engineering and GIS.

OUTCOME:

After undergoing this course the students of civil engineering assimilate the basic knowledge of remote sensing techniques and GIS.

PRINCIPLES AND CONCEPTS

Definition - Historical Importance of remote sensing - Principles - and methods of remote sensing - Electromagnetic spectrum Electromagnetic Radiation and radiation sources - Interference - Atmospheric effects on remote sensing - Energy interaction with energy surface features. (9)

AERIAL PHOTOGRAPHY

Definition - Types of air photographs - Geometry of air photo - Parallax - pair of photos - Height determination - Flight planning - Stereoscopy - Monovision - Binocular vision - Aerial photo interpretation - Basic elements - Techniques of photo interpretation - Application of aerial photo interpretation - photographs versus maps. (9)

IMAGERY

Landsat imagery - thermal infrared imagery - Radar imagery - Digital image processing - Comparison with aerial photographs. (9)

INSTRUMENTATION FOR REMOTE SENSING

Imaging devices - Aerial camera - Panoramic camera - Multiband camera - Films for recording images - Black and white and colour serial films - Optical and electronic colour combiner - Photogrammetric equipments. (9)

GIS AND ITS APPLICATIONS

GIS in water resources engineering, land use studies, soil sciences, geology, agriculture, forestry and oceanography. Survey, Mapping, Land use. (9)

Total : 45

09CE34 SURVEYING I

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge about the measurement of various heights and distance using chain, compass surveying etc., and also about theodolite surveying.

OUTCOME:

On completion of the course, the basic knowledge in surveying equipment will be accomplished.

INTRODUCTION:

Definition of surveying - Principles - classification - field and office work - scales - conventional signs.

CHAIN SURVEYING:

Chain Surveying - equipment - chains, tapes, ranging rods, arrows, cross staff, pegs - Ranging and chaining - reciprocal ranging - methods of chaining - overcoming obstacles - setting perpendiculars, gradients - Base, check and tie lines - well conditioned triangles - Traversing - Plotting - Errors in chaining and their corrections. (9)

COMPASS SURVEYING:

Prismatic compass - surveyor's compass - Bearings – systems and conversions - Local attraction - True and magnetic meridians - magnetic declination-dip-Traversing-Plotting- adjustment of error by graphical and analytical methods. (9)

PLANE TABLE SURVEYING:

Instruments and accessories - merits and demerits – methods - Radiation - Intersection - Traversing - Resection - Three and two Point problems. (9)

MINOR INSTRUMENTS:

Hand level, Abney level, Indian pattern clinometers, Cylon Ghat tracer, Sextant, Planimeter, Pentagraph.

LEVELLING:

Levels and staves - Spirit level - sensitiveness - Benchmarks - Temporary and permanent adjustments - methods - Differential, fly,

check, profile and block levelling - Booking, reduction - Arithmetic checks - correction for curvature and refraction -Reciprocal levelling - Intervisibility of stations - Errors in levelling. Longitudinal and cross sections - plotting - calculation of areas and volumes. Contouring - characteristics and uses of contours - plotting - Earthwork volume - capacity of reservoirs. (9)

THEODOLITE SURVEYING:

Transit Theodolite - vernier, micrometer and micro-optic theodolites-description and uses-Fundamental lines of a Transit theodolites-Temporary and Permanent adjustments - Horizontal angles - reiteration and repetition-vertical angles. Methods of traversing-conditions for closure-closing error and distribution-Gale's Traverse table - plotting by Coordinates-Omitted Measurements - Gross errors. (9)

Total : 45

TEXT BOOK:

1. Kanetkar, T.P. ,” Surveying and Levelling”, Volumes I and II, United Book Corporation, 1994.

REFERENCE BOOKS:

- 1) Punmia,B.C.,”Surveying”, Volumes I & II, Laxmi Publications, NewDelhi, 2003.
- 2) Arora.K.R., “Surveying”, Volume I, Standard Book House, Delhi 6, 1990.

WASTEWATER CHARACTERISTICS AND TREATMENT SCHEMES IN INDUSTRIES

Typical manufacturing industries: cement, iron and steel, thermal power plants, sugar, paper and pulp and mining- Typical process industries: tannery, food processing, distilleries, and dairy, textile-Dyeing and petrochemical industries. (9)

Total : 45

TEXT BOOK:

1. Rao, M.N and Datta, A.K. “Waste Water Treatment”, Oxford and IBH Publishers Co; New Delhi, 1995.

REFERENCE BOOKS:

1. Eckenfelder, W.W.(jr)”, Industrial Water Pollution Control”, McGraw-Hill Book Co, NewYork ,2000.
2. Metcalf and Eddy”, Wastewater Engineering Treatment, Disposal and Resuse”, McGraw-Hill Publishing Co, Indian Edition, New Delhi,2005.

09CEE09 INDUSTRIAL WASTEWATER TREATMENT AND DISPOSAL

L	T	P	C
3	0	0	3

ASSESSMENT: THEORY

OBJECTIVES:

This course facilitates the students of civil engineering about the various aspects of treatment and disposal of industrial wastewater.

OUTCOME:

After undergoing this course the students of civil engineering assimilate the basic knowledge pertaining to industrial waste water management.

INDUSTRIAL WASTEWATER PERSPECTIVES

Manufacturing and process-based industries – General characteristics of industrial wastewaters - Objectives and management of industrial wastewaters – Effluent and stream standards for disposal of wastewaters – Sewer ordinance – Effects of untreated and/or partially treated wastewaters on disposal into land and rivers - DO sag curve and Streeter - Phelps's equation – Joint treatment of municipal sewage and Industrial wastewater – Individual treatments and CETPs. (9)

WASTEWATER MINIMIZATION AND CLEANER PRODUCTION

Necessity of wastewater minimization and basic concepts of cleaner production- Volume and strength of reductions – Housekeeping aspects - 3R concepts – By-product recovery aspects - Material balance and waste auditing – Raw Material selections. (9)

WASTEWATER TREATMENT TECHNIQUES

Objectives, principles and process description of equalization, neutralization, chemical oxidation, chemical precipitation, adsorption and sedimentation facilities – Biological treatment process: aerated lagoon, stabilization ponds, oxidation ditch, RBCs and UASBPs – Principles of RO, ultra-and nano - Filtrations in TDS removal. (9)

INDUSTRIAL SLUDGE TREATMENT

Types of industrial sludges – Characteristics and treatment schemes- Toxicity and hazardousness – High-rate digestors and methane recovery – Land application of sludge and acceptable limits – Bioaccumulation potential – Pyrolysis and incineration techniques- Energy conversion and air pollution problems. (9)

09CE35 CONCRETE TECHNOLOGY

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

OBJECTIVES:

To impart knowledge about concrete making materials, properties of fresh and hardened concrete, special concretes, mix design and non-destructive testing.

OUTCOME:

Students will acquire knowledge about properties of concrete making materials, mix design procedures, fresh and hardened properties of concrete and special concretes which will help them to adopt the knowledge and skill in their profession.

CEMENT

Types of cement - properties and specific uses of various cements - Tests of cement - Fineness - Setting time - Consistency- Soundness - compressive strength.

AGGREGATES

Properties of aggregates - shape, texture, bond, strength, soundness and thermal properties - grading - bulking of sand - Tests on aggregates - Flakiness index - Elongation index - Crushing value - Impact value - Abrasion value. (9)

WATER

Quality of water for mixing and curing - use of Sea water for mixing concrete.

ADMIXTURES

Air-entraining agents - Accelerators - Retarders - Pozzolona - Water proofing agents - workability agents – plasticizers – super plasticizers

CONCRETE MIX DESIGN

Factors affecting mix proportion - Water cement ratio - Aggregate cement ratio - Mix design by I.S. method and ACI method. (9)

MANUFACTURE OF CONCRETE

Measurement of materials - Volume batching and weigh batching - mixing of concrete - Types of mixers - Transporting of concrete placing of concrete - compaction of concrete - Methods of

compacting concrete - Tamping - Vibration - Vibroprocessing - Jolting
- Rolling - Centrifugation - Curing of concrete - Different methods of
curing. (9)

PROPERTIES AND TESTS ON FRESH AND HARDENED CONCRETE:

FRESH CONCRETE

Workability - Workability Tests - Slump Test - Compacting factor
Test – Flow test – Kelly Ball test – Vee Bee consistometer test –
segregation and Bleeding.

HARDENED CONCRETE

Compressive Strength of concrete - Modulus of Rupture -Tensile
Strength - Modulus of elasticity - Bond stress - Shrinkage of
concrete - Factors affecting shrinkage of concrete - creep - Factors
influencing creep - Factors affecting permeability - Thermal
properties - Non destructive test on Concrete using schmidt hammer,
ultrasonic concrete tester. (9)

QUALITY CONTROL

Sampling - Frequency of sampling - Standard deviation -
acceptance criteria as per IS 456 - 2000.

SPECIAL CONCRETES:

Light weight concrete - Fibre Reinforced Concrete - Ready Mixed
concrete - High density Concrete - Polymer Concrete - Ferrocement
- Shotcreting. (9)

Total : 45

TEXT BOOK:

1. Shetty M.S., "Concrete Technology", S.Chand and Company Ltd,
New Delhi, 2004.

REFERENCE BOOKS:

- 1 Neville.A.M., "Properties of Concrete", ELBS, 2000.
2. Santhakumar A.R., "Concrete Technology" Oxford University Press,
New Delhi, 2007
3. Gulkarni et al., "Concrete Technology", Oxford and IBH @ Publishing
Company, New Delhi, 1987.
4. Krishnasamy K.T. , "Concrete Technology", Dhanpat Rai, New
Delhi, 1987.

TEXT BOOK:

1. Dension Campell, Allen and Harold Roper., "Concrete Structures" ,
Materials, Maintenance and Repair", Longman Scientific and
Technical, U.K. 1987.

REFERENCE BOOKS:

1. Allen R.T., and Sc Edwards., "Repair of Concrete Structures",
Blakie and sons", U.K. 1987.
2. Neville A.M., "Properties of Concrete", The English Language Book
Society and Pitman publishing, London, 2000.
3. Guha P.K., " Maintenance and Repairs of Building", New Central
Book Agency (P) Ltd.,Calcutta,1998

09CEE08 REHABILITATION OF STRUCTURES

ASSEMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to learn the need for quality control in concreting, types of distresses in structures and their remedial measures, various materials and methods available for rehabilitation and also about the various non destructive techniques.

OUTCOME:

The student will be in a position to diagonalize various distresses in structures and their causes and also they will have clear idea about various materials and techniques available for rehabilitation of structures.

INTRODUCTION

Strength, permeability, volume changes and thermal properties of concrete. (9)

CRACKS

Cracks in concrete - intrinsic cracking and structural cracking - causes and remedies - plastic cracks and remedies - Thermal contraction cracks - Long term drying shrinkage cracks - Sulphate attack cracks – Alkali aggregate reaction cracks. (9)

MATERIALS FOR REPAIR

Material for Repair: Concrete chemicals, special elements for accelerated strength gain - Expansive cement - Polymer concrete - Sulphur infiltrated concrete - Ferrocement - Fibre reinforced concrete.(9)

REPAIR TECHNIQUES

Repair techniques: Rust eliminators and polymer coating for steel bars during repairs - formed concrete, mortar and dry pack - Vacuum concrete – Gunite, shotcrete and Grouting - Epoxy injection - Mortar repair for cracks - shoring and under pinning. (9)

NON-DESTRUCTIVE TESTINGS

Non-destructive testings: Ultrasonic and sonic tester - Flaw detectors - Rebound test - hammer strength evaluation of existing structures. (9)

Total : 45

- Gambhir M.L., "Concrete Technology", Tata McGraw Hill Publishing Company Limited, New Delhi, 2004.
- IS 456- 2000 Indian Standard Code of Practice for Plain and Reinforced Concrete, BIS, New Delhi.
- Hand Book on Concrete Mixes (Based on Indian Standards), BIS, New Delhi, Indian Standard Institution, 1983.

09CE36 ENGINEERING GEOLOGY

ASSESSMENT : THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge about various geological problems encounter during civil engineering projects like infrastructure development and mega projects like dams, tunnel and landslide. It also imparts knowledge about the methods used to explore the sub surface for natural resources.

OUTCOME:

Student will able to acquire fundamental geological knowledge to solve many civil engineering field problems.

INTRODUCTION

The need for imparting geological training to the engineers.

GENERAL GEOLOGY

Weathering, soils, Geological action of wind, Rivers, Glacier and oceans - mountains, Earthquake and Interior of the earth, Age of the earth. (9)

STRUCTURAL GEOLOGY

Contours, Dip, Apparent Dip, True Dip, strike, thickness of strata, folds, faults, joints, unconformities, outlier, Inlier's, overlap, offlap.

CRYSTALLOGRAPHY

Out line of elementary crystallography - symmetry elements, goniometer, miller's indices, study of the symmetry elements and forms of the normal class of the cubic, tetragonal, Hexagonal, orthorhombic, monoclinic and triclinic systems. (9)

MINERALOGY

Physical properties of minerals - characteristic features of the following minerals and mineral groups.

GROUP MINERALS

- Quartz group - Rock crystal, Chalcedony, Agate, Flint, Jasper, opal
- Felspar group - Orthoclase, Microcline, Plagioclase Felspars.
- Pyroxene group - Hypersthene, Augite
- Amphibole group - Hornblende only.
- Mica group - Muscovite, Biotite, Phlogopite and Lapidolite.

COMPOSITE BEAMS

Composite prestressed concrete beams - Design procedure - Calculation of stresses at important stages both for propped and unpropped constructions - Design of shear connectors - Shrinkage stresses. (6)

STATICALLY INDETERMINATE STRUCTURES

Statically indeterminate structures - continuous beams - Concept of concordant cable and linear transformations - Sketching of pressure lines (simple problems). Partial and circular prestressing (Principles only) (8)

Total : 45

TEXT BOOKS:

1. Sinha, N.C. and Roy, S.K. ,”Fundamentals of Prestressed Concrete”, S.Chand and Co., 1987.
2. Krishna Raju, N. “Prestressed Concrete”, Tata McGraw Hill, New Delhi,2007.
3. IS 1343:1980 – Code of Practice for Prestressed Concrete, Bureaus of Indian Standards, New Delhi.

REFERENCE BOOKS:

1. Lin T.Y.& Burns,N., “Design of Prestressed Concrete Structures”. John Wiley & Sons, 1992.
2. Dayaratham,N, “Prestressed Concrete Structures”. Oxford & IBH Company, New Delhi, 2004.
3. Kachaturian,N. and Gurfinkel,G. - “Prestressed Concrete”, McGraw Hill Book Co., Newyork, 1975.
4. Antoine, E.Naaman - “Prestressed Concrete Analysis and Design - Fundamentals”, McGraw Hill Book Co., Newyork, 1982.
5. Rajagopalan- “Prestressed Concrete”, Narosa Publishers, New Delhi, 2002.

09CEE07 PRESTRESSED CONCRETE STRUCTURES

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To develop an advanced understanding of the behaviour, analysis and design of prestressed concrete structures

OUTCOME:

Student will develop skills in the analysis and design of prestressed concrete beams, columns and slabs, to satisfy the serviceability and strength provisions of prestressed concrete structures

INTRODUCTION

Difference between reinforced and prestressed concrete. Principles of prestressing - Methods and systems of prestressing - Principles of Electrothermal prestressing & chemical prestressing - Classification of prestressed concrete structures - Materials - High strength concrete and High strength steel - Stress - Strain diagrams. (5)

LOSSES IN PRESTRESS

Loss due to elastic shortening in pretensioned and post tensioned beams. Loss due to creep, shrinkage, relaxation, friction - Approximate percentage of various losses in pretensioned and post tensioned beams. (5)

DESIGN OF BEAMS

Theory and behaviour of prestressed concrete beams in bending - Design of prismatic prestressed concrete members for bending for working loads by Magnel's graphical method - Check for ultimate load stage (Limit State Design) (9)

DEFLECTION AND END BLOCK DESIGN

Simple cable profiles - calculation of deflections - Design of beams for shear in working and ultimate loads - Design of Anchorage Zone by Guyon's method (simple problems) - Concept of Magnel's method, IS 1343 recommendations. (10)

TENSION AND COMPRESSION MEMBERS

Design of tension and compression members - Columns subjected to bending moment and axial compression. (2)

Nepheline, chlorite, olivine, garnet, Beryl, sillimanite, Kyanite, Staurolite, Serpentine, Asbestos, Talc, clayminerals, Bauxite, Apatite, Corundum, Hematite, Magnetite, Limonite, chromite, Calcite, Dolomite, Barite, Gypsum, Galena, Pyrite, Fluorite and Graphite. (9)

PETROLOGY & STRATIGRAPHY

Elementary classification, textures and structures of the three groups of rocks - forms and mode of occurrence of igneous rocks, detailed description, distribution and economic uses of the following rock types:

Igneous Rocks - Granite, Syenite, Diorite, Gabbro, Pyroxenite, Dolerite, Rhyolite, Trachyte, Andesite, Basalt.

Sedimentary Rocks - Conglomerate, Breccia, Sandstone, shale, Limestone, laterite.

Metamorphic Rocks - Slate, Phyllite, Schist, Gneiss, Quartzite, Marble, Granulite.

Out line of stratigraphy of India with particular reference to the following:

Dharwars (Archaean)

Cuddapahs

Vindhyan

Gondwanas

Trichy Cretaceous

Deccan Traps

Tertiary with special emphasis on formation containing Lignite / petroleum. (9)

APPLIED GEOLOGY:

Landslide and related phenomenon

Geology of Reservoir and dam sites

Geology of Tunneling

Geology of Building stones, Building sites and Road metals

Geology of Ground - water supply

Geology of coastal protection

Fundamental principles of Geophysical methods.

Engineering properties of Rocks. (9)

Total : 45

TEXT BOOK:

1. Parbingsingh., "A Text book of General Engineering Geology", Katson Publishing House, Ludhiana, 1998.

REFERENCE BOOKS:

1. Krynine and Judd , "Principles of Engineering Geology and Geotechnics"., Tata McGraw Hill, New Delhi, 1998.
2. Tyrrell , "Principles of Petrology", B.I .Publications, Bombay,1989.
3. Billings, "Structural Geology", Asia Publishing House,New Delhi,1989.

TEXT BOOKS:

1. Subramanian.N,"Design of Steel Structures",Oxford University Press,New Delhi,2008.
2. Bhavikatti.S.S. "Design of Steel Structures by Limit State Design", I.K International Pvt.Ltd., 2009.

REFERENCE BOOKS:

1. Ramchandra, "Design of Steel Structures" - Vol. I and II, Standard Publishers Distributers, New Delhi, 2002.
2. Bresler and Lin,"Design of Steel Structures", Wiley Eastern Pvt. Ltd., New Delhi. 1980.
3. Vazirani, V.N. and Ratwani,N.M., Honey Mehra "Design and Analysis of Steel Structures", Khanna Publishers, New Delhi, 2000.
4. IS: 800,Code of Practice for use of Structural Steel in General Building Construction, Bureau of Indian Standards , New Delhi, 2007.
5. IS 801:1975, Code of Practice for use of Cold Formed Light Gauge Steel Structural Members in General Construction, Bureaus of Indian Standards, New Delhi.

09CEE06 ADVANCED STEEL DESIGN

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To develop technical competence in the design of light gauge sections, industrial buildings, Bunkers, Silos and Plastic design.

OUTCOME:

An ability to analyze and design the light gauge structural steel elements, industrial buildings, bunkers and silos will be acquired.

LIGHT GAUGE STEEL MEMBERS

Light gauge sections - types of sections, material - local buckling of thin elements - stiffened and multiple stiffened compression members - Unstiffened elements - Laterally supported and unsupported flexural members - connections. (10)

PLASTIC ANALYSIS

General methods of plastic design - Combining mechanisms and plastic moment distribution methods - estimate of ultimate deflections - effect of shear, axial load and lateral and local buckling - design of connections with special reference to rigid frame corners - Minimum weight design. (10)

CONNECTIONS:

Connections - flexible, semirigid and rigid or moment resisting connections.

Multistoreyed framed structures - Analysis for Vertical and lateral loads for frames with moment resistant connections only - Design for composite construction. (9)

INDUSTRIAL BUILDINGS:

Industrial Building frames - General, framing, bracing, Crane Girders and columns - Analysis of Trussed bents - Canopy design. (8)

BUNKERS AND SILOS:

Pressure on side walls of bunkers and silos - Jansen's and Airy's theories - complete design of circular silos. (8)

Total : 45

09CE41 NUMERICAL METHODS

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To develop effective understanding, formulation and solving skills of Numerical methods to apply into civil engineering field.

OUTCOME:

On completion of the course, the basic knowledge in numerical methods will be accomplished.

LINEAR SIMULTANEOUS ALGEBRAIC EQUATION

Direct methods: Gauss-elimination, Gauss-Jordon, Cholesky and Partition methods. Iterative methods: Jacobi and Gauss-Siedel methods. (9)

FINITE DIFFERENCE METHODS

Applications: Shear force, Bending moment and Deflection variation in statically determinate beams – Deflection in Statically indeterminate beams – Vibration of beams – Bending of laterally loaded thin plates. (9)

NUMERICAL INTEGRATION

Trapezoidal Rule, Simpson's one third Rule – Gaussian quadrature formula – Application of quadrature rule to deflection of non - prismatic simple beams. (9)

EIGEN VALUES AND EIGEN VECTORS

Iterative method (Power method) – Jacobi method – Applications: Principal stresses and Principal planes – Principal moment of inertia and principal axes – Application of finite difference in eigen value problems to buckling of columns. (9)

ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Ordinary Differential Equations:

Taylor series method – modified Euler's method – Runge-kutta method of fourth order - Milne's predictor - corrector method.

Partial Differential Equations:

Finite difference approximation – solution of partial differential equations – Laplace equation – Liebmann's iteration process- Poisson's

equation - parabolic equation – Bender-schmidt and Crank-Nicholson scheme – Hyperbolic equation.

(9)

Total : 45

TEXT BOOKS:

1. Krishna Raju, N. and Muthu K.U., “Numerical Methods for Engineering Problems”, Macmillan India Limited, 1990.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., “Numerical Methods”, S. Chand & Company Limited, 2005.

REFERENCE BOOKS:

1. Jain.M.K, Iyengar.S.R.K, and Jain.R., “Numerical Methods for Scientific and Engineering Computation”, New Age International (P) Ltd, Publishers, 2004.
2. Scarborough.J.B, “Numerical Mathematical Analysis”, Oxford and IBH Publishing Company, 1992.
3. Rajasekaran.S., “ Numerical Methods in Science and Engineering (A Practical approach)”, A.H. Wheeler & Co.1987.

TEXT BOOKS:

1. Ashok K.Jain., “Reinforced concrete - Limit State Design”, New Chand Brothers, Roorkee, 2002.
2. Ramakrishnan V & Arthur P.D., A.H.Wheeler & Co P Ltd., Allahabad, 1977.
3. Krishnaraju N., “Advanced Reinforced Concrete Design”, C.B.S Publishers and Distributors, New Delhi, 2003.

REFERENCE BOOKS:

1. Jain and Jai Krishna., “Plain and Reinforced Concrete”, Nem Chand Brothers, Roorkee, 1986.
2. Mallick and Gupta., “Reinforced Concrete Design”, Oxford and IBH, Publishers, Delhi, 1996.
3. Design Aids to I.S. 456 - 1978 (SP 16), Bureaus of Indian Standards, New Delhi.
4. Code of “Practice for Plain and Reinforced Concrete” IS456 - 2000, Bureaus of Indian Standards, New Delhi.
5. Glover.C.W.,” Structural Precast Concrete” , Asia Publishing House, Bombay, 1967.

09CEE05 ADVANCED CONCRETE DESIGN

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

The course aims to make the students to gain expertise in the design of special Civil Engineering structures, namely deep beams, flat slabs, prefabrication and tall structures.

OUTCOME:

The student will be basically understand the concept of design of special Civil Engineering structures.

DESIGN OF COLUMN SUBJECTED TO BIAXIAL BENDING

Design of columns subjected to biaxial bending moment and axial load using SP 16. Behaviour of deep beams - Designs as per IS 456-2000. (9)

CHECK FOR SERVICEABILITY

Check for deflection and cracking as per IS 456-2000 (8)

DESIGN OF FLAT SLAB:

Design of flat slab as per IS 456-2000. Limit Analysis of RCC structures - Fundamental principles, Concept of moment redistribution - moment rotation characteristics - permissible rotation capacity - cambridge method - A.L.L. Baker's method of Limit analysis (Assumptions and procedures only, qualitative treatment) (10)

PREFABRICATION:

Principles of precast construction - Merits and Demerits - Dimensioning and detailing of joints for different structural connections - Construction and expansion joints - Production - Transportation - Erection. (8)

TALL STRUCTURES:

Analysis of R.C.Chimneys by Elastic theory - Design by LSD. Design of square bunker using Rankine's theory. Design of circular silo using Jansen's theory - and Airy's theory. (Derivation not required for both theories) (10)

Total : 45

09CE42 MECHANICS OF SOLIDS II

L	T	P	C
3	1	0	4

ASSESSMENT: THEORY

OBJECTIVES

The subject of Mechanics of Solids cuts broadly across all branches of engineering profession. At the end of this course, the student will have knowledge about behaviour of members subjected to various types of forces. The subject can be mastered best by solving numerous problems.

OUTCOME

On completion of the course, the student will be accomplished with the knowledge in beams, cylinder and columns.

DEFLECTION OF DETERMINATE BEAMS

Governing differential equation – Macaulay's method – Moment area method – Conjugate beam method. (9)

STATICALLY INDETERMINATE BEAMS

Analysis of propped cantilevers and fixed beams - Continuous beams -Theorem of Three moments. (6)

THIN AND THICK CYLINDER

Stresses in thin walled Cylindrical and spherical shells - Wire wound cylindrical Vessels – Thick cylinder - Lamé's equations - Compound cylinders - Shrink fit. (6)

THEORY OF COLUMNS

Short columns -Stresses due to combined bending and axial Force - core of section – Elastic buckling of long columns- Euler's theory for long Columns - limitations of Euler's theory - Rankine's formula. (9)

THEORIES OF FAILURE

Study of maximum stress, maximum strain, maximum shear Stress, maximum strain energy, maximum energy of distortion and Octahedral shear stress - Theories of failure and their Importance in design. (6)

UNSYMMETRICAL BENDING AND SHEAR CENTRE

Significance of shear centre - Location of shear centre for Thin walled open sections with one axis of symmetry. Analysis of stresses and deflections due to unsymmetrical Bending. **(9)**

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOK

1. Rajput,R.K., "Strength of Materials", S.Chand & Company Ltd., New Delhi, 2001.

REFERENCE BOOKS

1. Sadhu Singh, "Strength of Materials",Khanna Publishers,New Delhi, 2003.
2. Prakash Rao D.S., "Strength of Materials" Volume I, Universities Press (India) Limited., Hyderabad, 1999.
3. Lehri, RS., Lehri., AS., "Strength of Materials", S K Kotaria & Press, New Delhi, 2000.
4. Timonshenko, S.P, Gere, J.M., "Mechanics of Materials", CBS Publishers, New Delhi, 2002.
5. Egor P.Popov,"Introduction to Mechanics of Solids", Prentice Hall of India, New Delhi, 2003.
6. Punmia BC, Ashok Jain and Arun Jain, "Strength of Materials and Theory of Structures" Vol 1, Laxmi Publications, New Delhi, 2000.
7. Bansal RK, "Strength of Materials", Laxmi Publications, New Delhi, 2004.

REFERENCE BOOKS:

1. Timoshenko,S and Krierger,S.W., "Theory of Plates and Shells", Mc- Graw Hill Book and co, Newyork , 1998.
2. Chandrashekhara.K. "Theory of Plates" Universities Press (India) ltd, Hyderabad, 2001.
3. Bairagi.N.K, "Theory of Plates", Khanna Publications, New Delhi 2005.

09CEE04 ANALYSIS AND DESIGN OF PLATED STRUCTURES

L	T	P	C
3	0	0	3

ASSESSMENT: THEORY

OBJECTIVES:

The student should be able to understand the behavior of plates in terms of its geometry and material property and also understand the development of the design tables specified in Indian and International standard code books.

OUTCOME:

The student will be able to analyze and design plates in different geometric and support condition with respect to engineering approach.

STATIC ANALYSIS OF PLATES

Introduction to Theory of Elasticity-Differential equation of plates in cartesian coordinates – Boundary condition – Isotropic and Orthotropic Materials –Applications. **(9)**

SMALL DEFLECTION THEORY

Rigrons solution producer – Navers method and Levys method for all sides simply supported. **(9)**

CIRCULAR PLATES

Differential equation for symmetrical bending of laterally loaded circular plates – simply supported edges – clamped edges – simple symmetric loading cases only. **(9)**

NUMERICAL AND APPROXIMATE METHODS

Finite difference method – improvements for solution – energy methods- Galerkin’s method- Ritz method. **(9)**

DESIGN OF PLATED STRUCTURES

Engineering approach to design of continuous rectangular slabs-codal provisions- flat slabs- design of orthotropic plates. **(9)**

Total : 45

TEXT BOOK:

1. Rudolph Szilard, “Theory and Analysis of Plates” Prentice Hall, Ins., New Jersey, 1974.

09CE43 APPLIED HYDRAULICS AND HYDRAULIC MACHINERY

L	T	P	C
3	1	0	4

ASSESSMENT : THEORY

OBJECTIVE:

Student is introduced to open channel flow characteristics including hydraulic jump. Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught.

OUTCOME:

The students will have the abilities to analyse the flow characteristics in open channel and design hydraulic machines.

NON-UNIFORM FLOW IN OPEN CHANNELS

Critical depth - Specific Energy - Nonuniform flow - Characteristics of non uniform flow - Analysis of hydraulic Jump - Back water curves – Venturiflume. **(9)**

DIMENSIONAL ANALYSIS AND MODEL STUDY:

Dimensional Homogeneity - Rayleigh’s method - Buckingham’s Pi-theorem – Significance of Reynolds number, Froude number, Euler’s number, Mach number and Weber number - Distorted models - Scale effect. **(9)**

IMPACT OF JETS:

Flow over immersed bodies: Drag and lift - Stream - lined Bluff bodies - Terminal velocity - Estimation of drag and lift forces - Impulse momentum principle and its application - Dynamic force upon a body in motion - Jet propulsion. **(9)**

TURBINES:

Classifications - Velocity triangles, work done and efficiency - Study of Pelton wheel, Francis and axial flow turbines - Governing of turbines - Characteristic curves - Specific speed - Model testing - Selection of turbines - Simple problems to determine geometric dimensions. **(9)**

PUMPS:

Classification of pumps - Centrifugal pumps – Reciprocating pumps - Deep well pumps - Airlift pumps - Working principles only - Characteristic curves - selection of pumps and Simple problems. (9)

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOK

1. Bansal.R.K, "A Text book of Fluid Machanics and Hydraulic Machines", M/s Lakshmi Publications, Madras,2005.

REFERENCE BOOKS

1. Kumar.K.L, , "Engineering Fluid Mechanics" , M/s.S.Chand Co., Madras.2003
2. Ramamrutham.S, "Fluid Machanics, Hydraulics & Fluid Machines", Dhanpat Rai & Sons, New Delhi, 1998.
3. Modi.P.M, & Seth.S.M, - "Hydraulics, Fluid Mechanics & Hydraulic Machinery", Metropolitan Book Co., New Delhi. 1987.
4. Arora, K.R., "Fluid Mechanics, Hydraulics and Hydraulic Machines", Standard Publishers Distributors, Delhi, 1998.

TEXT BOOK:

1. Rao.S.S., "Optimization Theory and Applications", New Age International Publishers, New Delhi, 1999.

REFERENCE BOOKS:

1. Stark, R.M and Nichols ., "Mathematical Foundation for Design of Civil Engineering Systems", Mc Graw Hill, Newyork, 1995.
2. Ossenbruggen, P.J., "Systems Approach to Civil Engineering Planning and Design", John Wiley & Sons, Canada , 1987.
3. Jewell, T.K., "Systems Approach to Civil Engineering Planning and Design", Harper & Row, Publishers, New York, 1991.

09CEE 03 OPTIMIZATION IN CIVIL ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

The student should be able to understand different optimization techniques with reference to variable and also apply the concept of optimization for few civil engineering systems.

OUTCOME:

The student will be able to understand the constraints, interpret the results and provide better engineering solution in terms of analysis and design.

INTRODUCTION

Design vector, constraints, design surface – objective function – classification of optimization problems – Problem formulation. (6)

CLASSICAL OPTIMIZATION

Single variable – Multivariable problems – Equality constraints - Lagrangian Multipliers – Inequality constraints - Khun – Tucker conditions – Graphical method for two variable problem. (8)

LINEAR PROGRAMMING

Graphical solution – Simplex Algorithm – Primal – dual concept – Transportation problem – Assignment problem. (9)

NON – LINEAR PROGRAMMING

One dimensional minimization – search methods – Exhaustive search – Dichotomous search – Fibonacci method – Golden section method - Descent methods – Cauchy's method - Fletcher – Reeves method.

Constrained optimization : Penalty Function method. (10)

DYNAMIC PROGRAMMING

Concept of sub optimization – Bellman's principle of optimality – calculus and tabulation methods. (6)

APPLICATIONS

Application in design of pipes – plastic design of steel beams – simple portal frames. (6)

Total : 45

09CE44 SURVEYING – II

ASSESSMENT : THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge about the measurements of heights and distances using tacheometry, triangulation etc., to introduce the fundamentals of horizontal and vertical curves and also to introduce modern survey instruments like total station, GPS etc.

OUTCOME

Students will be able to solve engineering problems with rise of surveying applications.

TACHEOMETRY

Systems - stadia, tangential - principles, instruments required. Stadia system - fixed hair method - horizontal and inclined sights - staff held vertical -horizontal distance and elevation formulae-movable hair method- Determination of stadia constants of the tacheometer - use of analytic lens.

Tangential system - subtense measurements - subtense bar, Tachometric Tables, Direct reading tacheometer. (9)

TRIANGULATION

Introduction - different net works - Grades of triangulation - Signals and towers - Field work - selection of triangulation stations – inter visibility and heights of stations.

Base Line - Choice - instrument and accessories - Measurement of base line - corrections - Satellite stations - need reduction to centre.

TRIGNOMETRIC LEVELLING

Corrections - Curvature and refraction - Axis signal correction - methods of trigonometrical levelling - single and reciprocal observations. (9)

TRIANGULATION ADJUSTMENT

Terms and definitions used - laws of weights - true and most probable values - weighted observations. Method of equal shifts - Principle of least squares - Normal equations. (9)

HORIZONTAL CURVES

Horizontal curves - Elements of simple curve - setting out with chain and tape - with Theodolites by deflection angles - Obstructions in curve ranging, compound and reverse curve (Parallel tangents only) - Transition curves - different kinds - functions and requirements - setting out the combined curve by Theodolites. **(9)**

VERTICAL CURVES AND MODERN SURVEYING TECHNIQUES

Vertical curves - summits and sags - setting out vertical curve by tangent corrections.

Principle uses and advantages of electronic theodolites and electronic distance meters. Basic principles of remote sensing - GIS - GPS. **(9)**

Total : 45

TEXT BOOKS

1. Kanetkar, T.P. and Kulkarni, S.V., "Surveying and Levelling", Volumes I and II, Pune Vidyarthi Griha Prakashan, Pune 2004.

REFERENCE BOOKS

1. Mahajan, Santhos K., "Advanced Surveying", Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.
2. Punmia, B.C., "Surveying", Volumes I & II, Laxmi Publications, New Delhi, 2005.
3. Arora, K.R., "Surveying", Volume I, Standard Book House, Delhi-6, 2008.
4. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992.
5. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 2004.
6. Schofield, W., Engineering Surveying, Butterworth – Heinemann, London, Fifth Edition, 2001
7. Jack C. McCormac, "Surveying", John Wiley & Sons, 2004

TEXT BOOKS:

1. Weaver, J.R and Gere, J.M., "Matrix Analysis of Framed Structures", CBS Publishers, New Delhi, 1990.
2. Rajasekaran, S and Sankarasubramanian G., "Computational Structural Mechanics" Prentice Hall of India, New Delhi, 2004.
3. Fleming, J.F., "Computer Analysis of Structural Systems" McGraw Hill Book Co., New York 1995.

REFERENCE BOOKS:

1. Moshe, F. Rubinstein., "Matrix Computer Analysis of Structures" Prentice Hall of India, New Delhi., 1969.
2. Manicka Selvam V.K., "Elements of Matrix and Stability Analysis of Structures", Khanna Publications, New Delhi, 2005.
3. Jindal, R.L., "Indeterminate Structure", S.Chand & Company, New Delhi, 2000.

09CEE02 MATRIX METHODS OF STRUCTURAL ANALYSIS

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

At the end of this course the student should be able to analyse pin jointed and rigid jointed 2D frames using matrix flexibility and matrix stiffness method.

OUTCOME:

The students will understand the basic flexibility and stiffness method that can be solved using matrices and also write program to solve for forces acting on a structure.

BASIC CONCEPTS

Indeterminacy (static, kinematic), Generalized measurements, Degrees of freedom, Constrained measurements, Behaviour of structures, Principle of superposition.

STIFFNESS & FLEXIBILITY

Stiffness and Flexibility matrices in single, two and n - coordinates, Structures with constrained coordinates, Stiffness and flexibility coefficients. (9)

TRANSFORMATION OF INFORMATION

Determinate and indeterminate structures - Transformation of element matrices to structure matrices - orthogonal transformations. (9)

FLEXIBILITY METHOD

Flexibility method applied to statically determinate and indeterminate structures (2 - D structures only - beams, trusses, frames, subject to external loads only). Choice of redundant. (9)

STIFFNESS METHOD

Development of the method - Application to symmetrical structures - Basic stiffness method and direct stiffness method - Static condensation technique. (9)

COMPUTER PROGRAMS:

Preparation of computer programs for simple problems in two dimensional beams, trusses and frames. (9)

Total : 45

09CE45 ENVIRONMENTAL SCIENCE AND ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

This course primarily aims at creating awareness about the overall perspectives of the Environmental Science and Engineering.

OUTCOME

After undergoing this course, students of any discipline can assimilate the various interlacing aspects about the Environmental Science and Engineering.

ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Introduction - Need for public awareness of various natural resources - substantial discussion on forest, water mineral, food, energy and land resources - Conservator of natural resources and equitable use for sustainable life. (9)

ECOSYSTEMS AND BIODIVERSITY

Introduction - concepts of ecology and ecosystem - structure and functions of an ecosystem - General characteristic of an ecosystem - Ecological succession - Brief discussion about forest, grass land, desert and aquatic ecosystems - Biodiversity and its value - Biogeographical classification of India - Hot - spots and threats to biodiversity - Endangered and endemic species of India - conservation aspects. (9)

ENVIRONMENTAL POLLUTION

Environmental episode and pollution - Definition causes, and effects of water, thermal, air noise and soil pollution - Uses and abuses of fertilizers and pesticides - Brief discussion about MSWM and disaster management - Eutrophication and water -borne diseases - Role of public in prevention of pollution. (9)

SOCIAL ISSUES AND ENVIRONMENTAL LEGISLATION

Unsustainable and sustainable development - Urban problems related to energy and water - Rainwater harvesting - aWater shed management - Resettlement and rehabilitation water - Environmental

ethics; issues and probable solutions - Climate change and global warming - Acid rain and ozone layer depletion - Nuclear accidents and Holocaust - Waste land reclamation - Consumerism and waste products - Typical features of various legislations; water and air pollution and prevention of pollutions acts, forest and wildlife, protection acts - Environmental protection act. (9)

POPULATION GROWTH AND ENVIRONMENTAL SANITATION

Factors affecting growth and global perspectives - Population dynamic and growth curves - Population deficit and explosion - Current scenario in India - Environmental hygiene and sanitation - Air borne, milk borne, vector borne and food borne diseases- home sanitation - Value education and human rights - Child welfare Programme Role of IT in health and global environment. (9)

Total: 45

TEXT BOOKS

1. Millen, G.T., "Environmental Science and Engineering", Betmont C.A., Thompson Publishers, 2004.
2. Keerthinarayana.S and Daniel Yesudian.c., "Principles of Environmental Science and Engineering", 1st Edn. Anuradha Publications, Kumbakonam, 2004.

REFERENCE BOOKS

1. Benny Joseph, "Environment Studies", Tata Mc Graw - Hill Publishing Co., 2008.

MODEL ANALYSIS AND DISTRESS MEASUREMENT

Direct and indirect models – Laws of structural similitude – Choice of scales – Limitation of model studies – Model materials – Begg's defrometer and its use – Simple design of direct and indirect models – Crack observation and measurement – Corrosion of reinforcement in concrete – Half cell, construction and use. (9)

Total : 45

TEXT BOOKS:

1. Srinath, L. S, "Experimental Stress Analysis", McGraw Hill Book Company, New Delhi., 2007.
2. Roy, T. K, "Experimental Analysis of Stress and Strain", S Chand & Co, New Delhi, 2006.

REFERENCE BOOKS:

1. Dally J.W. and Riley W.F., "Experimental Stress Analysis", McGraw Hill Book Co., 1985.
2. Dove and Adams, "Experimental Stress Analysis and Modern Measurement", Prentice Hall of India Ltd.1986.
3. Hetenyi M, "Hand Book of Experimental Stress Analysis", John Wiley and Sons, Inc. Newyork, 1980.

09CEE01 EXPERIMENTAL STRESS ANALYSIS

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

At the end of this course the student should be able to understand the measurement of strain for the experiments to be conducted in the laboratory and also understand modeling and distress on a structure.

OUTCOME:

The student will understand the working principles of different strain gauges and the force applied on the structure and also learns the model analysis and photo elastic concepts & the distress measurements.

STRAIN GAUGES

Definition of gauge length, sensitivity and range – Characteristics of an ideal strain gauge - Different types of mechanical strain gauges (Huggenberger tensometer, Amslers' Extensometer, Amslers' mirror extensometer, Unwins compressometer) - Mechanical optical strain gauges (Tuckermans' gauge) – Optical strain gauge – Acoustic strain gauge – Pneumatic strain gauge – Merits and demerits. (9)

ELECRICAL STRAIN GAUGES

Inductance, capacitance and piezo electric gauges –Electrical resistance gauges and their application in stress analysis – Fixing techniques and measurement of strains – Rosettes – Determination of principal stresses using rosettes – Construction of stress, strain circles – Analytical solution. (9)

FORCE AND VIBRATION MEASUREMENTS

Hydraulic jacks and pressure gauges – Load cells – Proving rings – Transducer for velocity and acceleration measurements – Vibration meter – Vibration analyzer – Display and recording of signals – Digital data acquisition systems. (9)

PHOTO ELASTICITY

Basics of optics and stress optic law – Plane and circularly polarised light and their use in photo elasticity – Polariscopes – Diffusion type polariscope – Isoclinics and Isochromatics - Calibration methods for finding material fringe values – Model fringe values – Examples of beam flexure and diametrically loaded circular plates. (9)

09CE46 BASIC STRUCTURAL DESIGN

(MASONRY, TIMBER & STEEL)

ASSESSMENT : THEORY

L	T	P	C
3	1	0	4

OBJECTIVES:

To learn the design of structural components using steel, timber and masonry.

OUTCOME:

The students will be able to design masonry walls, timber beams and columns, tension, compression member, beam and plastic analysis as per the current I.S codes.

DESIGN OF BRICK MASONRY STRUCTURES

Classification of masonry structures - Design considerations of brick masonry -Permissible stresses. Load bearing walls - Non-load bearing walls. Design of load bearing walls and Columns - Pressure calculation for masonry walls. (7)

DESIGN OF TIMBER STRUCTURES

Properties of structural timbers - Factors affecting the Strength - Permissible stresses - Grading of timber. Joints in timber structures - Design of bolted, nailed joints. Timber beams (rectangular) - Solid columns - Combined bending and direct stress. (9)

DESIGN OF STEEL STRUCTURES:

PLASTIC THEORY

Stress–strain relation of Mild steel – Modified stress-strain diagram – Assumptions in Plastic theory – Collapse load – load factor – plastic bending – Plastic hinge – Plastic moment of resistance – Plastic modulus – Shape factor – Plastic Analysis – Kinematic theorem, Static theorem and Uniqueness theorem – Propped cantilevers – Fixed beams and Continuous beams. (8)

CONNECTIONS

Bolted and welded connections for axial forces- eccentric connections with bolt and weld. (7)

TENSION AND COMPRESSION MEMBERS

Design of tension members subjected to axial tension- tension member subjected to bending – lug angles.

Design of compression members with single rolled steel sections – Angle struts. **(8)**

BEAMS

Design of Simple beams (laterally supported) of rolled sections for flexure, shear, web crippling and buckling and deflection. **(6)**

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOKS

1. Arya., "Structural Design in Steel, Masonry and Timber", Nem Chand and Bros, Roorkee, 1988.
2. Ramchandra, Virendra Gehlot, "Limit State Design of Steel Structures", Scientific Publishers, Jodhur, 2010.
3. Bhavikatti.S.S. "Design of steel structures by Limit State Design", I.K International Pvt.Ltd., 2009.

REFERENCE BOOKS

1. Subramanian.N,"Design of Steel Structures",Oxford University Press,New Delhi,2008.
2. IS: 1905 – Code of Practice for Structural use of Unreinforced Masonry, 1987.
3. SP 20 (S & T),"Hand Book on Masonry Design and Construction", Bureau of Indian Standards, 1991.
4. S.P.6 (1), ISI "Hand Book for Structural Engineers – Structural Steel Sections, BIS, 1964.
5. IS: 883, "Code of Practice for Design of Structural Timber in Building", Bureau of Indian Standards, 1994.
6. IS: 2366, "Code of Practice for Nail- Jointed Timber Constructions", Bureau of Indian Standards, 1983.
7. IS: 800, "Code of Practice for use of Structural Steel in General Building Construction", Bureau of Indian Standards , 2007.
8. IS: 816," Code of Practice for Used of Metal arc Welding in General Construction in Mild steel, Bureau of Indian Standards , 1969.

2. Head, K. H,"Manual of Soil Laboratory Testing (Vol-1 to 3)", John Wiley and Sons, Chichester,1998.
3. Lambe T. W., "Soil Testing for Engineers", John Wiley & Sons, New York, 1990.
4. "I.S. Code of Practice 2720 (Part I to XLI) – Indian Standard Code of Practice for Methods of Tests for soil.
5. Saibaba Reddy, E. and Rama Sastri, K., "Measurement of Engineering Properties of Soils", New Age International Publishers, New Delhi, 2002.

B. SOIL MECHANICS LABORATORY

OBJECTIVES

At the end of this course students should acquire the capacity to assess the engineering properties and index properties of soil.

Performing soil tests to determine Physical and Engineering properties such as:

1. Specific gravity determination
2. Grain size distribution by sieve analysis
3. Grain size by Hydrometer analysis
4. Consistency limits (liquid, Plastic and Shrinkage limits)
5. Coefficient of permeability by Constant head method.
6. Coefficient of permeability by Variable head method.
7. Field density by core cutter method
8. Field density by sand replacement method.
9. Relative density determination
10. Direct shear Test
11. Unconfined compression Test
12. Proctor Compaction Test
13. Consolidation Test
14. CBR Test
15. Plate Load Test (Field Test - Demonstration only)
16. Standard Penetration Test (Field Test, Demonstration only)
17. Determination of Shear strength parameters using triaxial shear test.
18. Estimation of soil resistivity by Wenner method.

REFERENCE BOOKS:

1. "Soil Engineering Laboratory Instruction Manual", Published by the Civil Engineering Department. CIT, Coimbatore - 2008.

09CE47 SURVEY PRACTICAL

ASSESSMENT: PRACTICAL

L	T	P	C
0	0	6	4

OBJECTIVES:

To impart knowledge about practical applications of various types of surveying.

1. Chain Surveying I - Unfolding and folding a chain, Aligning, Ranging, Chaining, Offsets.
2. Chain Surveying II - Traverse.
3. Compass Survey I - Measurement of bearings.
4. Compass Survey II - Traverse.
5. Plane Table Surveying I - Triangulation Problem to find the distance between inaccessible points.
6. Plane Table Surveying II - Traverse.
7. Plane Table Surveying III - Three Point Problem.
8. Plane Table Surveying IV - Two point problem.
9. Levelling I - Study of levels and levelling staff.
10. Levelling II - Fly levelling using Dumpy level.
11. Levelling III - L.S. and C.S.
12. Levelling IV - Contouring.
13. Study of Theodolites.
14. Electronic Distance Meter.
15. Theodolite - Measurement of Horizontal and Vertical angles.
16. Theodolite traverse - closed traverse and open traverse.
17. Heights and Distances - Using base line of known length.
18. Heights and Distances - Using the stadia Tachometric principles.
19. Heights and Distances - Using Tangential Tacheometry -Sub tense bar.
20. Setting out simple curve - by chain and tape method.
21. Setting out a building - Foundation marking.
22. Demonstration of Electronic Total station, Electronic Planimeter

09CE48 FLUID MECHANICS AND MACHINERY LABORATORY

ASSESSMENT: PRACTICAL

L	T	P	C
0	0	6	4

OBJECTIVE:

To impart knowledge about practical applications of concepts of Fluid Mechanics and Machinery.

FLOW EXPERIMENTS

1. Calibration of flow meters – Venturimeter, orifice meter, bend meter, and flow nozzle meter.
2. Flow through pipes – major and minor losses.
3. Flow through orifices and mouth pieces.
4. Flow over notches.
5. Verification of Bernoulli's theorem.
6. Impact of jet on curved and flat vanes.

MACHINERY EXPERIMENTS

1. Performance studies of pumps
 - (a) Centrifugal pumps
 - (i) Single stage (mono bloc and coupled)
 - (ii) Multistage (two and three)
 - (b) Jet pumps
 - (c) Reciprocating pumps
 - (d) Gear pumps
2. Study of Turbines

15. Turbidimetric-based Estimation of Sulphates in the given Water/Wastewater Sample.
16. Estimation of Iron and Manganese in the given Ground Water Sample.
17. Determination of Fluorides in the given Ground Water Sample.

REFERENCE BOOKS:

1. APHA, AWWA, and WPCF, "Standard Methods for the Examination of Water and Wastewater", 2005.
2. Sawyer, N.C., McCarty, P.L. and Parkin, G.F., "Chemistry for Environmental Engineering and Science", Fourth Edition, McGraw Hill Co., New York, 2005.
3. IS:10500-1995, "Drinking Water Standards of India", Bureau of Indian Standards, New Delhi.

**09CE87 ENVIRONMENTAL ENGINEERING
AND SOIL MECHANICS LAB**

L	T	P	C
0	0	6	4

A. ENVIRONMENTAL ENGINEERING LABORATORY

OBJECTIVES:

The vital aim of this laboratory course is to train the students of Civil engineering about the analytical and quantitative aspects of water quality and waste water characteristics. Also, at the end of the course, they would assess the suitability of water for drinking, construction, and other purpose.

1. Determination of Acidity of the given Water/Wastewater Sample.
2. Determination of Alkalinity of the given Water/Wastewater Sample.
3. Determination of Hardness of the given Water/Wastewater Sample.
4. Estimation of Chlorides in the given Water/Wastewater Sample.
5. Determination of pH of the given Water/Wastewater Sample.
6. Determination of Dissolved Oxygen Content in the given Water/Wastewater Sample.
7. Determination of Specific Conductivity of the given Water sample.
8. Assessment of Settleable, Total, Volatile, Fixed, Dissolved and Suspended Solids in Water/Wastewater Sample.
9. Nephelometric-based Turbidity Assessment of the given Turbid water.
10. Assessment of Optimum Coagulant Dose (OCD) to treat the given Turbid water.
11. Assessment of Available Chlorine in the given Bleaching powder sample.
12. Estimation of Residual Chlorine and Determination of Break-point chlorination of the given Polluted Water/Wastewater Sample.
13. Assessment of Biochemical Oxygen Demand (BOD) of the given Water/Wastewater Sample.
14. Assessment of Chemical Oxygen Demand (COD) of the given Water/Wastewater Sample.

**09CE49 SCIENCE OF CREATIVITY AND
PROFESSIONAL ETHICS**

L	T	P	C
2	0	0	2

ASSESSMENT : THEORY

OBJECTIVE

To inculcate among the students the importance of spirituality, yoga and procedures to manage stress and strain. To impart the knowledge of professional and management skills.

EXPECTED OUTCOME

The students will be able to manage stress and strain in their profession in future. They will have knowledge of introspection procedures, practical considerations and guidelines for their living.

INTRODUCTION

Science of creativity and personality development – objectives - evolution of the universe - creation theory – evolution theory – theory of permanence – theory of mithya – big-bang theory – static and dynamic States – etherial particles - panchabhudas – evolution of life - science and spiritualism – physical transformation of biomagnetism - harmony in life – self, family, society and nature - cause and effect system. **(6)**

LIFE FORCE, MIND AND CONCIOUSNESS

Life force – origin – potentiality of the life force – pathway to realize universal force - premordial state - almighty – mind – existence and purpose of mind – greatness and mystery - role of mind in shaping one's personality - ten stages – totality – wisdom – consciousness - sixth sense – action, word and deed – six temperaments. **(6)**

TECHNIQUES FOR SELF EVALUTION

Blockades for personality development – six impurities - introspection – analysis of thought – moralization of desire –eradication of worries – neutralization of anger – realization of self or actualization of the universe – understanding of morality, duty and charity – yoga - different types - kundalini yoga – nine centers – removal of six imprints – meditation and its benefits. **(6)**

HUMAN BODY

Body structure – endocrine glands and six chakras – seven thadus – health and nature – medicines - understanding the need, habit, environmental conditions, society and evolutionary process of life – physical exercise and its importance – regulating food, work, rest, sex and thought. (6)

PROFESSIONAL ETHICS

Engineering Ethics – variety of moral issues – moral autonomy – professions and professionalism - professional ideals and virtues – engineers as responsible experiments – safety and risk – reducing risk – collegiability and loyalty – professional rights – intellectual property rights – multinational corporations – environmental ethics – engineering as managers. (6)

Total : 30

TEXT BOOKS

1. Yogiraj Vethathri Maharishi, “Karma Yoga – The Holistic Unity”, Vethathri Publications, 1986.
2. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, NewYork 1996.

REFERENCE BOOKS

1. Charles D. Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 1999.
2. Laura Schlesinger, “How Could You Do That: The Abdication of Character, Courage, and Conscience”, Harper Collins, NewYork, 1996.
3. Stephen Carter, “Integrity”, Basic Books, NewYork, 1996.
4. Tom Rusk, “The Power of Ethical Persuasion: From Conflict to Partnership at work and in Private Life”, Viking, NewYork, 1993.2. Laura Schlesinger, “How Could You Do That: The Abdication of Character, Courage, and Conscience”, Harper Collins, NewYork, 1996.
5. Naagarazan R.S., “A Textbook on Professional Ethics and Human Values”, New Age International Publishers, New Delhi, 2009.

09CE86 COMPUTER APPLICATIONS LABORATORY

ASSESSMENT: PRACTICAL

L	T	P	C
0	0	6	4

OBJECTIVES:

On line training for application to simple problems in Analysis, Design and Planning tools in Civil Engineering which aims the student to understand Civil Engineering Softwares and also develop to address the demand industry ready professionals.

ANALYSIS AND DESIGN PACKAGES

Introduction to STAAD/pro – Need for computer analysis-analysis of basic structural elements like simply supported beams, cantilever beams, propped cantilever beams, continuous beams and fixed beams. Analysis and design of 2D and 3D frames-Analysis and design of 2D and 3D trusses-Analysis and design of space frame subjected to wind force –sinking of supports –Analysis, design and modelling of 2D frames and bridge deck with moving load-Analysis and design of rectangular and circular- ground level, underground and elevated water tank with bracings.

Design of structural elements like slab, beams, columns and footings Using Excel.

PLANNING TOOLS-PRIMAVERA AND MS PROJECT

Introduction to project planner and project management – defining Administrative categories- setting up OBS,WBS and EPS- creating calendars- defining activity duration – predecessor – successor- positive and negative lag- relationships –float- defining resources and roles-managing base lines – preparing activity areas and bar/Gantt chart areas- updating and tracking projects using base line- producing reports –layout- filter – formatting, printing layout and reports.

REFERENCES BOOKS:

1. STAAD.Pro – Manual Volume 1 and 2, Bentley Systems India Private Limited, New Delhi.
2. Primavera Project Planner- Planning and Control Guide-Primavera System.Inc, Boston, USA.
3. MS Project Professional- Manual- Microsoft Corporation.

TEXT BOOKS:

1. Pankaj Agarwal and Manish Shirikhande, 'Earthquake Resistant Design of Structures', Prentice Hall of India Pvt. Ltd., New Delhi, 2006.
2. Duggal.S.K., "Earthquake Resistant of Structures", Oxford University Press, New Delhi, 2007.

REFERENCE BOOKS:

1. Anil K.Chopra, 'Dynamics of Structures – Theory and Applications to Earthquake Engineering', Prentice Hall of India Pvt. Ltd., New Delhi, 2003.
2. Park and Priestly, 'Seismic Design of Reinforced Concrete and Masonry Buildings', John Wiley & Sons, 1982.
3. IS 1893 -2002, Indian Standard Code of Practice for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
4. IS 13920 - 1993, Indian Standard Code of Practice for Ductile Detailing of RC Structures, Bureau of Indian Standards, New Delhi.

09CE51 TRANSPORTATION ENGINEERING 1**ASSESSMENT: THEORY**

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart basic concepts in highway planning, geometrics, construction and traffic engineering.

OUTCOME:

On completion of the course, the basic knowledge in highway engineering will be accomplished.

HIGHWAY PLANNING

Role of IRC, CRRRI and NHAI-Classification of roads-Road patterns-Planning Surveys-Master Plan and Phasing of master plan-Highway alignment –Factors –Engineering surveys-Drawings and reports –Highway project-New and re alignment project. Maximum dimension of road vehicles and loaded weight-Passenger Car Units-Pavement failures –Flexible and rigid-Types-Causes-Maintenance-Pavement evaluation. **(9)**

HIGHWAY GEOMETRIC DESIGN

Cross section elements –Friction, roughness, light reflecting characteristics-camber-Width of carriage way, medians-Kerbs-Road margins-Cross section of roads in embankment and cutting –Width of formation IRC standards-Right of way-Recommended road width for different classes of roads-Sight distance-Design of Horizontal Alignments-Design Speed-Radius of Horizontal Curves-Super elevation-Widening of pavement on horizontal curves-Transition curves-Types-Length-Examples. Design of vertical alignment-Gradient-Types-Gradient for different terrains-Vertical curves –Summit curves, Valley curves-Examples. **(9)**

MATERIALS

Properties of road aggregates and tests – Bituminous materials – Types- Requirements – Tests- Bituminous mixes- Design- Pavements –Flexible –Rigid –comparison-Soil subgrade, sub base and base course, wearing course and their evaluation. Design of flexible pavements – CBR method- Design of rigid pavement – Highway construction – Earthwork and preparation of subgrade- Bituminous pavements – Types –Construction procedure. Construction of cement concrete pavement.**(9)**

TRAFFIC ENGINEERING

Scope- Characteristics- Road user-Vehicle-Traffic studies – Volume, Speed, Origin and Destination, Capacity, Parking and Accidents.
(9)

TRAFFIC OPERATIONS

Traffic regulations- Traffic control devices - Traffic signs - Traffic signals - Road markings - Traffic islands - Control of access on highways - Design of intersections - Grade separated intersections - Express ways.
(9)

Total : 45

TEXT BOOKS:

1. Khanna.S.K and Justo.C.E.G., "Highway Engineering" , Khanna Publishers, Roorkee, 2001.

REFERENCE BOOKS:

1. Sharma S.K., "Principles, Practice and Design of Highway Engineering", S.Chand &co., New Delhi, 2005.
2. Kadayali., "Principles, Practice and Highway Engineering", Khanna Publishers, New Delhi, 2007.
3. Smith T.N and Hurd E.W "Traffic Engineering", McGraw Hill, New Delhi, 2003.
4. IRC Codes 15-1981,37-1984,38-1988,52-1988,62-1976,66-1976,73-1980,58-1988,37-2001&IRC SP 23- 1983.

09CE 83 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

L	T	P	C
3	0	0	3

ASSESSMENT: THEORY

OBJECTIVES:

To know about the fundamentals of Dynamics of structures and Earthquake Resistant Design of structures as per IS codes.

OUTCOME:

Students will be able to do the analysis and design of structures for earthquake forces as per IS 1893.

STRUCTURAL DYNAMICS

Introduction – Fundamentals of structural dynamics – Single degree of freedom system – Free vibration – forced vibration – Damping - Introduction to multi-degree of freedom system. (10)

ENGINEERING SEISMOLOGY

Elements of Engineering seismology – Definitions – Plate tectonics – Seismic waves – Earthquake History - Behaviour of Structures in past earthquakes –Elastic rebound theory – Seismograph and Accelerograph – Seismic Zoning map of India. (8)

SEISMIC ANALYSIS

Calculation of base shear as per IS 1893-2002 - Static and Dynamic method - Seismic Design concepts. (8)

EARTHQUAKE RESISTANT DESIGN

Design of Beams, Columns – Shear wall – Types of Shear wall – Design of Rectangular Shear wall with boundary elements as per IS 13920 -1993. (9)

DUCTILE DETAILING

Ductility – Assessment of Ductility – Member / Element Ductility – Structural Ductility – Factors affecting Ductility- Ductile detailing of beams, column, joint and footings and special confining reinforcements- as per IS 13920 - 1993.

(10)

Total : 45

advance - Revised estimate - Completion report - Classification of stores - Maintenance - Inspection - Transfers - Surplus and shortage.(9)

INDUSTRIAL MANAGEMENT

Relationship between management and labour - Industrial psychology - Motivating - Merit rating - Incentive plans - Leadership - Importance - Styles - Communication - Types - Methods - Process - Time and Motion studies. (9)

Total : 45

TEXT BOOKS:

1. Subramanian.K., "Construction Management", M/s. Anuratha Agencies, Kumbakonam, 1992.
2. Seetharaman, S, "Construction Engineering and Management", Umesh Publications, New Delhi, 1997.

REFERENCES BOOKS:

1. Mahesh Varma., "Construction Equipments" Metropolitan Book Co., 1985.
2. Jerry Kinard., "Management", D.C. Health & Co, North Carolina, 1995.
3. Harpal Singh., "Construction Management & Accounts," Tata Mc Graw Hill, New Delhi, 1986.

09CE 52 STRUCTURAL ANALYSIS I

ASSESSMENT: THEORY

L	T	P	C
3	1	0	4

OBJECTIVES:

At the end of the course the student should be able to understand the different concepts of the analysis like equilibrium, energy approach, basics of arches, moving load concept on bridges, and basics of the force method using consistent deformation method.

OUTCOME:

The student will basically understand the basic of structural analysis, energy concept and moving loads on static structures.

FUNDAMENTALS OF STRUCTURAL ANALYSIS

Determination of static indeterminacy and kinematic indeterminacy-Deficiency for beams, frames and pin jointed trusses - Behaviour of Structures - Principle of superposition- Analysis of Pin-jointed space trusses by Method of Tension coefficient. (9)

ENERGY CONCEPTS

Energy principles - Strain energy - Complementary energy - Principle of Virtual work - Principle of virtual displacement and virtual force - Castigliano's Theorems - Engesser's Theorem - Maxwell Betti's Theorem - Application of the above principles to find the deflections of statically determinate beams and plane trusses-Theorem of least work- Analysis of statically indeterminate beams (upto 2 degrees). (9)

MOVING LOADS AND INFLUENCE LINES

Moving loads - Absolute maximum shear force and bending moment in simply supported beams - Determination of equivalent UDL - influence lines for shear force, bending moment and reactions in statically determinate beams and influence lines for forces in members of statically determinate plane trusses - Reversal of forces in members of plane trusses.

Influence lines for shear force, bending moment and reactions in statically indeterminate beams by Muller-Breslau's Principle - Application of Muller Breslau Principle to beams with degree of static indeterminacy not exceeding one. (12)

ANALYSIS OF ARCHES:

Analysis of three hinged arches of parabolic and circular profiles
– Analysis of two hinged symmetric parabolic and circular arches.
Settlement and temperature effects - Influence lines for bending moment, normal thrust and radial shear at sections of an arch. (6)

CONSISTENT DEFORMATION METHOD:

Application of Consistent Deformation method to the analysis of statically indeterminate beams and statically indeterminate plane trusses subjected to loads, lack of fit settlement and temperature effects - Analysis of Trussed Beams. (9)

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOKS:

1. Guptha.S.P and Pandit.G.S, "Theory of Structures, Vol.I & II", Tata McGraw Hill, New Delhi, 2003.
2. Rajasekaran.S and Sankara subramanian. G., "Computational Structural Mechanics" Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. Bhavikatti.S.S, "Structural Analysis" Vol.I & II, Vikas Publishing House (P) Ltd., New Delhi, 2008.
2. Prakash Rao., D.S., "Structural Analysis", Universities Press, Hyderabad, 2001.
3. Armenakas.A.E., "Classical Structural Analysis" Mc-Graw Hill Book Co., New York, 1995.
4. Reddy.C.S, "Basic Structural Analysis", Tata Mc-Graw Hill, New Delhi, 2004.
5. Junnarkar and Shah., "Mechanics of Structures" Vol.II, Charotar Publishing House, Anand, 2005.
6. Punmia.B.C and A.K.Jain "Strength of Materials and Theory of Structures", Vol.II, Laxmi Publications, New Delhi, 2005.
7. Wang.C.K, "Intermediate Structural Analysis", Tata Mc-Graw Hill, New Delhi, 1983.

09CE82 CONSTRUCTION MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT: THEORY

OBJECTIVES:

To impart knowledge about management principles and functions used in construction management. It imparts knowledge related to planning, scheduling and execution of construction projects and maintaining accounts.

OUTCOME:

Students will be able to acquire various aspects of construction management principles.

INTRODUCTION

Importance - Scope of Construction Management - Principles - Classification of construction work - Construction stages - Construction Team - Management Functions - Types of Firms - Government - Private - Public sector.

CONSTRUCTION PLANNING

Need - Collection of field data - Approval and sanction of estimates - Budget - Scheduling.

RESOURCES PLANNING

Planning for materials, machines, men and organization. (9)

EXECUTION OF WORKS

Execution of work - Departmental execution - contract system - Calling of tenders - Tender documents - Types of contracts - Contracting firms - Specifications, quality control - Legal implications - Penalties - Arbitration. (9)

PROJECT PLANNING AND SCHEDULING

Forms of scheduling - Bar charts - Milestone charts - Network analysis - CPM and PERT - Numbering events - Time calculations - Floats - Critical path - Time estimates - Time cost optimization - Resource leveling. (9)

STORES AND ACCOUNTS

Measurement of works - Recording - Checking - Types of bills - Modes of payment - Cash Book - Imprest account - Temporary

Assessed value - Replacement value - Gross income - Net income - Capital cost - sinking fund - Depreciation - Determination of Depreciation - Depreciation method of valuation - Fixation of Rent - Calculation of standard rent of Government Building. **(6+9)**

Theory : 30

Tutorial : 45

Total : 75

TEXT BOOKS:

1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & distributors (P) Ltd., New Delhi, 2003.
2. Kanagasabapathi.B., "Practical Valuation Vol. I", M/s. Ezhililarasi Kanagasabapathi, Tiruchirapalli, 1998.

REFERENCE BOOKS:

1. Mahajan., "Civil Estimating and Costing" , Satya Prakashan, New Delhi, 1985.
2. Aggarwal., "Civil Estimating, Costing and Valuation" , B.D.Kataria and Sons, Ludhiana, 1980.
3. Shah N.A., "Quantity Surveying and Valuation" , Khanna Publishers, Delhi , 1980.
4. Ashok Nair, "Professional Valuation Practice", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1997.

09CE53 MECHANICS OF SOILS

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

Undergoing this course enables the student to gain adequate knowledge on engineering properties of soil.

OUTCOME:

At the end of the course, students will have knowledge to analyse the engineering properties of soil and to determine stress distribution and Shear strength of soil.

INTRODUCTION

Soil formation and soil types – Civil engineering problems related to soils – Nature of soil – Simple definitions – Phase relationships – Classification – IS Classification system – Soil compaction – Theory and Laboratory compaction – Field compaction methods. **(9)**

SOIL WATER AND WATER

Principles of water flow – Darcy’s law – Permeability – Laboratory Methods – Field measurement of permeability – Effective stress concept – Dry and saturated soils. **(9)**

STRESS DISTRIBUTION

Stress distribution in soil media – Bousinesq’s Analysis – Westergaard’s Analysis – Intensity of vertical stress using influence charts – Consolidation - Terzaghi’s one dimensional consolidation Theory. **(9)**

SHEAR STRENGTH

Shear at a point – Mechanism of shear resistance – Mohr–Coluomb failure criterion – measurement of shear strength – Direct shear test – Triaxial shear test – Unconfined compression strength test - Vane shear test – Shear strength of clay soil – Shear strength of sand. **(9)**

STABILITY OF SLOPES:

Types of slopes – Stability of infinite slope – Stability of Finite slope – Total stress Analysis – Swedish circle method – Friction circle method – Use of Taylor’s stability number – Slope failure mechanicsm – Effect of Tension cracks. **(9)**

Total : 45

TEXT BOOKS:

1. Gopal Ranjan and Rao, ASR, "Basic and Applied Soil Mechanics" New Age International (P) Limited Publication, New Delhi, Second Edition, 2005.
2. Venkataramaiah, "Geotechnical Engineering", New Age International Ltd., New Delhi Third Edition, 2008.

REFERENCE BOOKS:

1. Alam Singh, "Modern Geotechnical Engineering", IBS Publications, New Delhi, 1987.
2. Punmia, B.C, "Soil Mechanics and Foundation Engineering", Laxmi Publications, New Delhi, Sixteenth Edition, 2005.
3. Muni Budhu, "Soil Mechanics and Foundation Engineering", Wiley India Publication, New Delhi, Second Edition, 2009.

09CE81 QUANTITY SURVEYING AND VALUATION

ASSESSMENT: THEORY

L	T	P	C
2	0	3	4

OBJECTIVES:

This subject covers the various aspects of estimating of quantities of items of works involved in buildings. This also covers the rate analysis, valuation of properties and preparation of reports for estimation of various items.

OUTCOME:

At the end of this course the student shall be able to estimate the material quantities, prepare the bill of quantities and make specifications.

INTRODUCTION AND METHODS OF BUILDING ESTIMATE

General-Units of measurements - Requirements of estimation - Types of estimates - Long wall, Short wall and Centre Line Methods - Simple problems - Estimate of different foundations, steps and boundary walls - Lump Sum items. **(6+9)**

DETAILED ESTIMATE

Detailed estimate of all items of work - Residential Building - Industrial Building - stair case - Estimate of lean to roof - Estimate of R.C.C works. **(6+9)**

SPECIFICATIONS:

Object of specifications - General and detailed Specifications for various items of work - Earth work Excavation - Lime mortar - Cement Concrete - Damp Proof course - Form work - Brick masonry - Stone masonry - Flooring - Painting and Wood work. **(6+9)**

RATE ANALYSIS:

Purpose - Requirements – PWD Schedule of rates and data book - Procedure of rate analysis - Requirement of labour and materials for different works - Obtaining rates for various items of work namely Cement mortar - Cement Concrete - R.C.C. - R.R.Masonry - Brick work - Damp proof course - Plastering - Flooring - Weathering course - Pointing - Painting. **(6+9)**

VALUATION:

Objects of valuation - Definition of various terms such as Free hold property - Lease hold property - Market value - Book value -

design of conventional activated sludge process and trickling filter – Modifications of CASP – Standard and high rate trickling filters – Low cost treatments: stabilization ponds, oxidation ditch and aerated lagoons – Rural sanitation – Objectives, principles, operation, analysis and design of septic tanks and dispersion trenches – Objectives and principles of secondary sedimentation tank – Sludge volume index (SVI) and sludge density index (SDI) – Introduction to RBC and UASB processes. **(9)**

SLUDGE TREATMENT AND EFFLUENT DISPOSAL

Objectives of sludge treatment – Types and characteristics of sludge in a typical plant – Essential relationships – Integrated sludge treatment flow sheet – Objectives, principles, operation, analysis and design of conventional and high rate digestors – Energy recovery aspects with respect to methane – Sludge dewatering and drying – Unconventional methods of disposal – Effluent disposal aspects: sewage farming, land application and dilution methods into lakes, rivers, estuaries and oceans – Self purification and oxygen sag–curve analysis – Trophic status of aquatic bodies. **(9)**

Total : 45

TEXT BOOK

1. Garg S.K. "Sewage Disposal and Air Pollution Engineering", Khanna Publishers, New Delhi, 2001.

REFERENCES BOOKS

1. Raju, B.S.N, "Water Supply and Waste Water Engineering", Tata McGraw – Hill Co, New Delhi, 1995.
2. Metcalf and Eddy, "Waste Water Engineering Treatment, Disposal, and Reuse", McGraw-Hill Publishing Co; Indian Edn; New Delhi, 2005.
3. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, GOI, New Delhi, 1985.

09CE54 REINFORCED CONCRETE STRUCTURES – I

ASSESSMENT: THEORY

L	T	P	C
3	1	0	4

OBJECTIVES:

The course will focus on explaining the background of current design specifications for reinforced concrete structures.

OUTCOME:

Student can define problems for design of reinforced concrete elements that meet code requirements based on strength, stiffness and serviceability considerations.

INTRODUCTION

Materials for concrete - Stress - Strain curve for concrete in compression - Concrete mix proportioning - Design concrete mix and nominal concrete mix - Types of reinforcement Specifications as per IS1786 : 2008 - Plain and deformed bars - Stress - strain curve for reinforcing steel. Concept of WSD (No problems) and LSD - Difference between WSD and LSD - Characteristic loads and strengths - partial safety factor - Various limit states. **(4)**

DESIGN FOR FLEXURE:

Design of singly and doubly reinforced rectangular and flanged sections- Design of lintels - Design of continuous beams using B.M. and S.F. co-efficients as per IS code - detailing. **(9)**

DESIGN FOR SHEAR, BOND AND TORSION:

Design for shear - concept of bond and anchorage - Design for torsion - IS code provision for the design of beams – Detailing. **(5)**

DESIGN OF SLABS:

Types of slabs - IS code regulations - Stiffness requirements - Design of one-way simply supported and continuous slab using BM and SF co-efficient as per IS code - Principles of Rankine - Grashof's method (no problems) - design of two way, simply supported and continuous slab as per IS code – Detailing. **(6)**

DESIGN OF STAIRCASE SLAB:

Design of waist slab for dog-legged stair case - Detailing of Tread– Riser type of stair case (Concept only) – Detailing. **(3)**

DESIGN OF COLUMNS

IS-code regulations - Design of short rectangular and circular columns subjected to axial compressive load - Design of short columns subjected to combined axial compressive load and uni-axial and biaxial bending moments using Design Aids (SP 16) – Detailing. (9)

DESIGN OF FOOTINGS

Design of wall footings - Design of isolated, square and rectangular footings. - combined rectangular and trapezoidal footings – Detailing. (9)

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOKS:

1. Unnikrishna Pillai and Devados Menon, “Reinforced Concrete Design”, Tata Mc Graw Hill Publishing Co, New Delhi, 2009.
2. Ashok K Jain, “Reinforced Concrete Limit State Design”. New Chand Bros, Roorkee, 1988

REFERENCE BOOKS:

1. Purusothaman.P, “Reinforced Concrete Structural Elements Behaviour Analysis and Design”, Tata McGraw hill Publishing Co., Limited, New Delhi, 1987.
2. Park.R and Paulay T., “Reinforced Concrete Structures”, John Wiley and Sons, New York, 1975.
3. Sinha, N.C., and Roy, S.K., “Fundamentals of Reinforced Concrete”, S.Chand and Company, New Delhi, 2001.
4. Sinha,S.N., “Reinforced Concrete Design”, Tata Mc Graw – Hill Publishing Co, Ltd., New Delhi, 2001.
5. MacGregor J.G., “Reinforced Concrete Mechanics and Design”, Prentice Hall, New Jersey, 1998.
6. Varghese,P.C, “Limit State Design of R.C.Structures”, Prentice Hall of India, 2001.
7. Mallick,S.K., and Gupta, A.P., “Reinforced Concrete”, Oxford & IBH Publishing Co., New Delhi, 1987.

09CE73 SANITARY ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

This course aims at exposing the students of Civil Engineering about the perspectives and management of Sewage in dwelling regions.

OUTCOME:

After understanding this course, the students of Civil Engineering assimilate the basic knowledge pertaining to perspectives and management of sewage.

SEWAGE DISPOSAL PERSPECTIVES

Definitions, systems, and classifications of sewage - Necessity and current problems in India - Quantity of dry weather flow (DWF) and factors affecting its generation- Storm water and its assessment: rational and empirical methods – Concept of time of concentration – Fluctuations in flow pattern – Design flow of sewage – Characteristics of sewage: physical, chemical, and biological – Microbiology of sewage – BOD, COD and TOC of sewage – Sewage analysis and BOD calculations – Population equivalents. (9)

HOUSE DRAINAGE AND SEWERAGE SYSTEM

Principles and general layout of house drainage – Traps and other appurtenances – One pipe and two pipe systems - Antisiphonage pipe and street connection – Systems and layout of sewerage - Separate and combined systems – General considerations in the design of sewers - Design of sewers under various flow situations – Sewer materials and sections – Laying, jointing, and testing of sewers - Sewer appurtenances and storm relief works – Pumping of sewage and HP requirements – Pumping stations and its locations. (9)

PRELIMINARY AND PRIMARY TREATMENT OF SEWAGE

Objectives of treatment – Conventional and unconventional treatment units – Objectives, principles, operation, analysis, and design of bar-rack, gritchamber and primary sedimentation units – Velocity control devices in grit chamber – Disposal of rackings, grittings, and primary sludge. (9)

BIOLOGICAL TREATMENT OF SEWAGE

Necessity – Systems and Processes – Aerobic, anaerobic and anoxic processes –Objectives, principles, operation, analysis, and

WATER RESOURCES PLANNING

India's Water Resources – Water use scenario – Purpose and classification of water resources development projects – Multipurpose projects – Water resources project formulation and evaluation – Planning and management strategies. **(9)**

Total : 45

TEXT BOOK

1. Punmia, B. C. and Pande B. B. Lal, "Irrigation and Water Power Engineering", Laxmi Publications, New Delhi, 2001.

REFERENCE BOOKS

1. Garg.S.K, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi, 2001.
2. Sahasrabudhe, S. R, "Irrigation Engineering and Hydraulic Structures Including Hydrology & Water Power Engineering" S. K. Kataria Publications, Sixth Edition 1996 (Reprint 2000)
3. Ragunath.H.M., "Hydrology", Willey Eastern Limited, New Delhi, 2000.

8. IS: 456 - 2000 Indian Standard Code of Practice for Reinforced Concrete, Bureau of Indian Standards, New Delhi.
9. SP- 16 Design Aids for reinforced Concrete, Bureau of Indian Standards, New Delhi.
10. SP - 34 – 1987, Hand Book on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi.

09CE55 CONSTRUCTION TECHNOLOGY

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge about various types of foundations, masonry floors, stairs, roofs, doors and windows. It also provides knowledge regarding anti termite treatment, damp prevention, fire protection, acoustics and other techniques used in construction technology.

OUTCOME:

Students will be able to acquire various aspects of construction techniques.

FOUNDATIONS

Introduction - Building components - site selection - Functions of foundations -Requirements of good foundation - Types of foundations - Selection, description and construction of Spread footing - Combined footing - Strap footing - Raft foundation - Grillage foundation - Raymond pile - Mc Arthur case Pile - Simplex pile - Vibro pile - Mc Arthur pedestal pile - Pile driving - Under reamed pile foundation for black cotton soils.

Setting out foundation - Excavation of foundation trenches - Timbering of trenches - Excavation in ground with sub-soil Water - Anti-termite treatment - Pre-construction - post Construction treatment.(12)

MASONRY

Bonds in brickwork - Stretcher, Header, English, Flemish, Racking, Rat trap bond - Tools for brick laying - Supervision of brick work - Reinforced brick masonry. Dressing of stones - Tools used - Types of surface finishes - Appliances for lifting stones - Classification of stone masonry - Joints in stone masonry - Supervision of stone masonry.

Concrete masonry - Types of concrete blocks - construction - Hollow clay block masonry. (6)

FLOORS AND FLOOR COVERINGS

Ground floors - Component of floors - materials for construction - Flooring Types - Upper floors - Steel joist and stone or precast slab floors - Jack arch floors. (3)

STAIRS

Terms - requirement of a good stair - classification - Straight

09CE72 IRRIGATION ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge about utilization of water for Irrigation and idea about irrigation system.

OUTCOME:

The students will have knowledge about irrigation practices, irrigation water requirement, source and supply of water and also be able to plan irrigation project.

IRRIGATION ENGINEERING

Irrigation – Necessity – Advantages – ill-effects – Types – Methods – Quality of water – Standards – Crops – Seasons - Definitions related to agriculture and irrigation – Rotation of crops – Crop water requirements – Base period – Duty – Delta – Consumptive use – Irrigation Efficiency – Assessment of irrigation water - Water logging – Causes and effects – Remedies - Drainage – Necessity – Advantages – Methods. (9)

HYDROLOGY

Surface hydrology – Precipitation – Types and forms – Measurement – Evaporation – Transpiration – Infiltration (Brief Idea only) – Run-off – Hydrograph – Unit Hydrograph for single peaked storm – S-curve technique – Flood Estimation and Routing. (9)

CANAL ENGINEERING

Canals – Classification – Alignment (Theoretical aspect only) – Distribution network –Cross sectional details – Sediment transportation in canals – Silt theories – Design of canals based on silt theories and use of charts – Balancing depth of cutting – Design procedure for fixing longitudinal section – Canal losses – Canal maintenance – Canal lining – types, construction and maintenance – Design of lined canals. (9)

RESERVOIR PLANNING

Reservoir – Types – Zones of storage - Capacity – Yield – Area-Elevation –Capacity curves – Mass curve analysis – Capacity for specific demand and yield for given capacity – Fixing reservoir capacity – Reservoir Operation – Economic height of a dam – Reservoir sedimentation and control – Selection of site for reservoir. (9)

tonnage, warehouse, Transit shed – Planning, site selection - layout of harbours – classification of harbours – Break water classification and sections of different types of break waters – Docks – Jetty, quay, quay wall – Dolphins – fenders – navigational aids- necessity and types. **(9)**

Total : 45

TEXT BOOKS:

1. Saxena.S.C and Arora.S.P, “A Text book of Railway Engineering”, Dhanpat Rai Publications, New Delhi, 2005.
2. Khanna .S.K. and Arora M.G., “Airport Planning and Design”, Nem Chand and Bros., Roorkee, 1994.
3. Oza and Oza., “Elements of Dock and Harbour Engineering”, Charotar Publishing House, Anand, 1992.

REFERENCE BOOKS:

1. Robert Horonjett., “The Planning and Design of Airports”, McGraw Hill Book Co., 1963.
2. Quinn, “Design and Construction of Port and Marine Structures”, McGraw Hill, 1956.

stairs - Turning stairs - Circular or spiral stair -Geometrical Stair - Construction details - Problems in Geometric design - Ramps, elevators and escalators. **(3)**

ROOFS AND ROOF COVERINGS

Pitched roof - technical terms - Lean to roof - couple roof - Couple close roof - King post truss - Queen post truss - steel roof trusses - composite roof truss- Purlins – Cold form purlins- Erection of steel trusses. Roof coverings for pitched roof - thatch - Plain or flat tiles - Half round country tiles - Asbestos cement sheets – Metal sheets - Light weight roofing. Aluminum roofs – Galvolium sheets. Flat roof - Madras terrace roof - R.C.C. roof - Flat slab roof - Precast concrete roof – Drainage in roofs. **(4)**

DOORS AND WINDOWS

Technical terms - Types of doors - ledged doors - Framed and Paneled doors - Glazed door - Louered doors - Flush doors - Revolving - Sliding doors - Swing doors - Collapsible doors - Rolling shutters - Metal doors – P.V.C doors. Windows - rules for fixing size of windows - different type of windows. **(2)**

DAMP PREVENTION

Causes and effect of dampness - Methods of damp proofing - Materials used for damp proofing course - D.P.C Treatment in buildings. **(2)**

FINISHES

Plastering and pointing - Tools for plastering - Methods of plastering - Preparation of back ground - lime plaster, cement plaster and cement lime Plaster - Plaster on lath - Types of plaster finish - Defects in Plastering - Different types of pointings.

Painting and varnishing - Painting on new and old wood work - Painting on new and old Steel work - Varnishing over wood work - Distemping - White washing and colour washing. **(4)**

INSULATION

Fire protection - Fire resisting properties of common building materials - Fire safety requirements for buildings – Fire resistant construction – Thermal Insulation.

Acoustics and sound insulations - Behaviour of sound in enclosures - Defects due to reflected Sound - Sabines expression for

reverberation time - Absorption – Absorbants - Acoustical defects
- Acoustical design of halls – Thermal Insulation. (4)

MISCELLANEOUS

Formwork - requirements - shuttering for columns - Shuttering
for beam and slab floor - form work for stairs & Walls.

Shoring - underpinning - various types of scaffolding. (5)

Total : 45

TEXT BOOK:

1. Punmia.B.C, "Building Construction", Laxmi Publications Pvt.Ltd, New Delhi, 2003.

REFERENCES BOOKS:

1. Sharma.S.K and Kaul.B.K, "Building Construction", S.Chand and Co., New Delhi , 1987.
2. Sushil Kumar., "Building Construction", Standard Publishers distributors, New Delhi, 1998.

09CE71 TRANSPORTATION ENGINEERING II

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES

To impart the engineering concepts in railways, airport and harbour.

OUTCOME:

On completion of the course, the student will be accomplished with the engineering knowledge in railways, airport and harbour.

RAILWAYS

Comparison of railway and highway transport – organization of Indian railways – Railway board – Zonal railways, different production units, undertakings, organizations, divisions- railway terminology – Permanent way – Gauges – Railway Track cross section – coning of wheels – Rails – Sections – Length – failures, wear on rails – Long Welded Rails - Rail joints – Creep – effects- remedies – Sleepers – Track fitting and fastenings –Ballast – Sub grade and Embankment – Track alignment- Surveys. (9)

Gradients – speed, degree of curves, super elevation and cant deficiency – Negative super elevation- Curves – points and crossings – necessity –Turnouts – Switches – types of switches crossing – components, types – Sleeper at points and crossings. (9)

Stations and yards – requirements, classification, layout of station – Platform – Loops, siding and level crossing – Loco sheds – Derailing switches, Fouling marks, Butter stop – Sand hump – Signalling – Object engineering principles – classification and types – interlocking of signals and points. (9)

AIRPORT

Role of ICAO, FAA, DGCA and AAI – Aircraft characteristics – Airport site selection – Surveys – Drawings – Orientation of Runway, windrose diagram – ICAO classification of Airports – Runway geometrics – corrections for length – Taxiway geometrics – Layout of airports, Apron, Hangar – Airport markings and Lightings – Air traffic control – ILS. (9)

HARBOUR

Definitions: Harbour, port, marine terminal, offshore mooring, anchorage area, turning basin, length, beam, draft, load line, dead weight

B. GEOLOGY LABORATORY

OBJECTIVES:

The knowledge about the identification of rocks and minerals are useful in deciding the type of foundation, soil and finding the availability of valuable natural resources.

identification and description of the following minerals with uses and distribution in India.

Quartz Group: Rock Crystal, Amethyst, Rose Quartz, Agate Flint and Jasper.

Felspar Group: Orthoclase, Microcline, Plagioclase.

Pyroxene Group: Augite, Hypersthene.

Amphibole Group: Hornblende

Mica Group: Muscovite, Biotite.

Carbonates: Calcite, Magnesite, Dolomite.

Miscellaneous minerals: Gypsum, Olivine, Corundum, Garnet, Talc, Asbestos, Chlorite.

Ore minerals: Haematite, Magnetite, Limonite, Chalcopyrite, Pyrite, Galena, Sphalerite, Malachite, Azurite.

Megascopic study of the following rocks with their composition, texture, structure, and Engineering importance.

Granite, Gabbro, Dunite, Porphyries, Pegmatite, Dolerite, basalt, Obsidian, Pumice, Conglomerate, Breccia, Sand stone, Lime stone, Shale, Slate, Laterite, Gneiss, Schist, Quartzite, Marble.

Interpretation of geological maps with horizontal inclined, folded and faulted strata, unconformity. Dip and Strike problems. Bore hole problem and their use at dam, reservoir and tunnel sites. Subsurface analysis. Interpretation of resistivity data to find depth to the water table, aquifer, thickness, water quality, depth of bedrock.

REFERENCE BOOKS

1. Sathya Narayanaswamy. B.S, Engineering Geology Laboratory Manual, LCSE – New Delhi.
2. Gurappa. K.M, Structural Geology Maps and Problems
3. Gohale. N.E, Manual of Geological map, CBS publishers, New Delhi, 1987.

09CE56 COMPUTER AIDED BUILDING DRAWING

ASSESSMENT: THEORY

L	T	P	C
2	0	4	4

OBJECTIVES:

To enable the students to develop manual and computer Aided Drafting skills for planning.

OUTCOME:

Students will be able to develop manual and computer Aided Drafting skills for planning.

DRAFTING TECHNIQUES

Architectural lines and pencils used - Architect's scales, templates, flexible rules, overlays, under lays - Architectural lettering - Layout of Architectural Drawing for presentation and submission. **(8 + 12)**

BASIC HOUSE DESIGN

Concept of one, one and half and two storey - Split level design. Study of Function, location, shape and size and planning of the following building areas.

- Living areas - living rooms, dining room entry way, foyer, patios and porches.
- Sleeping areas - bedrooms with and without attached toilets.
- Service areas - Kitchen, cabinets, Toilets, washing places, garages.
- Fixing the size of doors, windows and sunshades. **(8 + 12)**

PREPARATION OF DRAWINGS

Detailed drawings of floor plans, elevations and sections to show various features in a building.

Preparation of plot plans with a study of property lines - location of building on the site - Landscape plot plans with topo sketches (contour maps) **(7 + 11)**

PREPARATION OF WORKING DRAWINGS

Detailed drawings of different types of doors, windows with specifications.

Detailed layout design and drawing of different types of staircases. Detailed planning and drawing of electrification and Plumbing layout in buildings. **(7 + 10)**

Preparation and submission of building drawing using AutoCAD.

Total: 30+45 = 75

TEXT BOOK:

1. Shah.M.G, Kale.C.M and Patki.S.Y, "Building Drawing", Tata McGraw Hill Book Co., 2004

REFERENCES BOOKS:

1. Clois E.Kicklighter., "Architecture, Residential Drawing and Design", The Good Heart - Willcox Company Inc., 1986.
2. Donald E. Hepler and Paul I. Wallach., "Architecture, Drafting and Design", Tata McGraw Hill Book Co., New Delhi, 1967.

* **NOTE:** Final Examination will be of 4 Hrs. duration and evaluation will be done by two internal examiners. Continuous assessment pattern will be followed.

**09CE68 HIGHWAY ENGINEERING AND
GEOLOGY LABORATORY**

L	T	P	C
0	0	6	4

A. HIGHWAY ENGINEERING LABORATORY**OBJECTIVES:**

It is imperative to carryout tests on construction materials like aggregate and bitumen for the scientific designing and economic utilization. Different tests are carried out to know and classify the pavement materials into different groups depending upon their physical strength and stability characteristics.

1 TESTS ON COARSE AGGREGATE

- 1) Los Angeles Abrasion Test
- 2) Impact Test
- 3) Shape Test
- 4) Water Absorption Test.
- 5) Sieve Analysis Test

2 TESTS ON BITUMEN

- 1) Ductility Test
- 2) Viscosity Test
- 3) Softening Point Test
- 4) Penetration Test
- 5) Specific Gravity Test

REFERENCE BOOKS:

- 1) Highway Material Testing – S.K.Khanna & C.E.G. Justo, 2007.
- 2) Bureau of Indian Standard Code of Practice for Particle Size and Shape IS 2386 – Part I Specific gravity, Density, Voids, Adsorption and Bulking IS 2386 – Part III
Mechanical Properties IS 2386 – 1963 Part IV
Soundness IS 2386 -1963 Part V

**09CE67 STRENGTH OF MATERIALS
AND CONCRETE LAB**

L	T	P	C
0	0	6	4

ASSESSMENT: PRACTICAL

OBJECTIVES:

To study the properties of materials when subjected to different type of loading. Also to study fresh and hardened properties of concrete.

TESTS ON METALS

Tension, Shear, bending, and hardness tests on metal specimens and deflection test on spring.

TESTS ON TIMBER

Tension, Compression, bending, cleavage, hardness and impact tests on wooden specimens.

TESTS ON BRICK

Compression test on brick specimens – Water absorption – Efflorescence.

TESTS OF CONCRETE

Testing equipments - Concrete mixer - Needle vibrator - Table vibrator - Moulds - Proving ring – Jacks - Dial gauges.

Normal consistency and setting time of cement - Strength test for cement - Soundness test for cement -Workability tests - Slump test - Compacting factor test, Kelly ball test, Vee-bee consistometer test . Compression test on cube and cylinder - Split tension test on cylinder - Modulus of rupture of concrete.

REFERENCE BOOKS:

1. Rajput.R.K, "Strength of Materials", S.K Kataria and Sons, New Delhi, 2005.
2. Shetty.M.S, "Concrete Technology", S.Chand & Co, New Delhi, 2005.
3. I.S:516-1959, "Methods of Test for Strength of Concrete", Bureau of Indian Standards, New Delhi.
4. I.S: 3495 Part I to IV – 1976, "Methods of Test for Burnt Clay Building Bricks", Bureau of Indian Standards, New Delhi.
5. I.S:4031-1968, "Method of Physical Tests for Hydraulic Cement", Bureau of Indian Standards, New Delhi.

09CE61 STEEL STRUCTURES

L	T	P	C
3	1	0	4

ASSESSMENT: THEORY

OBJECTIVES:

The aim of this course is to impart knowledge in the design of steel structures.

OUTCOME:

Students will be able to design the steel structural elements in limit state method as per the current IS code.

BOLTED AND WELDED CONNECTIONS

Unstiffened and stiffened seated connections. **(6)**

COLUMNS:

Design of built-up compression members - Design of lacings and battens - Eccentrically loaded column - column splices - column bases for axial and eccentric loads. **(12)**

BEAMS:

Built-up Beams - beams with unrestrained compression flange. **(4)**

WELDED PLATE GIRDER

Design of Welded Plate girder - curtailment of flange - stiffeners and splices. **(7)**

INDUSTRIAL STRUCTURES AND ROOF TRUSSES

Requirements of industrial structures - Design of gantry girder. Analysis and design of single bay gable frame with Knee bent.

Types of roof trusses for different spans - Design of roof trusses for dead, live and wind loads - connections at the Supports - design of purlins. **(8)**

CHIMNEY

Design of a self supporting steel chimney – Chimney Base.**(8)**

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOKS:

1. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2008.
2. Bhavikatti.S.S. "Design of Steel Structures by Limit State Design", I.K International Pvt.Ltd., New Delhi, 2009.
3. Ramchandra, Virendra Gehlot, "Limit State Design of Steel Structures", Scientific Publishers, Jodhur, 2010.

REFERENCE BOOKS:

1. Arya and Ajmani., "Design of Steel Structures", Nemchand Bros, Roorkee, 1989.
2. Ramachandra., "Design of steel structures" - Vol.2, Standard Publishers Distributors, New Delhi, 2002.
3. Vazirani.V.N and Ratwani.N.M., "Steel Structures", Khanna Publishers, New Delhi, 1985.
4. Ramamrutham.S and Narayanan.R., "Design of Steel Structures", Dahanpat Rai & Sons, New Delhi,2003.
5. Krishnamachar B.S. and Ajitha Simha., "Design of Steel Structures", Tata McGraw Hill Publishing Company Ltd., New Delhi,1985.
6. IS 800-2007, Code of Practice for use of Structural Steel in General Building Construction, Bureau of Indian Standards, New Delhi.
7. I.S. 6533 - 1971 Code of Practice for Design and Construction of Steel Chimney, Bureau of Indian Standards, New Delhi., 1986.
8. SP6(6) ISI Hand Book for "Structural Engineers and Application of Plastic Theory in Design of Steel Structures", 1972.

TEXT BOOKS:

1. Krishnamurthy,D., "Structural Design and Drawing" Vol.II, CBS Publishers and Distributors, Delhi, 2008.
2. Krishnamurthy,D. "Structural Design and Drawing" Vol.III (Steel Structures), CBS Publishers & Distributors, New Delhi, 2008.

REFERENCE BOOKS:

1. Vazirani, V.N. and Ratwani.N.M, "Design of Steel Structures", Khanna Publishers, Delhi, 1985.
2. Krishnaraju N., "Structural Design and Drawing", Oxford University Press, 2004.

* **NOTE:** Final Examination is of 4 hours duration. Two questions will be asked from Part A and two questions from Part B, out of which students have to answer one question in each part. Continuous Assessment pattern will be followed.

09CE66 DESIGN AND DRAWING

ASSESSMENT: THEORY

L	T	P	C
2	0	4	4

OBJECTIVES

At the end of this course the student should be able to draw as well as understand the structural detailing of structures like slab, beam, staircase, retaining wall, watertank, foundation, plate girder, roof trusses, etc., This can be achieved by them by preparing the detailing manually.

OUTCOME

The student will be able to prepare and understand manually structural drawings like R.C Slabs, R.C Beams, R.C Columns, R.C Footings, R.C Stairs, Concrete retaining wall and concrete water tank. In steel he will understand grillage foundation, plate girders, columns, OHT and roof trusses. The student will gain the confidence in working out the quality of raw materials needed to be procured for fabrication the structures.

CONCRETE

Detailed design, drawing and bar bending schedule for the following concrete structures are to be prepared.

1. One way floor slab/two way floor slab
2. Continuous beams.
3. Columns with footing.
4. Dog legged staircase.
5. Cantilever retaining wall.
6. Counterfort retaining wall.
7. Rectangular and Circular water tanks with staging.
8. Frame Joint Detailing. **(15 + 23)**

STEEL

Detailed design and drawing of the following steel structures.

1. Plate girder (Welded)
2. Columns with lacings on gusseted base.
3. Roof truss
4. Chimney
5. Industrial bent
6. Grillage foundation **(15+22)**

Total : (30 + 45) = 75

09CE62 STRUCTURAL ANALYSIS II

L	T	P	C
3	1	0	4

ASSESSMENT: THEORY

OBJECTIVES:

At the end of the course the student should be able to understand the moment distribution methods, slope deflection methods, matrix flexibility and matrix stiffness method and basics of finite element method

OUTCOME:

The students will understand the concept of slope deflection, moment distribution, Matrix flexibility and Matrix stiffness method & the basics of finite element analysis.

SLOPE DEFLECTION METHOD

Application of slope deflection method to the analysis of statically indeterminate beams and rigid jointed plane frames - Effects of settlement of supports for beams only (Examples on structures having Kinematic indeterminacy not exceeding three) **(9)**

MOMENT DISTRIBUTION METHOD

Stiffness and carry over factors for prismatic and non prismatic members - Application of the method to the analysis of continuous beams and rigid jointed plane frames - effects of settlement of supports - Symmetric and skew symmetric loadings. **(9)**

MATRIX FLEXIBILITY METHOD

Element flexibility – Structure flexibility – Formulation of Structure flexibility matrix – Determination of forces / displacements – Application to simple determinate and indeterminate beams, frames and trusses. **(9)**

MATRIX STIFFNESS METHOD

Element stiffness – Structure stiffness – Formulation of Structure stiffness matrix – Application to simple determinate and indeterminate beams, frames and trusses. **(9)**

INTRODUCTION TO FINITE ELEMENT METHOD

Basic steps – Concept of an element – Various element shapes – Application of FEM – Limitations – Element stiffness matrix for one dimensional members – Procedure of assembly and solving equations (No problems) **(9)**

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOKS:

1. Gupta.S.P and Pandit.G.S, "Theory of Structures,Vol.I & II", Tata McGraw Hill, New Delhi, 2003.
2. Rajasekaran.S and Sankara subramanian. G., "Computational Structural Mechanics" Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. Bhavikatti.S.S, "Structural Analysis" Vol.I & II, Vikas Publishing House (P) Ltd., New Delhi, 2008.
2. Prakash Rao., D.S., "Structural Analysis", Universities Press, Hyderabad, 2001.
3. Armenakas.A.E., "Classical Structural Analysis" Mc-Graw Hill Book Co., New York, 1995.
4. Reddy.C.S, "Basic Structural Analysis", Tata Mc-Graw Hill, New Delhi, 2004.
5. Junnarkar and Shah., "Mechanics of Structures" Vol.II, Charotar Publishing House, Anand, 2005.
6. Punmia.B.C and A.K.Jain "Strength of Materials and Theory of Structures", Vol.II, Laxmi Publications, New Delhi, 2005.
7. Wang.C.K, "Intermediate Structural Analysis", Tata Mc-Graw Hill, New Delhi, 1983.
8. Krishnamoorthy C.S., Finite Element Analysis, Theory and Programming - Tata McGraw Hill Company, 2000.
9. Reddy.J.N., " An Introduction to the Finite Element Method", Tata McGrawHill Company, NewDelhi, 2005.

sand filtration units - Objectives and principles of disinfection - Chlorination and its methods – Principles, objectives, and operation of aeration, water softening, iron and manganese removal and fluoride removal. **(9)**

STORAGE AND DISTRIBUTION OF WATER

Necessity and classification of storage tanks - Ground level and elevated reservoirs - Balancing and distribution reservoirs- Location and assessment of capacity of distribution reservoir - Methods and systems of distribution of water - Objectives, requirements and functions of a distribution network-Application, merits and demerits of various types of distribution networks - Analysis and design of distribution network by equivalent pipe method and Hardy-Cross method of balancing – Maintenance and leak detection - Corrosion and its control - Langelier saturation index(LSI) - Appurtenances in distribution network and in buildings. **(9)**

Total : 45

TEXT BOOKS:

1. Garg S.K. "Environmental Engineering (Vol-I) Water Supply Engineering", Khanna Publishers, New Delhi, 1994.
2. Birdie G.S, "Water Supply and Sanitary Engineering",Dhanapat Rai Publications, New Delhi, 2000.

REFERENCE BOOKS

1. Raju , B.S.N , "Water Supply and Waste Water Engineering",Tata McGraw – Hill Co, New Delhi ,1995.
2. Duggal,K.N., "Elements of Environmental Engineering", S.CHand & Co, New Delhi, 2002.
3. Punmia B.C, Ashok Jain and Arun Jain, "Water Supply Engineering", Laxmi Publications - Pvt. Ltd., New Delhi, 2004.

09CE65 WATER SUPPLY ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

This course aims at exposing the students of Civil Engineering about the Water Quality and its perspectives in dwelling regions.

OUTCOME:

After undertaking this course, the students of Civil Engineering assimilate the basic knowledge pertaining to Water Quality and its perspectives.

WATER SUPPLY PERSPECTIVES

Objectives of public water supply scheme - Components of water supply project and scheme – Planning and financial aspects - Design period - Water quality parameters: physical, chemical, and biological - MTFT and MFT tests - MPN and Thomas formulae- Water analysis and drinking water standards of India - Population forecasts: short and long term methods - Water demands and variation in demand pattern- Fire demand and MUDM formulae. (9)

SOURCES OF WATER

Surface and ground water sources - Factors to be considered - Assessment of capacity of impounding reservoirs: Mass in-flow curve and analytical methods- Elementary ground water hydrology - Assessment of yield of wells by steady-state methods (no derivation) – Field testing of wells for the yield – Construction, development and sanitary protection of wells – Intake structures and their selection. (9)

TRANSMISSION OF WATER

Different categories of pipes used in transmission – Analysis and design of pressure pipes – Application of nomograms in the design - Pipe materials and their selection - Laying, jointing and testing of pipes – Pumping of water and selection of pumps – HP requirements and operating point of pumps – pumping station and its requirement – Various valves used in transmission. (9)

TREATMENT OF WATER

Unit operations and unit processes - Conventional and unconventional treatment units - Objectives, principles, operation , analysis and design of flash mixer, flocculator, sedimentation and rapid-

09CE63 FOUNDATION ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES

At the end of this course student acquires the capacity to investigate the soil condition and to design suitable foundation.

OUTCOME:

At the end of the course, students will have adequate knowledge to investigate the soil and design all types of shallow and pile foundations.

SOIL INVESTIGATION AND CHOICE OF FOUNDATION

Methods of Soil Exploration – Boring – Sampling – Disturbed and undisturbed Sampling – Sampling techniques – Bore log and soil investigation report – Function and requirements of good foundation – Choice of foundation based on soil conditions. (9)

BEARING CAPACITY AND SHALLOW FOUNDATIONS

Location and depth of foundations – Code provisions – Bearing capacity of shallow foundations on homogeneous deposit – Terzaghi's Theory – IS Code method – Field tests – Factors influencing Bearing Capacity – Settlement of foundations – Components of settlement – Allowable and maximum differential settlement – Proportioning of footing (No structural design) – Methods of improving bearing capacity – Methods of minimizing settlements. (9)

PILE FOUNDATIONS

Need for deep foundations -Types of piles - classification of piles – Load carrying capacity of piles in granular and cohesive soils –Static and Dynamic formulae – Pile carrying capacity by field tests - Pile load test – Group Capacity – Settlement of Pile groups – Negative skin friction. (9)

EARTH PRESSURE AND RETAINING WALLS

Earth pressure theory – Plastic equilibrium in soils – active and passive state – Rankine's theory – Coulomb's wedge theory – Earth pressure on retaining walls of simple configurations – Stability of retaining wall – Culmann's graphical method for determining earth pressure.(9)

FOUNDATIONS ON EXPANSIVE SOILS AND GROUND IMPROVEMENT METHODS

Shrinkage and expansion of clays – Identification of expansive soils – Measurement of swell and swell pressure – Principles of design of foundations in expansive soils – Ground improvement methods – Preloading – Soil replacement – Densification – Stabilization – Soil reinforcement. **(9)**

Total : 45

TEXT BOOKS:

1. Varghese P.C., “Foundation Engineering”, Prentice Hall of India, 2005.
2. Gopal Ranjan and Rao A.S.R., “Basic and Applied Soil Mechanics”, New age International (P) Ltd Publications, New Delhi, Second Edition, 2005.

REFERENCE BOOKS:

1. Venkataramaiah.C, “Geotechnical Engineering”, New Age International Ltd., New Delhi,2008.
2. Alam Singh., “Modern Geotechnical Engineering”, IBS Publications, New Delhi, 1987 .
3. Punmia.B.C., “Soil Mechanics and Foundation Engineering”, Laxmi Publications, New Delhi, Sixteenth Edition, 2005.
4. Braja M. Dass, “Principles of Foundation Engineering”, Thomson Brooks Gole, Singapore, 2005.

6. I.S.456 - 2000 Code of Practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi.
7. I.S.3370 (Part I) – 1965 (Reestablished :1999) – Code of Practice for Concrete Structures for the Storage of Liquids, Bureau of Indian Standards, New Delhi.
8. I.S.3370 (Part II) – 1965 (Reestablished :1999) – Code of practice for Concrete Structures for the Storage of Liquids, Bureau of Indian Standards, New Delhi.
9. I.S.3370 (Part III) – 1965 (Reestablished :1999) – Code of practice for Concrete Structures for the Storage of Liquids, Bureau of Indian Standards, New Delhi.
10. I.S.1343- 1980 (Reestablished :1999) – Code of practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi.
11. IRC:5 – 1998 – Standard Specification and Code of Practice for Road Bridges (SectionI), Bureau of Indian Standards, New Delhi.
12. IRC:6 – 1966 – Standard Specification and Code of Practice for Road Bridges (SectionII), Bureau of Indian Standards, New Delhi.
13. IRC:21 – 2000 – Standard Specification and Code of Practice for Road Bridges (SectionIII), Bureau of Indian Standards, New Delhi.

BRIDGES

Types of bridges - IRC loadings - design of single span slab bridges for class A (or) class AA loadings only - concept of skew slab bridge. (no problems) (5)

PRESTRESSED CONCRETE

Materials - principles of prestressing - different methods and systems - losses due to prestress (no - problems). IS code provisions - Analysis of stresses for rectangular section only. (7)

Theory : 45

Tutorial : 15

Total : 60

TEXT BOOKS:

1. Unnikrishna Pillai and Devados Menon, "Reinforced Concrete Design", Tata Mc Graw Hill Publishing Co, New Delhi, 2003.
2. Ashok K Jain, " Reinforced Concrete Limit State Design" ,New Chand Brothers, Roorkee, 2007.
3. Jain, O.P.and Jaikrishna "Plain and Reinforced Concrete Vol.I and Vol.II" Nemchand and Brothers, Roorkee, 2007.
4. Vazirani V.N. and Ratwani, N.M., "Concrete Structures", Khanna Publishers, New Delhi, 2004.

REFERENCES BOOKS:

1. Design aids for Reinforced Concrete to IS : 456 - 1978, Bureau of Indian Standards, New Delhi.
2. Reynolds.C.E., "Reinforced Concrete Designer's Handbook" Cement and Concrete Association, London, 2002.
3. Johnson Victor D., "Essentials of Bridge Engineering" Oxford and IBH Publishing Company, New Delhi, 2003.
4. Krishna Raju N., "Advanced Reinforced Concrete Design", CBS Publishers and Distributors, Delhi, 2003.
5. Syal I.C. and Goel A.K., "Reinforced Concrete Structures", Wheeler and Company, Private Limited, New Delhi, 1998.

09CE64 REINFORCED CONCRETE STRUCTURES – II

ASSESSMENT: THEORY

L	T	P	C
3	1	0	4

OBJECTIVES:

At the end of this course the student should be able to design rigid frames, retaining walls, water tanks, bridges and further understand the plastic theory of RCC and Pre stressed concrete.

OUTCOME:

Finally the student will understand the conceptual design of rigid frames for vertical and horizontal loading, retaining wall, water tank, bridges, plastic design concept and basics of prestressed concrete element.

YIELD LINE THEORY

Introduction to yield line theory of slabs - Application to square and rectangular slabs with simply supported or fixed boundary conditions subjected to uniformly distributed and central concentrated loads (by upper bound theorem). Concept of corner lever. (5)

BUILDING FRAMES

Difference between multistoreyed load bearing and framed structures - Elastic analysis using suitable substitute frames for gravity loadings - approximate analysis of single and two bay frames upto 3 storeys for wind loads using portal and cantilever methods. (6)

RETAINING WALLS

Design of cantilever and counterfort retaining walls for level surface filled with/without uniform surcharge - stability requirements – Description of inclined backfill (no problems) (8)

GROUND WATER TANK

Classifications - based on shapes, levels and functions - Principles of design - IS code provision - no tension basis - Design of underground rectangular tank. (8)

OVERHEAD WATER TANK

Design of overhead rectangular and circular tanks. Design of staging for rectangular tank. – Descriptions of Intz type tank (no problems) (6)

09CEE16 TOWN PLANNING AND ARCHITECTURE

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To introduce the fundamental of architecture, development plans and development control rules for the overall development of a city in a scientific and systematic way.

OUTCOME:

The student will understand the various elements of architecture principles of orientation, development plans, planning regulations and development control rules.

ELEMENTS OF ARCHITECTURE

Introduction of architecture - definition - Evaluation of geometric forms - function and history - Sphere, Cube, Pyramid, Cylinder and Cone - aesthetic qualities of Architecture - Proportion, Scale, Balance, Symmetry, Rhythm and axis - Contrast in Form - Harmony. (9)

PRINCIPLES OF ORIENTATION AND PLANNING OF BUILDINGS

Factors affecting orientation - Sun-Wind-Rain - Orientation criteria for Indian conditions - Principles governing the theory of planning - Planning of residential buildings. (9)

DEVELOPMENT PLAN

Principles of city planning - levels of planning- scope and contents of regional plan, master plan, detailed development plan and structure plan - preparation and implementation - planning of new towns - slum clearance and urban renewal. (9)

PLANNING LEGISLATION

Planning legislation and administration - review of planning legislation relating to city planning and housing in India - Tamil Nadu Town and Country planning Act, Tamil Nadu Housing Board Act, Tamil Nadu slum clearance and Improvement Act. (9)

DEVELOPMENT CONTROL RULES:

Zoning regulations - sub division regulations - building regulations - Floor Space Index - minimum plot sizes and building frontage - open spaces - minimum standard dimensions of building

COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University and Accredited by NBA)

Coimbatore - 641 014.

B.E. CIVIL ENGINEERING - Full Time

SUBJECTS OF STUDY

III Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE31	Mathematics III	3	1	0	4
09CE32	Mechanics of Solids I	3	1	0	4
09CE33	Mechanics of Fluids	3	1	0	4
09CE34	Surveying I	3	0	0	3
09CE35	Concrete Technology	3	0	0	3
09CE36	Engineering Geology	3	0	0	3
09CE49	Science of Creativity and Professional Ethics	2	-	-	-
Practicals					
09CE47	Survey Practical	-	-	-	-
09CE48	Fluid Mechanics and Machinery Laboratory	-	-	-	-
Total Credits					21

IV Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE41	Numerical Methods	3	0	0	3
09CE42	Mechanics of Solids II	3	1	0	4
09CE43	Applied Hydraulics & Hydraulic Machinery	3	1	0	4
09CE44	Surveying II	3	0	0	3
09CE45	Environmental Science and Engineering	3	0	0	3
09CE46	Basic Structural Design (Masonry, Timber and Steel)	3	1	0	4
09CE49	Science of Creativity and Professional Ethics	2	0	0	2
Practicals					
09CE47	Survey Practical	0	0	6	4
09CE48	Fluid Mechanics and Machinery Laboratory	0	0	6	4
Total Credits					31

V Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE51	Transportation Engineering I	3	0	0	3
09CE52	Structural Analysis I	3	1	0	4
09CE53	Mechanics of Soils	3	0	0	3
09CE54	Reinforced Concrete Structures I	3	1	0	4
09CE55	Construction Technology	3	0	0	3
09CE56	Computer Aided Building Drawing	2	0	4	4
Practicals					
09CE67	Strength of Materials and Concrete Lab	-	-	-	-
09CE68	Highway Engineering Lab & Geology Lab	-	-	-	-
09CE69	Mini Project	-	-	2	-
TotalCredits					21

ACTUATORS

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro rheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials. **(6)**

SIGNAL PROCESSING AND CONTROL SYSTEMS

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear. **(6)**

BIOMIMETICS

Characteristics of natural structures, Biomimetic structural design, Biomimetic sensing, Challenges and opportunities for Biomimetics, Chemical and biochemical sensing in structural assessment, Absorptive chemical sensors, Spectroscopes. **(6)**

Total : 45**TEXT BOOKS:**

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.
2. Srinivasan,A.V., and Michael McFarland.D., Smart Structures – Analysis and Design, Cambridge University Press, 2001.

REFERENCE BOOKS:

1. Brian Culshaw, “Smart Structures and Materials” , Artech House, Boston, 1996
2. Gandhi.M.V and Thompson.B.S,“Smart Materials and Structures”, Chapman and Hall, NewYork, 1992
3. Mel. M Schwartz, Encyclopedia of Smart Materials, John Wiley and Sons Inc. 2002

09 CEE 15 SMART MATERIALS AND STRUCTURES

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

This course is designed to give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

OUTCOME:

On completion of this subject, the students will have a clear idea of smart materials, their characteristics and their uses in structures.

INTRODUCTION

Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors. (4)

PROPERTIES OF MATERIALS

Piezoelectric Materials - Piezoelectric properties - Actuation of structural components - Shape Memory Alloys - Constitutive modeling of the shape memory effect - vibration control - Embedded actuators - Applications of shape memory alloys. (5)

ER AND MR FLUIDS

Electro rheological and magneto rheological fluids - Mechanisms and Properties - Applications of ER and MR fluids - Fiber Optics - Fiber characteristics - Fiber optic strain sensors - Applications of optical fibers. (6)

CONTROL OF STRUCTURES

Control modeling of structures - Control strategies and limitations - classification of control systems - Classical control - Modern control - Optimal control and Digital control - Active structures in practice. (6)

SENSORS

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.

Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement. (6)

VI Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE61	Steel Structures	3	1	0	4
09CE62	Structural Analysis II	3	1	0	4
09CE63	Foundation Engineering	3	0	0	3
09CE64	Reinforced Concrete Structures II	3	1	0	4
09CE65	Water Supply Engineering	3	0	0	3
09CE66	Design and Drawing	2	0	4	4
Practicals					
09CE67	Strength of Materials and Concrete Lab	0	0	6	4
09CE68	Highway Engineering Lab & Geology Lab	0	0	6	4
09CE69	Mini Project	0	0	2	2
Total Credits					32

VII Semester

Subject Code .	Subject	L	T	P	C
Theory					
09CE71	Transportation Engineering II	3	0	0	3
09CE72	Irrigation Engineering	3	0	0	3
09CE73	Sanitary Engineering	3	0	0	3
09CE74	Elective I	3	0	0	3
09CE75	Elective II	3	0	0	3
Practicals					
09CE86	Computer Applications Laboratory	-	-	-	-
09CE87	Environmental Engineering & Soil Mechanics Lab	-	-	-	-
09CE88	Project Work & Viva Voce	-	-	6	-
Total Credits					15

VIII Semester

Subject Code	Subject	L	T	P	C
Theory					
09CE81	Quantity Surveying & Valuation	2	0	3	4
09CE82	Construction Management	3	0	0	3
09CE83	Earthquake Resistant Design of Structures	3	0	0	3
09CE84	Elective III	3	0	0	3
09CE85	Elective IV	3	0	0	3
Practicals					
09CE86	Computer Applications Laboratory	0	0	6	4
09CE87	Environmental Engineering & Soil Mechanics Lab	0	0	6	4
09CE88	Project Work & Viva Voce	0	0	6	6
	Total Credits				30

POWER HOUSE PLANNING:

Surface power stations - Power House structure - Dimensions - Lighting and ventilations - Design variations - Under ground power stations - Location - Types - Advantages - Components - Layout types - Limitations - Environmental impact of Hydel power projects - Introduction to economic analysis of Hydro Power projects. **(9)**

Total : 45**TEXT BOOK:**

1. Dandekar.M.M and Sharma, K.N., "Water Power Engineering", Dandekar Vikas Publishing House Pvt Ltd., New Delhi, 1998.

REFERENCE BOOKS:

1. Creager.W.P and Justin .J.D, "Hydro Electric Hand Book", John Wiley Sons, London, 1981.
2. Desmukh.M.M "Water Power Engineering" , Dhanpat Rai Publications, New Delhi, 1977.

09CEE14 WATER POWER ENGINEERING

ASSESSMENT: THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

To make the students understand the various sustainable sources of hydraulic energy available for generation of power and the system for power generation.

OUTCOME:

The student will have knowledge about various types of hydel power generation facilities.

WATER POWER

Introduction - Sources of energy - Status of power in world - Hydro Power - Transmission voltages and Hydro power - Estimation of Water Power Potential. (4)

ELECTRICAL LOAD ON HYDRO TURBINES

General - Load curve - Load factor - capacity factor - Utilisation factor - Diversity factor - Load duration curve - Firm power - Secondary power - Prediction of load - Illustrative examples. (5)

HYDRO POWER PLANTS

Classification of hydel plants - Run-of-River Plants - General arrangements - Valley dam plants - Diversion canal plants - High head diversion plants - storage and pondages.

Pumped storage plants - Types - Advantage - two unit arrangement, Three unit arrangement - Reversible pump turbines - Problems in operation - Efficiency of pumped storage plants. (9)

WATER CONVEYANCE

Penstock - Types - Design criteria - Anchor Blocks - Valves, Bends and Manifolds - Intakes - Types - Losses - Aeration - Forebays - canals - Tunnels, - Water Hammer - Surge tanks. (9)

TIDAL POWER

Tidal Phenomenon - Tidal power - Basic principle - Location - Difficulties - Components - Modes of generation - Constructional aspects - Estimation of energy and power - Regulation of power output - Corrosion control and quality of concrete

B.E. / P.T.B.E. CIVIL ENGINEERING LIST OF ELECTIVE SUBJECTS

Subject Code .	Subject	L	T	P	C
Elective I					
09CEE01	Experimental Stress Analysis	3	0	0	3
09CEE02	Matrix Methods of Structural Analysis	3	0	0	3
09CEE03	Optimization in Civil Engineering	3	0	0	3
09CEE04	Analysis and Design Plated Structures	3	0	0	3
Elective II					
09CEE05	Advanced Concrete Design	3	0	0	3
09CEE06	Advanced Steel Design	3	0	0	3
09CEE07	Prestressed Concrete Structures	3	0	0	3
09CEE08	Rehabilitation of Structures	3	0	0	3
Elective III					
09CEE09	Industrial Waste Water Treatment and Disposal	3	0	0	3
09CEE10	Remote Sensing and GIS	3	0	0	3
09CEE11	Renewable Energy Resources	3	0	0	3
09CEE12	Hydraulic Structures	3	0	0	3
Elective IV					
09CEE13	Prefabricated and Industrial Structures	3	0	0	3
09CEE14	Water Power Engineering	3	0	0	3
09CEE15	Smart Materials and Structures	3	0	0	3
09CEE16	Town Planning & Architecture	3	0	0	3

L - Lecture T - Tutorial P - Practical C - Credit