B.Tech. Civil Engineering

SYLLABUS

CREDIT BASED CURRICULUM

(2012 - 2016)

DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI - 620 015, INDIA.

CURRICULUM

B. Tech. (CIVIL ENGINEERING)

The total minimum credits required for completing the B.Tech. Program in Civil Engineering is 178 (45 + 133).

SEMESTER III

Code	Course of Study	L	T	P	C
MA203	Probability, Statistics and Linear programming	3	0	0	3
CE201	Mechanics of Solids-I	2	1	0	3
CE203	Mechanics of Fluids - I	2	1	0	3
CE205	Surveying - I	3	0	0	3
CE207	Geotechnical Engineering - I	3	0	0	3
CE209	Concrete Technology	3	0	0	3
CE211	Building Planning and Drawing	0	0	3	2
CE213	Survey Lab I	0	0	3	2
CE215	Geotechnical Lab	0	0	3	2
	Total	**16**	**2**	**9**	**24**

SEMESTER IV

Code	Course of Study	L	T	P	C
MA204	Numerical Techniques	2	1	0	3
CE202	Mechanics of Solids-II	2	1	0	3
CE204	Mechanics of Fluids - II	3	0	0	3
CE206	Surveying - II	3	0	0	3
CE208	Geotechnical Engineering - II	3	0	0	3
CE210	Environmental Engineering - I	3	0	0	3
CE214	Survey Lab II	0	0	3	2
CE216	Strength of Materials Lab	0	0	3	2
	Total	**16**	**2**	**6**	**22**

SEMESTER V

Code	Course of Study	L	T	P	C
CE301	Environmental Engineering - II	2	0	2	3
CE303	Structural Analysis - I	2	1	0	3
CE305	Concrete Structures -I	3	0	2	4
CE307	Steel Structures - I	2	0	2	3
CE309	Hydraulic Machinery	3	0	0	3
CE311	Advanced Strength of Materials	3	0	0	3
CE313	Fluid Mechanics Lab	0	0	3	2
CE315	Environmental Engineering Lab	0	0	3	2
	Total	**15**	**1**	**12**	**23**

SEMESTER VI

Code	Course of Study	L	T	P	C
CE302	Structural Analysis - II	2	1	0	3
CE304	Transportation Engineering - I	2	1	0	3
CE306	Concrete Structures-II	3	0	2	4
CE308	Steel Structures - II	2	0	2	3
CE310	Water Resources Engineering	3	0	0	3
	Elective - 1	3	0	0	3
CE312	Computer Aided Design - I	0	0	3	2
CE314	Estimation, Costing and Valuation	0	0	3	2
	Total	**15**	**2**	**10**	**23**

SEMESTER VII

Code	Course of Study	L	T	P	C
CE401	Matrix Methods of Structural Analysis	2	1	0	3
CE403	Transportation Engineering - II	3	0	0	3
CE405	Irrigation and Hydraulic Structures	2	0	2	3
HM401	Industrial Economics	3	0	0	3
	Elective – 2	3	0	0	3
	Elective – 3	3	0	0	3
CE407	Computer Aided Design - II	0	0	3	2
CE447	Comprehensive Viva - Voce	0	0	6	3
	Total	**16**	**1**	**11**	**23**

SEMESTER VIII

Code	Course of Study	L	T	P	C
MB491	Management Concepts and Practices	3	0	0	3
CE402	Prestressed Concrete Structures	3	0	0	3
	Elective – 4	3	0	0	3
	Elective – 5	3	0	0	3
CE498	Project Work	0	0	12	6
	Total	**12**	**0**	**12**	**18**

ELECTIVES

Code	Course of Study	L	T	P	C
CE352	Groundwater Hydrology	3	0	0	3
CE451	Experimental Stress Analysis	3	0	0	3
CE452	Earthquake Resistant Structures	3	0	0	3
CE453	Remote Sensing and GIS	3	0	0	3
CE454	Advanced Foundation Engineering	3	0	0	3
CE455	Hydrology	3	0	0	3
CE456	Water Power Engineering	3	0	0	3
CE457	Structural Dynamics	3	0	0	3
CE458	Finite Element Method	3	0	0	3
CE459	Models for Air and Water Quality	3	0	0	3
CE460	Transportation planning	3	0	0	3
CE461	Pavement Analysis and Design	3	0	0	3
CE462	Advanced Surveying Techniques	3	0	0	3
CE463	Steel-Concrete Composite Structures	3	0	0	3
CE464	Geotechnical Earthquake Engineering	3	0	0	3
ME453	Industrial Safety	3	0	0	3
ME457	Computational Fluid Dynamics	3	0	0	3
AR451	Urban and Regional Planning	3	0	0	3
MA302	Operations Research Techniques in Civil Engineering	3	0	0	3
HM404	Creative writing through literature	3	0	0	3

SEMESTER III

MA203 PROBABILITY, STATISTICS AND LINEAR PROGRAMMING

Course objectives

- To understand the concepts of Probability, Statistics and Linear Programming which arise in engineering applications
- To study the defects arising in any of the engineering products
- To study the quality of the components purchased for the projects
- To study the optimization techniques for various problems
- To study the Transportation and Assignment problems

Course Content

Total, Compound, Marginal and conditional probability, Bayes' theorem - Binomial, Poisson and Normal distributions, Moment generating function, Characteristic function
Central Limit Theorem, Law of large numbers, Tests of significance, large and small samples, t- test, F-test and chi-square test for goodness of fit.
Estimation theory, ANOVA table and analysis, Multiple and partial correlation - Regression
Convex spaces, LPP statement, basic feasible solution, Graphical solution - Slack and surplus variables - Artificial variable technique - Charne's penalty method - Two phase method - Dual simplex method - Primal dual problems, Transportation and Assignment problems.
Integer programming - Gomory's cutting plane method - Branch and bound method

References

1. *Gupta. S.C. and Kapoor. V.K., Fundamentals of Mathematical Statistics, 7th Edition, Sultan Chand and Sons, 1980.*
2. *Kantiswarup, Gupta P.K. and Man Mohan, Operations Research, 11th Edition, Sultan Chand and Sons, 2003.*

Course outcomes

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

- apply the principles and techniques learnt in this course for solving the practical problems which arise in the industry
- use Estimation Theory and Regression Analysis to estimate the present condition from previous history in any real life situation
- apply LPP to Transportations problems which is essential for a Civil Engineer
- apply Probability in Reliability and life testing machine tools in Civil Engineering
- solve the Linear Programming problems for minimizing the project cost and maximizing its profit

CE201 MECHANICS OF SOLIDS – I

Course objectives:

- To learn about the concept of stress, strain and deformation of solid and state of stress

- To know the concepts of strain energy, principal stress and principal planes
- To learn the bending moment, shear force and the corresponding stress distribution for different types of beams
- To learn the analysis of plane truss, thin cylinders and shells
- To understand the theory of torsion and stresses in springs

Course Content

Tension, compression and shear stresses - Hooke's law - elastic constants - compound stresses - composite bars - thermal stresses.
Strain Energy due to axial force - Resilience - stresses due to impact and suddenly applied load - Principal stress and principal planes - Mohr's circle
Beams and support conditions -Types of supports and loads - shear force and bending moment - their diagrams for simply supported beams, cantilevers and overhanging beams. Theory of simple bending - Stress distribution at a cross section due to Bending Moment and Shear - strain energy.
Analysis of plane truss - Method of joints - Method of sections - Thin cylinders and shells.
Theory of torsion - Torsion of circular and hollow circular shafts and shear stresses due to torsion - closed and open coiled helical springs - leaf spring.

References

1. *Vazirani, V.N. and Ratwani, N.M., Strength of Materials, Vol I, Khanna Publishers, 1996.*
2. *Kazimi, Mechanics of Solids, Tata McGraw - Hill, 2004.*
3. *Timoshenko, S.P. and Gere, J.M., Mechanics of Materials, Tata McGraw Hill, 1992.*

Course outcomes:

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

- determine the strength parameters of the materials
- solve principal stress and principal plane problems
- apply various methods of analysis of plane truss
- determine shear force, bending moment, bending and shear stress distribution
- analyze members subjected to torsion

CE203 MECHANICS OF FLUIDS – I

Course objectives:

- To understand the properties of fluids and fluid statics
- To derive the equation of conservation of mass and its application
- To solve kinematic problems such as finding particle paths and stream lines
- To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems
- To analyze laminar and turbulent flows

Course Content

Continuum concept - CGS, MKS and SI systems - Properties of Fluids - Ideal and real fluid - Pressure at a point – pressure variation - pressure measurement

Hydrostatic forces on plane and curved surfaces - Buoyancy and equilibrium - Metacentric height and its determination-Types of flow - continuity equation for one, two and three dimensional flows - stream function and velocity potential - flow net and its properties
Convective and local acceleration - Pressure, Kinetic and Datum energy - Bernoulli's theorem and proof - Euler's equations of motion for a three dimensional flow and along a streamline - Deduction of Bernoulli's theorem - Momentum equation - applications.
Reynold's experiment - Laminar and turbulent flow - Reynold's number - critical flow - Navier-Stoke equations of motion - shear stress and pressure gradient - Laminar flow between parallel plates - Couette flow - Hagen Poiseuille equation for flow through circular pipes.
Turbulence - semi empirical theories –Major losses - Darcy-Weisbach equation for flow through circular pipe - Friction factor - Smooth and rough pipes - Moody diagram - flow through noncircular pipe - Minor losses - pipes in series and parallel - Equivalent length - Introduction to water hammer phenomena.

References

1. *Nagaratnam, S., Fluid Mechanics, Khanna Publishers, 1995.*
2. *Natarajan, M.K. Principles of Fluid Mechanics, Oxford & IBH Publishing Co, 1994.*
3. *Jagdish Lal, Hydraulics and Fluid Mechanics, Tata McGraw Hill, 2001.*
4. *Streeter V.L., Fluid mechanics, Tata McGraw Hill, 1998.*

Course outcomes:

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

- determine the properties of fluid and pressure and their measurement
- compute forces on immersed plane and curved plates
- apply continuity equation and energy equation in solving problems on flow through conduits
- compute the frictional loss in laminar and turbulent flows
- analyse flow between reservoirs

CE205 SURVEYING - I

Course objectives:

- To understand the importance of surveying in the field of civil engineering
- To study the basics of linear/angular measurement methods like chain surveying, compass surveying
- To study the significance of plane table surveying in plan making
- To know the basics of levelling and theodolite survey in elevation and angular measurements
- To understand tacheometric surveying in distance and height measurements

Course Content

Introduction and Principles of surveying – Classification – Brief introduction to chain surveying – Chaining and ranging - Compass surveying – Prismatic compass only – Instruments – Bearing of survey lines – systems and conversions – Local attraction – Latitude and departure – Traversing – Traverse adjustment of closing errors.

Plane Table surveying – instruments and accessories – advantages and disadvantages of plane table surveying – methods – radiation, intersection, traversing, resection – Two and three point problems – errors in plane table surveying.
Levelling – Definitions – Levelling instruments – Temporary and permanent adjustments – Booking – Reduction to levels – Correction for Curvature and refraction – Classification of leveling – Profile Levelling – Differential levelling – Reciprocal levelling – longitudinal and cross sectioning - Contours – Contour interval – Methods of contouring – uses.
Theodolite surveying – Vernier theodolite – Temporary and permanent adjustments – Measurement of horizontal and vertical angles – Methods of repetition and reiteration – errors in theodolite surveying – elimination of errors - Area and volume computation – area from latitude and departure – Simpson's rule and Trapezoidal rule.
Tacheometric surveying – Principles – Methods – Stadia system –Fixed and Movable hair methods – Methods with staff held vertical and normal – Analytic lens – Subtense bar – Tangential method.

References

1. *Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004.*
2. *Punmia, B.C. Surveying Vol.I and II, Standard Publishers, 1994.*
3. *Arora, K. R. Surveying Vol. I and II, Standard Book House, 1996*

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Course outcomes:

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

- carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering
- plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse
- use various conventional instruments involved in surveying with respect to utility and precision
- plan a survey for applications such as road alignment and height of the building
- undertake measurement and plotting in civil engineering

CE207 GEOTECHNICAL ENGINEERING - I

Course objectives:

- To explain what Geotechnical Engineering is and how it is important to civil engineering
- To explain how three phase system is used in soil and how are soil properties estimated using three phase system
- To explain role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated
- To determine shear parameters and stress changes in soil due to foundation loads
- To estimate the magnitude and time-rate of settlement due to consolidation

Course Content

Historical development of Soil Engineering - Origin and general types of soils - soil structure, clay minerals-Three phase system- Identification and Classification of soils

Soil water - capillary phenomena - concept of effective and neutral stresses - Permeability - determination of coefficient of permeability in the laboratory - Seepage flow - Head, gradient, pressure - steady state flow - two dimensional - flow net.
Vertical stress distribution in soil - Boussinesq and Westergaard's equation - Newmark's influence chart - principle, construction and use - Equivalent point load and other approximate methods - pressure bulb. Compaction
Shear strength - Mohr-Coulomb failure criterion - shear strength tests - Different drainage conditions - Shear properties of cohesionless and cohesive soils - Use of Mohr's circle - relationship between principal stresses and shear parameters.
Compressibility and consolidation - Terzaghi's one dimensional consolidation theory - pressure void ratio relationship - preconsolidation pressure - Total settlement and time rate of settlement - coefficient of consolidation - curve fitting methods - Correction for construction time.

References

1. *Gopal Ranjan and Rao, P. Basic and Applied Soil Mechanics, New Age International Pvt. Limited, New Delhi, 2002.*
2. *Murthy, V.N.S., A text book of Soil Mechanics and Foundation Engineering, UBS Publishers Distributors Ltd., New Delhi, 1999*
3. *Punmia, B.C. Soil Mechanics and Foundation Engineering, Laxmi Publications Pvt. Ltd., New Delhi, 1995.*
4. *Braja M. Das, Fundamentals of Geotechnical Engineering, Thomson Asia Pvt. Ltd., Singapore, 2005.*

Course outcomes:

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

- carry out soil classification
- solve three phase system problems
- solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram
- estimate the stresses under any system of foundation loads
- solve practical problems related to consolidation settlement and time rate of settlement

CE209 CONCRETE TECHNOLOGY

Course objectives:

- To understand the properties of ingredients of concrete
- To study the behavior of concrete at its fresh and hardened state
- To study about the concrete design mix
- To know about the procedures in concreting
- To understand special concrete and their use

Course Content

Introduction - Concrete materials - Cement: Physical tests on cement - Concrete materials - Tests on aggregates - Quality of Water for mixing and curing - use of sea water for mixing concrete

Mix Design - factors influencing mix proportion - Mix design by ACI method and I.S. code method - Design of high strength concrete.
Admixtures - accelerating admixtures - Retarding admixtures - water reducing admixtures - Air entraining admixtures - coloring agent - Plasticizers. Batching - Mixing -Transportation - Placing of concrete - curing of Concrete
Strength of Concrete - Shrinkage and temperature effects - creep of concrete - permeability of concrete - durability of concrete - Corrosion - Causes and effects - remedial measures- Thermal properties of concrete - Micro cracking of concrete.
Special Concrete - light weight concrete - Fibre reinforced concrete - Polymer-polymer modified concrete - Ferrocement - Mass concrete - Ready mix concrete- Self compacting concrete- Quality control - Sampling and testing-Acceptance criteria

References

1. *Shetty, M.S., Concrete Technology, Theory & Practice, S.Chand and Co, 2004.*
2. *Gambhir, M.L., Concrete Technology, Tata McGraw Hill, 2004.*
3. *Nevile, Properties of Concrete, Longman Publishers, 2004.*
4. *Santakumar A.R., Concrete Technology, Oxford University Press, New Delhi, 2007.*

Course outcomes:

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

- test all the concrete materials as per IS code
- design the concrete mix using ACI and IS code methods
- determine the properties of fresh and hardened of concrete
- design special concretes and their specific applications
- ensure quality control while testing/ sampling and acceptance criteria

CE211 BUILDING PLANNING AND DRAWING

Course objectives:

- To understand the principles of planning and bylaws
- To draw plan, elevation and section of load bearing and framed structures
- To draw plan, elevation and section of public and industrial structures
- To prepare detailed working drawing for doors, windows, etc.

Course Content

Classification of buildings - Principles of planning - Dimensions of buildings - Building bye-laws for floor area ratio, open spaces - Orientation of buildings - Lighting and Ventilation- Planning and preparing sketches and working drawings of Residential buildings (Flat and sloping roof), Schools, Hostels, Hospitals, Single-storey factory buildings with trusses. Detailed working drawings of the component parts - Doors and Windows - Roof Trusses - Staircases-Toilets

References

1. *Shah M.G. Kalec. M. & Patki SY Building Drawing, Tata Mcgraw Hill, New Delhi, 2000*

Course outcomes:

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

- apply the principles of planning and bylaws used for building planning
- draw plan, elevation and section for various structures

CE213 SURVEY LAB – I

Course objective:

The Lab sessions would include experiments on

- Chain Surveying
- Chain Traverse
- Compass Surveying
- Compass surveying Traversion
- Plane Table Surveying – Radiation, intersection, Traverse, Resection Leveling

Course Content

1. Chain surveying
2. Chain traverse
3. Compass surveying
4. Compass traverse-open and close traverse
5. Plane table surveying
6. Leveling: Fly leveling and contouring
7. Radiation, intersection-Traverse- Resection

Course outcomes:

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

- use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling
- apply the procedures involved in field work and to work as a surveying team
- plan a survey appropriately with the skill to understand the surroundings
- take accurate measurements, field booking, plotting and adjustment of errors can be understood
- plot traverses / sides of building and determine the location of points present on field on a piece of paper

CE215 GEOTECHNICAL LAB

Course objectives:

- To estimate index properties of soils (coarse and fine)
- To estimate consistency limit of fine grained soils
- To estimate shear strength of soils by direct shear test, triaxial shear test, vane shear test & unconfined compressive test

- To estimate the engineering properties of the soils by density test, CBR test permeability test and consolidation test

Course Content

1. Grain Size analysis
2. Consistency limits
3. Specific gravity
4. Permeability tests
5. Unconfined compression test
6. Direct shear test
7. Core cutter and sand replacement
8. Compaction test
9. California bearing ratio test
10. Vane shear test
11. Triaxial test
12. Consolidation test

Course outcomes:

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

- classify soil by physical observation of the soils
- classify soil based on estimated index and engineering characteristics of soils
- carry out interpolation among the estimated soil design parameters

SEMESTER IV

MA202 NUMERICAL TECHNIQUES

Course objectives:

- To study various numerical techniques
- To study the behavior of the solution of linear/non-linear differential equations
- To study the solution of heat conduction/ wave equation numerically
- To find approximate solutions with minimum error
- To learn algorithms for computers to solve problems in math, science and engineering

Course Content

Solution of linear system - Gaussian elimination and Gauss-Jordan methods - LV decomposition methods - Crout's method - Jacobi and Gauss-Seidel iterative methods sufficient conditions for convergence - Power method to find the dominant eigenvalue and eigenvector
Solution of nonlinear equation - Bisection method - Secant method - Regula falsi method - Newton-Raphson method for f(x) = 0 and for f(x,y) = 0, g(x,y) = 0 - Order of convergence - Horner's method - Graeffe's method - Bairstow's method.
Newton's forward backward and divided difference interpolation - Lagrange's interpolation - Numerical Differentiation and Integration - Trapezoidal rule - Simpson's 1/3 and 3/8 rules - Curve fitting - Method of least squares and group averages.
Numerical Solution of Ordinary Differential Equations- Euler's method - Euler's modified method -

Taylor's method and Runge-Kutta method for simultaneous equations and 2nd order equations - Multistep methods - Milne's and Adams' methods.
Numerical solution of Laplace equation and Poisson equation by Liebmann's method solution of one dimensional heat flow equation - Bender - Schmidt recurrence relation Crank - Nicolson method - Solution of one dimensional wave equation.

References

1. *Gerald, CF., and Wheatley, P.O., Applied Numerical Analysis, Mis. Addison Wesley, 1989.*
2. *Jain, MK., Iyengar,S.R.,and Jain,R.K., Numerical Methods for Scientific and Engineering Computation, Wiley Eastern, 1991.*
3. *Kandasamy, P.Thilagavathy, K., and Gunavathy,S., Numerical Methods, Chand and Co., 1997.*

Course outcomes:

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

- solve linear and non-linear equations using numerical techniques
- solve linear and non-linear differential equations using numerical techniques
- solve a system of equations using the techniques studied

CE202 MECHANICS OF SOLIDS – II

Course objectives:

- To understand the concept of Principle of virtual work
- To study the different methods of finding deflection of beam
- To analyze the Indeterminate beams subjected to various loading
- To study the different methods to find the deflection of truss
- To analyze the column with different end conditions and stress in thick cylinders

Course Content

Principle of virtual displacement and virtual forces - Castigliano's first theorem - Maxwell's reciprocal theorem. Determination of deflection curve of beams- double integration - Macaulay's method - Area moment method - Conjugate beam method - strain energy and dummy unit load approaches to deflection of Simple and Curved members. Statically indeterminate Structures - Propped cantilever, fixed and continuous beams - Theorem of three moments - Bending moment and shear force diagrams
Thick cylinders - Lame's equation - Shrink fit - compound cylinders.
Deflection of trusses - Dummy unit load method - Strain energy method - Williot Mohr's diagram
Theory of columns: Axial load- Euler's theory-Rankines formula, combined bending and axial load

References

1. *Vazirani,V.N. and Ratwani, N.M. Strength of Materials, Vol. II, Kanna Publishers, 1996.*
2. *Timoshenko, S.P. and Gere, J.M. Mechanics of Materials, Tata McGraw Hill, 1992*
3. *Rajput R.K., Strength of Materials, S. Chand & Co., Ltd., 1996.*

Course outcomes:

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

- apply the principle of virtual work
- determine deflection of a beam for various loading conditions
- apply unit load method to find the deflection of truss
- determine different stresses developed in thick cylinders
- visualize the behavior of column for combined bending and axial loading

CE204 MECHANICS OF FLUIDS - II

Course objectives:

- To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows
- To study about non uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump
- To develop an understanding of fluid flow patterns and learns to use boundary layer theory and drag
- To provide insights to the open channel hydraulics and introduce dimensional analysis for fluid flow problems
- To study in detail about boundary layers theory

Course Content

Ideal fluid flow- Uniform flow- source - sink- doublet - combination of flow patterns - uniform flow and source- flow around cylinder - flow with circulation - lift. Boundary layer - displacement and momentum thickness - development of flow in circular pipes - Von Karman momentum equation - Laminar and turbulent boundary layers on flat plates - Drag in flat plates, cylinders and spheres - Drag coefficients - Boundary layer control.
Open Channel Flow - Classification - Terminology - velocity distribution in open channels - Chezy, Manning and other formulae - Best hydraulic section - specific energy - specific force - hydraulic jump and its characteristics - Gradually varied flow - computation of surface profiles. Velocity measurement with Pitot tube, Prandtl Pitot tube and current meter - discharge measurement in pipe flow - venturimeter, mouthpiece, orificemeter, nozzlemeter, bendmeter and rotameter - discharge measurement in open channel flow - All types of notches and weirs, venturiflume - critical depth meter - basic principles. Introduction to CFD- Dimensional homogeneity - dimensional analysis - Rayleigh`s method - Buckingham Pi theorem - applications - significance of dimensionless numbers - Model study and similitude - scale effect and distorted models .

References

1. *Streeter, V.L. Fluid Mechanics, Tata McGraw Hill, 1998.*
2. *Chow, V.T. Open Channel Hydraulics, Tata McGraw Hill, 1975.*
3. *Nagaratnam, S. Fluid Mechanics, Khanna Publishers, 1989.*

Course outcomes:

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

- visualize fluid flow phenomena observed in Civil Engineering systems such as flow in a pipe, flow measurement through orifices, mouth pieces, notches and weirs

- analyze fluid flows in open channel hydraulics and devices such as weirs and flumes
- apply dimensional analysis and the concept of CFD
- design open channels for most economical sections like rectangular, trapezoidal and circular sections
- measure velocity through instruments in open channel and pipe flow

CE206 SURVEYING – II

Course objectives:

- To understand the basics and elements of different types of curves on roads and their preliminary survey
- To learn about surveying applications in setting out of curves, buildings, culverts and tunnels
- To get introduced to different geodetic methods of survey such as triangulation, trigonometric leveling
- To learn about errors in measurements and their adjustments in a traverse
- To get introduced to modern advanced surveying techniques involved such as Remote sensing, Total station, GPS, Photogrammetry etc.

Course Content

Curve setting – Horizontal curves - Elements of simple and compound curves – Methods of setting out – Reverse curve – Transition curve – Length of curve – Elements of cubic parabola, true spiral and cubic spiral – Vertical curve – parabola – Setting out of buildings – culverts – tunnels.
Triangulation – different networks – orders and accuracies – intervisibility and height of stations – signals and towers – Baseline measurement – instruments and accessories – tape corrections – extension of baseline – satellite stations – Reduction to centre.
Trignometrical levelling – Observations for heights and distances – Geodetic observations – Corrections for refraction, curvature, axis signal – Reciprocal observations.
Errors – Types of errors – Theory of least squares – weighted observations – most probable value – computations of indirectly observed quantities – method of normal equations – conditioned quantities, method of correlates, method of differences – adjustment of simple triangle and quadrilateral network without central station.
Electromagnetic distance measurement (EDM) – Principle – Types – Total station - Photogrammetry – Terrestrial and Aerial photographs – Photo interpretation – Stereoscopy - Remote Sensing – Principle – Idealized remote sensing system – Types – applications - Introduction to GPS – Segments – Principle of working – application.

References

1. *Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004.*
2. *Punmia, B.C. Surveying Vol.I and II, Standard Publishers, 1994.*
3. *Arora, K. R. Surveying Vol. I and II, Standard Book House, 1996.*
4. *Satheesh Gopi. Advanced Surveying, Pearson Education, 2007.*
5. *Satheesh Gopi. The Global Positioning System and Surveying using GPS, Tata McGraw, 2005.*

Course outcomes:

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

- set out curves, buildings, culverts and tunnels
- carry out a geodetic survey, taking accurate measurements using instruments and adjusting the traverse

- apply mathematical adjustment of accidental errors involved in surveying measurements
- plan a survey for applications such as road alignment and height of the building
- invoke advanced surveying techniques over conventional methods in the field of civil engineering

CE208 GEOTECHNICAL ENGINEERING – II

Course objectives:

- To emphasize the importance of soil investigations including destructive and nondestructive methods
- To explain how earth pressure theory is important in retaining structure design
- To explain the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation system including settlement consideration
- To explain how do select a suitable shallow foundation system for various site conditions and also analysis of different foundation system
- To explain in what circumstances pile is needed and how do analysis the pile and pile group under various soil conditions

Course Content

Soil exploration - Planning - Augur boring - Soundings - Sampling - Plate load test, static and dynamic penetrations tests - geophysical explorations - Lateral Earth Pressure - Plastic equilibrium - Rankine's theory - Active and passive earth pressure for cohesionless and cohesive soils - Earth pressure at rest - Coloumb's wedge theory - Rebhann's and Culmann's graphical solutions, Stability analysis
Foundation - functions and requisites- Different types - choice of foundation type – general principles of design. Bearing capacity - types of failures - Prandtl's and Terzaghi's bearing capacity analysis - Bearing capacity based on settlement and building codes
Shallow foundation - spread footings - combined footings - trapezoidal and strap footings - Raft foundation - Contact pressure distribution - settlement analysis - Types of settlement, control
Deep foundation - piles - types - load carrying capacity of pile - static and dynamic formula - pile load test - penetration test - pile groups - Efficiency - Feld's rule - Converse Labarre formula, Settlement of piles and pile groups - Negative skin friction - under reamed piles

References

1. *Murthy, V.N.S, A text book of Soil Mechanics and Foundation Engineering, UBS Publishers & Distributors Pvt. Ltd., New Delhi 1999.*
2. *Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publications Pvt. Ltd., New Delhi, 1995.*
3. *Gopal Ranjan and Rao, Basic and Applied Soil Mechanics, New Age International (P) Limited, New Delhi, 2002.*
4. *Braja M. Das, Principles of Foundation Engineering, Thomson Asia Pvt. Ltd., Singapore, 2005.*

Course outcomes:

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

- carry out soil investigation for any civil engineering construction
- analyse earth retaining structures for any kind of soil medium

- estimate bearing capacity using IS code methods
- design proper foundations for any kind of shallow foundation system
- estimate pile and pile group capacity for any kind of soil including group efficiency and negative friction

CE210 ENVIRONMENTAL ENGINEERING - I

Course objectives:

- To make the students conversant with sources and its demand of water
- To understand the basic characteristics of water and its determination
- To expose the students to understand the design of water supply lines
- To provide adequate knowledge about the water treatment processes and its design
- To have adequate knowledge on operation and maintenance of water supply

Course Content

Physical, chemical and biological characteristics of water - water analysis- IS and WHO standards- Requirements of water supply - Types of demand and their contribution - rate of consumption - Forecasting the population- variation in demand pattern.
Sources of water - quantitative and qualitative studies. Intakes - Channels and pipes for conveying water -- Pipes- hydraulic design of pressure pipe- Materials - laying- joining- testing - pipe appurtenances- Pumps and pumping stations
Treatment plants - process of treatments - mixing, aeration, sedimentation, coagulation, filtration, disinfection, softening - advanced water treatment. Distribution systems - analysis of distribution networks
Operation and maintenance of water supply to buildings - Rural water supply - Protected water supply - Saline water intrusion.

Note: Assignments include the drawings of various water treatment units.

References

1. *Manual on Water supply and Treatment - CPHEEO, 1999*
2. *Birdie, G.S. and Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1992.*
3. *Duggal, K.N. Elements of Environmental Engineering, S.Chand & Co, 2002.*
4. *Punmia B.C, Ashok Jain & Arun Jain, Water Supply Engineering, Laxmi Publications, Pvt. Ltd., New Delhi, 2004.*

Course outcomes:

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

- identify the source of water and water demand
- apply the water treatment concept and methods
- apply water distribution processes and operation and maintenance of water supply
- prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data

CE214 SURVEY LAB – II

Course objectives:

The Lab sessions would include extensive experiments on

- Theodolite survey
- Trignometric leveling to determine heights/elevations
- Tacheometry
- Setting of curves

Course Content

1. Theodolite surveying
2. Single plane observation of trignometrical leveling
3. Two plane method
4. Determination of Tacheometric Constants
5. Tangential Tacheometry
6. Subtense Bar
7. Setting out of curves, Buildings layout.
8. Total station

Course outcomes:

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

- use the theodolite along with chain/tape, compass on the field
- apply geometric and trigonometric principles of basic surveying calculations
- plan a survey, taking accurate measurements, field booking, plotting and adjustment of errors
- apply field procedures in basic types of surveys, as part of a surveying team
- employ drawing techniques in the development of a topographic map

CE216 STRENGTH OF MATERIALS LAB

Course objectives:

- To find the Young Modulus, torsional strength, hardness and tensile strength of given specimens
- To find impact value and crushing value of coarse aggregates
- To find the compressive strength of concrete cubes and bricks
- To find stiffness of open coiled and closed coiled springs
- To find the physical properties of given coarse aggregate, fine aggregate and cement samples

Course Content

1. Test on springs
2. Deflection test
3. Torsion test
4. Tension test

5. Hardness test
6. Tests on brick
7. Tests on cement
8. Tests on concrete
9. Tests on aggregate
10. Tests on bitumen

Course outcomes:

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

- evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens
- determine the strength of coarse aggregates
- find the compressive strength of concrete cubes and bricks
- find stiffness of open coiled and closed coiled springs
- determine the physical properties of given coarse aggregates, fine aggregates and cement samples

SEMESTER V

CE301 ENVIRONMENTAL ENGINEERING – II

Course objectives:

- To learn the basics of sewage composition and its characteristics
- To depict the information about various sewage treatment processes
- To provide the adequate information on various disposal standards for industrial effluents
- To study the information about air pollution and its effects
- To understand the knowledge about solid waste generation and disposal methods

Course Content

Characteristics and composition of sewage-sampling-analysis- population equivalent - drainage in buildings-plumbing systems for drainage
Primary treatment- Secondary treatment- biokinetics- Lagooning- sludge digestion-Tertiary treatment
Disposal standards- self purification of rivers- Streeter Phelps equation - oxygen sag curve
Toxic and hazardous wastes - equalization and neutralization- biological degradation- recycle and reuse of waste effluents- treatment of industrial wastes- Dairy, Tannery, Petrochemical, Fertilizer, textiles, Pulp and paper
Air pollution-effects- stack emission- automobile exhaust - control devices-solid waste Management - EIA.

Note: Assignments include the designs and drawings of various wastewater treatment units.

References

1. *Duggal, K.N., Elements of Environmental Engineering, S.Chand and Co., New Delhi, 2002.*
2. *Birdie, G.S. and Birdie, J.S., Water Supply and Sanitary Engineering, Dhanpat Rai and Sons, New Delhi, 1992.*
3. *Metcalf and Eddy, Waste Water Engineering, Collection, Treatment and Disposal, Tata McGraw Hill, Inc., New York, 2005.*
4. *Manual of Sewage and Sewage Treatment - CPHEEO, 1999.*

Course outcomes:

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

- determine the sewage characteristics and design various sewage treatment plants
- analyze the status of surface water and ground water quality and the remediation technologies
- carry out municipal water and wastewater treatment system design and operation
- manage hazardous wastes, risk assessment and treatment technologies
- apply environmental treatment technologies and design processes

CE303 STRUCTURAL ANALYSIS – I

Course objectives:

- To understand the concept of analysis of indeterminate structures by various classical methods
- To study the use of ILD for determinate structure
- To learn the concepts of moving loads and its effect on structures
- To understand the concept of equivalent UDL
- To study the reversal of stress under live load

Course Content

Slope deflection method - analysis of indeterminate structures- Settlement.
Moment distribution method - analysis of indeterminate structures - settlement of supports - sway.
Energy methods - Kani's method - analysis of indeterminate structures - settlement of supports - sway.
Moving loads for statically determinate structures -single load - two point loads - several points loads - maximum bending moment and maximum shear force - equivalent u.d.l. - absolute maximum bending moment.
Enveloping curves for maximum bending moment and maximum shear force and determination of equivalent UDL, ILD for shear, moment and reactions for statically determinate beams and pinjointed trusses - Reversal of stresses under live load.

References

1. *Jindal. R.L, Indeterminate Structures, Chan Tea, New Delhi, 2000*
2. *Punmia B.C., Theory of Structures, Standard Book House, New Delhi, 2000*

Course outcomes:

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

- use various classical methods for analysis of indeterminate structures
- determine the effect of support settlements for indeterminate structures
- apply the concepts of ILD and moving loads on determinate structures
- apply the concept of equivalent UDL
- determine the reversal of stresses in trusses using ILD

CE305 CONCRETE STRUCTURES – I

Course objectives:

- To study the stress strain behavior of steel and concrete
- To understand the concept of working stress and limit state methods
- To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage
- To understand the behavior of columns subjected to eccentric load and use of interaction diagrams
- To study the design of various foundation

Course Content

Stress strain behavior of steel and concrete- Introduction to working stress method - permissible stresses. Limit state method-Limit states - Characteristic strength and load - Partial safety factor - Design of singly and doubly reinforced beams, T and L beams - Design for Shear and Torsion. Slabs - one way and two way slabs for different edge conditions - Yield line theory - Flat slab - continuous slabs - stair cases - different types. Columns - axially loaded and eccentrically loaded columns - Interaction Diagrams. Footings - isolated footings - square, rectangular and circular footings - Combined footing Pile and pile cap- Introduction to masonry structures.

Note: Assignments include the design and drawings of various R.C.C structural elements.

References

1. *Ashok, Kumar Jain, Reinforced Concrete Limit State Design, Nem Chand Brothers, 1990.*
2. *Sinha. S.N. Reinforced Concrete Design, Tata McGraw Hill, 2002.*
3. *Varghese, Limit state design of concrete, Oxford IBH, 2000.*
4. *IS456-2000 Code of practice for Plain and reinforced concrete code of practice.*

Course outcomes:

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

- apply the fundamental concepts of working stress method and limit state method
- use IS code of practice for the design of concrete elements
- design the beams, slab, stairs, column and footing
- draw various RCC structural elements
- design masonry structures

CE307 STEEL STRUCTURES-I

Course objectives:

- To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections
- To study the behaviour and design of compression and tension members using simple and built-up sections

- To understand behaviour of flexural members and the design laterally restrained and unrestrained beams
- To study the components of truss, loads on trusses, analysis and design of purlins and truss members
- To study the design of bolted and welded connections and arranging field visit to industries

Course Content

Introduction to steel structures and IS800-2007- Material specifications - Rolled sections – Section classifications - Permissible stresses in tension, compression, bending and shear.
Compression members - Slenderness ratio – Design - Simple and built- up sections - lacings and battens - Tension members.
Flexural members – Rolled sections - built-up beams - Design for strength and serviceability, web crippling, web yielding, bearing stiffeners.
Roof trusses - components - Loads - Design of purlins using channel and angle sections, and truss members - End connections at the supports.
Bolted connections - types of bolts - Resistance of bolted connections under various failure modes – design of beam splice, seated shear connections at the supports.
Welded connections - types - strength of welds - design of fillet and butt welds - shear and moment resistant joints - design and detailing of connections.

Note: Assignments include the design and drawings of various steel structural elements.

References

1. *Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi 2008.*
2. *Dayaratnam P, Design of Steel Structures, S. Chand & Co., New Delhi, 2003.*
3. *Arya, A.S and Ajmani, A.L., Design of Steel Structures, Nemchand and brothers, Roorkee, 1992..*
4. *Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain. Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., New Delhi 2000.*
5. *IS 800-2007, Code of practice for general construction in steel, Bureau of Indian Standards, New Delhi.*

Course outcomes:

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

- apply the IS code of practice for the design of steel structural elements
- design compression and tension members using simple and built-up sections
- calculate forces on the various members of the truss and design them
- analyze the behavior of bolted connections and design them
- design welded connections for both axial and eccentric forces

CE309 HYDRAULIC MACHINERY

Course objectives:

- To understand the application of momentum principle of impact of jets on plane and curved surfaces

- To study types of centrifugal Pumps, work done and efficiency of the different types centrifugal pumps and also study about performance of pumps & characteristic curves
- To study about specific speed and performance characteristics of different types of turbines
- To study about hydroelectric power plant and estimation of hydropower potential
- To explain the concept of positive displacement

Course Content

Principles of impingement of jets - Impact of jet on a stationary vertical plate, stationary inclined plate, stationary curved plate, hinged plate, moving vertical and inclined plates, moving curved plate and on series of moving flat and curved vanes fixed on the periphery of circular rim.
Turbines - classification- impulse turbines - Pelton wheel - Reaction turbines - Francis and Kaplan Turbines - draft tubes - Governing of a Francis turbine - Performance of turbines - specific speed and their significance.
Centrifugal pump - description and working - Head, discharge and efficiency of a centrifugal pump - pressure rise in the pump - minimum starting speed of a pump - cavitation - priming - multistage pumps - characteristic curves.
Reciprocating pump - Description and working - types - discharge and slip - power required to drive the pump - Indicator diagram - Air vessel - work done against friction with and without air vessels.
Working principle and use of the following hydraulic pumps and machines - Deep well pumps - submersible and jet pumps, special pumps - Gear pump - screw pump, sewage pump, miscellaneous machines - Hydraulic press - hydraulic accumulator - Hydraulic ram.

References

1. *Bansal, R.K., A text book of Fluid Mechanics and Hydraulic Machines, Laxmi Publications (P) Ltd., New Delhi, 2002.*
2. *Nagaratnam, S., Fluid Machines and Systems, Tata McGraw Hill, 1989.*
3. *Khurmi, R.S., Text Book of Hydraulics and Hydraulic Machine, S. Chand & Co, 2003.*

Course outcomes:

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

- calculate forces and work done by a jet on fixed or moving plate and curved plates
- apply the working principles of Impulse and Reaction turbines
- select the type of turbine required with reference to available head of water and discharge
- determine the characteristics of centrifugal pump
- apply the working principles of the Reciprocating pump

CE311 ADVANCED STRENGTH OF MATERIALS

Course objectives:

- To understand the mechanical properties of materials
- To understand the different theories of failure for brittle and ductile materials
- To know the features of unsymmetrical bending and different methods of analysis
- To understand the concept of shear centre and to know different methods for its location
- To know the fundamentals of vibration of structure

Course Content

Mechanical Properties of Materials - Stress-Strain Diagrams- Elastic and Plastic Deformation - Brittle and Ductile Failures of Materials - Mechanical Tests like Surface Hardness, Fatigue, Creep etc. Principal stresses in a 3D field.- Computation -Mohr's Circle - Lame's Ellipsoid. Theories of failure - Criteria for Failure - Different failure theories for ductile and brittle materials. Equivalent bending and twisting moments.
Unsymmetrical bending- Properties of unsymmetrical sections- Circle of inertia - Dyadic circle - Momental ellipse- Stresses and deflection due to unsymmetrical bending - Concept and relevance of Z polygon.
Shear Centre - Concept and significance - Shear flow for thin walled open sections-Location of shear centre for singly symmetric sections. Stresses in curved flexural members-Winkler Bach Formula - Crane hooks - rings and links.
Fundamentals of vibration - free vibration of single degree of freedom systems - Undamped and damped free vibration with different types of damping.- Resonance-Harmonic response of single degree of freedom systems with and without damping.

References

1. *Srinath, L. S., Advanced Mechanics of Solids , Tata McGraw Hill,1980.*
2. *Kazimi, S.M.A., Solid Mechanics, Tata McGraw Hill, 1976.*
3. *Punmia, B.C., Strength of Materials Part II, Standard Publishers and Distributors, 1991.*
4. *Shames I.H., Engineering Mechanics, Prentice Hall of India,1996*

Course outcomes:

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

- determine the important mechanical properties of materials
- demonstrate the different theories of failure for brittle and ductile materials
- apply the different methods of unsymmetrical bending analysis
- demonstrate the significance and concept of shear centre
- apply the principles of structural dynamics

CE313 FLUID MECHANICS LAB

Course objectives:

- To understand the flow measurement in a pipe flow
- To determine the energy loss in pipe flow
- To study the characteristics of turbines
- To study the characteristics of pumps
- To measure the discharge in a open channel flow

Course Content

1. Determination of pipe friction
2. Calibration of flow meters - Venturimeter and Orifice meter
3. Determination of discharge coefficients for notches
4. Determination of minor losses

5. Pressure gauge calibration.
6. Centrifugal pump
7. Submersible pump
8. Reciprocating pump
9. Jet pump
10. Gear pump
11. Screw pump
12. Francis Turbine

Course outcomes:

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

- measure discharge in pipes
- determine the energy loss in conduits
- demonstrate the characteristics curves of pumps
- demonstrate the characteristics curves of turbines
- carry out discharge measurements in open channel

CE315 ENVIRONMENTAL ENGINEERING LAB

Course objectives:

- To quantify the water and wastewater pollutant
- To measure the concentration of air pollutants
- To analyze the characteristics of water, wastewater and ambient air
- To study the growth of microorganism and its quantification

Course Content

1. Physical characteristics of water
2. Chemical characteristics of water
3. Bacteriological tests
4. Microscopic tests
5. Jar test
6. Chlorine demand and residual test
7. Total solids and settleable solids.
8. Organic and inorganic solids.
9. Determination of pH and chemical constituents like Cl^-, Fe^{2+} etc.

Course outcomes:

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

- quantify the pollutant concentration in water, wastewater and ambient air
- recommend the degree of treatment required for the water and wastewater
- analyze the survival conditions for the microorganism and its growth rate

SEMESTER VI

CE302 STRUCTURAL ANALYSIS – II

Course objectives :

- To understand the influence line concepts for indeterminate structures
- To understand the methods of analysis of intermediate trusses for external loads, lack of fit and thermal effect
- To study behaviour of arches and their methods of analysis
- To know the concept and analysis of cable stayed bridge
- To study the multi storey frames subjected to gravity loads and lateral loads

Course Content

Influence lines - Maxwell Betti's theorem - Muller Breslau's principle and its application. Influence lines for continuous beams and single bay, single storey portals with prismatic members.
Analysis of plane truss with one or two redundants - trusses with lack of fit - Thermal stresses - Settlement of supports - Trussed beams.
Theory of arches - Analysis of three hinged, two hinged and fixed arches - influence lines, rib shortening, settlement and temperature effects.
Analysis of cables - Suspension bridges with three and two hinged stiffening girders - influence lines.
Analysis of multistorey frames for gravity and lateral loads by approximate methods - Substitute frame - Portal and Cantilever methods.

References

1. *Punmia, B.C, Theory of Structures, Laxmi Publications, 2000.*
2. *Timoshenko, S.P.,Young, D.H., Theory of Structures, Tata McGraw Hill, 1983.*
3. *Wang. C.K., Intermediate Structural Analysis, International Text Book Co, 1983.*
4. *Hibbeler. R.C., Structural Analysis, Pearson Education (Singapore) Ptc. Ltd., Indian Branch, 2002.*

Course outcomes:

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

- demonstrate the concepts of qualitative influence line diagram for continuous beams and frames
- apply the methods of indeterminate truss analysis
- demonstrate the behavior of arches and their methods of analysis
- analyze cable suspension bridges
- analyze multistory frames subjected to gravity loads and lateral loads

CE304 TRANSPORTATION ENGINEERING - I

Course objectives:

- To understand the importance of transportation and characteristics of road transport
- To know about the history of highway development, surveys and classification of roads

- To study about the geometric design of highways
- To study about traffic characteristics and design of intersections
- To know about the pavement materials and design

Course Content

Introduction: Importance of transportation, different modes of transportation, characteristics of road transport, scope of highway and traffic engineering
Highway development and planning: Importance, classification of roads, road patterns, planning surveys; highway alignment and surveys
Highway Geometric Design: Cross section elements, sight distance, design of horizontal and vertical alignment
Traffic Engineering: Traffic characteristics - Traffic studies-speed, volume, speed and delay, origin-destination, parking and accident studies; capacity of urban roads and highways; traffic operations-regulation and control; design of intersections- at grade and grade separated
Pavement Materials and Design: Specifications and tests on pavement materials, pavement design factors, design of flexible and rigid pavements as per IRC.

References

1. *Khanna, S.K and Justo, C.E.G., Highway Engineering, Nem Chand and Bros.*
2. *Kadiyali, L.R, Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi*
3. *Kadiyali, Principles of Highway Engineering, Khanna Publishers.*

Course outcomes:

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

- carry out surveys involved in planning and highway alignment
- design cross section elements, sight distance, horizontal and vertical alignment
- implement traffic studies, traffic regulations and control, and intersection design
- determine the characteristics of pavement materials
- design flexible and rigid pavements as per IRC

CE306 CONCRETE STRUCTURES – II

Course objectives:

- To understand the design concept of various structures and detailing of reinforcements
- To understand the design of underground and elevated liquid retaining structures
- To study the design of material storage structures
- To know the effect of temperature on concrete structures
- To study the design of bridges subjected to IRC loading

Course Content

Earth Retaining structures - Retaining walls- types - cantilever and counterfort - design - drainage and other construction details. Liquid Retaining structure - Water tanks - types - square, rectangular, circular - Design of underground and elevated tanks - design of staging - spherical & conical roof for circular

tanks. Material storage structures - Determination of lateral pressure on side walls of bunker - Rankine's theory - design of bunker - design of circular silo using Jansen's theory. Environmental Structures - Chimneys - Principles and Design - Design of long columns. Transportation structures - Bridges - Slab bridge - Design of single span slab bridge - Tee beam bridge - Design of Tee beam bridge with stiffness - Tee beam bridge with cross girders

Note: Assignments include the design and drawings of various RCC structures.

References

1. *Vazirani, V.N., and Ratwani, Concrete Structures, Vol. IV, Khanna Publishers, New Delhi, 1995.*
2. *Dayaratnam, P., Design of Reinforced Concrete Structures, Oxford & IBH Publishers & Co., New Delhi, 2005.*
3. *Victor, D.J., Essentials of Bridge Engineering, Oxford & IBH Publishers Co., Newdelhi, 1991.*
4. *IS456-2006 Code of practice for Plain and reinforced concrete code of practice.*

Course outcomes:

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

- apply the concepts of liquid retaining structures
- design material storage structures using various theories
- apply the concepts of environmental and transportation structures
- demonstrate the detailing of reinforcement
- draw the various RCC structures

CE308 STEEL STRUCTURES-II

Course objectives:

- To introduce the concept of plastic analysis
- To study the behaviour and design of compression member subjected to eccentric force and design of base plate
- To study the design of Gantry girder, welded plate girder, stiffeners and connections
- To calculate the wind forces on steel stacks as per IS 875 and design the self supporting steel stacks including base plate and anchor bolts
- To study the behaviour and design of light gauge steel sections

Course Content

Eccentrically loaded column - simple and compound section - lacings and battens - column bases – slab base – gusseted base – moment resistant base plate
Welded plate girders – analysis and design using IS800-2007 - curtailment of flange plates –stiffeners – analysis and design of gantry girder
Introduction to IS875 part (3) – assessment of wind load – analysis and design of steel stacks - functional and structural requirements - self supporting and guyed stacks - base plate and anchor bolt
Light gauge steel sections-types of cross section - Local and post buckling - Effective width concept-Compression and Flexural members.

Introduction to Plastic analysis – ductility – plastic bending of beams – stages of bending – shape factor – plastic hinge – load factor – failure mechanism - upper and lower bound theorems of plastic analysis – collapse load for beams and frames.

Note: Assignments include the design and drawings of various steel structures.

References

1. *Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi 2008.*
2. *Bhavikatti, S.S., Design of Steel Structures, I.K. International Publishing House Pvt. Ltd., New Delhi, 2010*
3. *Krishnaraju.N, Structural Design and Drawing, University Press, Hyderabad, 2009.*
4. *IS 800-2007, Code of practice for general construction in steel, Bureau of Indian Standards, New Delhi.*
5. *IS875 Part (3) - 1987, Code of Practice for Design Loads (other than earthquake) for buildings and structures: Wind loads., Bureau of Indian Standards, New Delhi.*
6. *SP6 (1)-1964, IS hand book for structural Engineers. Bureau of Indian Standards, New Delhi.*

Course outcomes:

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

- calculate shape factor and plastic moment capacity
- design eccentrically loaded compression members (Beam-Columns) and their base plates
- design welded plate girder and other components and Gantry girder
- carry out wind load calculations for tall structures and design of steel chimneys
- design light gauge steel sections

CE310 WATER RESOURCES ENGINEERING

Course Objectives:

- To build on the student's background in hydrology and hydraulics and understanding of water resources systems
- To develop the skills in modeling of flood flows and flood routing
- To develop skills in the ground water flow, type of aquifer and yield from the well
- To provide the knowledge of design of reservoir, operation and sedimentation
- To study the effect, causes and remedial measures of water logging

Course Content

Hydrologic cycle - rainfall and its measurement - computation of mean rainfall over a catchment area using arithmetic mean, Theissen polygon and Isohyetal methods - Runoff -infiltration indices - Storm Hydrograph and unit hydrograph
River regions and their characteristics - classification of rivers on alluvial plains - meandering of rivers - river training
Reservoir planning - Investigations - zones of storage in a reservoir - single purpose and multipurpose reservoir - determination of storage capacity and yield - reservoir sedimentation - Reservoir life - Sediment prevention - Flood estimation- Flood forecasting - Flood routing

Ground water - types of aquifers - storage coefficient - coefficient of transmissibility - steady radial flow into a well located in an unconfined and confined aquifers - Tube wells and Open wells - yield from an open well.
Water logging - causes and effects of water logging - remedial measures - land reclamation - land drainage - benefits - classification of drains - surface drains - subsurface drains - design principles and maintenance of drainage systems.

References

1. *Punmia, B.C., Irrigation and Water Power Engineering, Standard Publishers, 2001.*
2. *Ragunath. H.M., Hydrology, Willey Eastern Limited, New Delhi, 2000.*
3. *Subramanya, Engineering Hydrology, Tata-McGraw Hill, 2004.*

Course outcomes:

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

- design various channel systems
- design head and cross regulator structures
- identify various types of reservoir and their design aspects
- By the Establishes the understanding of cross drainage works and its design
- design different types of dams

CE312 COMPUTER AIDED DESIGN – I

Course objectives:

- To learn the programming of numerical methods
- To use the computer to apply numerical techniques
- To learn the fundamentals of Computer Aided Drafting
- To understand DBMS concepts
- To learn the handling of spreadsheets

Course Content

Application Programs

a. Roots of an equation using Newton - Raphson method.
b. Solution of linear simultaneous equations using Gauss elimination.
c. Matrix inversion using Gauss Jordan method
d. Linear regression line of given points
e. Curve fitting using Polynomial Regression
f. Eigen value extraction using Power method

Standard packages to solve the above problems-Solution of Linear Programming problems using standard software-Basic 2D objects - line, polyline, circle, ellipse - editing objects - trim, break, change, stretch - dimensioning - preparation of plan, elevation and section drawings of simple structural objects - printing and plotting drawings - script files - introduction to 3D
DBMS concepts - Civil Engineering Databases - Manipulation - Spreadsheet concepts - Worksheet calculations in Civil Engineering - Regression, Matrix Inversion, etc.

References

1. *Chapra, S.C., and Canale R.P., Numerical Methods for Engineers, McGraw-Hill, 2004*
2. *Rajasekaran, S., Numerical Methods in Science and Engineering A Practical Approach, A.H.Wheeler and Co, 2005.*
3. *Ronald W., Leigh, AutoCAD: A Concise Guide to Commands and Features, Galgotia Publications, 2004.*

Course outcomes:

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

- develop programs for numerical methods
- solve numerical techniques in computer
- implement Computer Aided Drafting
- apply DBMS concepts to Civil Engineering
- apply Spreadsheet calculations to Civil Engineering

CE314 ESTIMATION, COSTING AND VALUATION
Course objectives:

- To know the importance of preparing the types of estimates under different conditions
- To know about the rate analysis and bill preparations
- To study about the specification writing
- To understand the valuation of land and buildings

Course Content

Preparation of detailed estimates - Preparation of specifications report accompanying the estimate Approximate methods of Costing - types of estimate - costing for various structures - rate analysis - rate for material and labour - schedule of rates -data sheets - abstract estimate. Values and its kinds - Valuation - purpose- scope - methods - land and building method - Factors affecting the value of plot and building - depreciation - Valuation of residential building with case study.

References

1. *Dutta, Estimating and Costing in Civil Engineering, S. Datta & Co, 2002.*
2. *Bhasin, P.L., Quantity Surveying, 2nd Edition, S.Chand & Co., 2000.*

Course outcomes:

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

- apply different types of estimates in different situations
- carry out analysis of rates and bill preparation at different locations
- demonstrate the concepts of specification writing
- carry out valuation of assets

SEMESTER VII

CE401 MATRIX METHODS OF STRUCTURAL ANALYSIS

Course objectives:

- To understand the importance of degrees of freedom and the concept of principle of superposition
- To know about the concept of strain energy and principle of virtual work
- To study the transformation of system matrices and element matrices for the determinate and indeterminate structures
- To analyze the forces in structures like continuous beam, truss and frames using stiffness and flexibility method
- To understand the behavior of structures due to thermal expansion and lack of fit

Course Content

Generalized measurements - Degrees of freedom - Constrained Measurements - Behavior of structures - Principle of superposition. Stiffness and flexibility matrices - Constrained measurements - Stiffness and flexibility coefficients from virtual work.
Strain energy - Stiffness and flexibility matrices from strain energy - Symmetry and other properties of stiffness and flexibility matrices - Betti's law and its applications - Strain energy in systems and in elements.
Determinate and indeterminate structures - Transformation of element matrices to system matrices - Transformation of system vectors to element vectors - Normal coordinates and orthogonal transformations.
Flexibility method applied to statically determinate and indeterminate structures - Choice of redundants - Transformation of redundants - Internal forces due to thermal expansion and lack of fit.
Development of the method - Internal forces due to thermal expansion and lack of fit - Application to symmetrical structures - Comparison between stiffness and flexibility methods.

References

1. *Moshe, F., Rubenstein, Matrix Computer Analysis of Structures, Prentice Hall, New York, 1986.*
2. *Rajasekaran S, Computational Structural Mechanics, Prentice Hall of India, New Delhi, 2001*
3. *Manickaselvam V.K., Elements of Matrix and Stability Analysis of Structures, Khanna Publishers, New Delhi, 1998.*

Course outcomes:

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

- apply the basic concepts of matrix methods in structural analysis
- develop stiffness and flexibility matrices
- analyze the structures using flexibility and stiffness method
- transform system coordinates to element coordinates
- determine the forces in various members due to lack of fit and thermal expansion

CE403 TRANSPORTATION ENGINEERING - II

Course objectives:

- To know about the basics and design of various components of railway engineering
- To study about the types and functions of track, junctions and railway stations
- To learn about the aircraft characteristics, planning and components of airport
- To study about the types and components of docks and harbours
- To know about various urban transportation systems and Intelligent Transportation Systems

Course Content

Railway Engineering - Location surveys and alignment - Permanent way - Gauges - Components - Functions and requirements - Geometric design
Track Junctions-Points and crossings - types and functions - design and layout - simple problems - Railway stations and yards. Signaling and interlocking - control systems of train movements.
Airport Engineering-Aircraft characteristics - Airport obstructions and zoning - Runway - taxiways and aprons- Terminal area planning
Docks and Harbours - Types - Layout and planning principles- breakwaters - docks- wharves and quays - Transit sheds- warehouses- navigation aids.
Urban transportation systems - Bus transit - Mass Rapid Transit System - Light Rail Transit. Transport economics and Financing - Intelligent Transportation Systems (ITS)

References

1. *M.M. Agarwal, Railway Engineering, Prabha & Co. 2007.*
2. *Khanna, S.K. and Arora, M.G. Airport Planning and Design, Nemchand and Bros. 1999.*
3. *Oza and Oza, Elements of Dock and Harbour Engineering, Charotar Publishing House, 1996.*

Course outcomes:

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

- carry out the surveys for railways, airports and harbours
- perform geometric design for the three modes
- plan the layout of different types of terminals
- apply the principles of bus transit, MRTS and LRT
- **demonstrate the** fundamentals of Intelligent Transportation Systems

CE405 IRRIGATION AND HYDRAULIC STRUCTURES

Course Objectives:

- To understand the basic types of irrigation, irrigation standards and crop water assessment
- To study the different aspects of design of hydraulic structures
- To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works
- To understand the analysis of seepage and hydraulic jump
- To design different types of dams

Course Content

Irrigation - necessity - Types of irrigation - Methods of supplying water - Assessment of irrigation water - Consumptive use and its determination - water requirement of various crops - Duty - Delta - Base period and crop period.
Functions and components of a diversion head work - Function - selection of site - type of weirs on pervious foundations - cause of failure - Bligh's creep theory and Khosla's theory - complete design of a vertical drop weir.
Gravity dams - Non overflow section - forces acting - stability rules - elementary profile - Low and High dams - drainage gallery - Construction joints - Earthen dams - stability of slopes by slip circle method - seepage analysis and its control
Types of canals - canal alignment - Kennedy's silt theory - Lacey's silt theory - Design of canals using the above theories - economical depth of cutting - canal losses - canal maintenance - lined canals and their design - silt control measures.
Canal falls - Necessity and location - Design of sand type fall - design of a cross regulator - cross drainage works - selection of suitable type of cross drainage work - canal outlets.

Note: Assignments include the design and drawings of various irrigation structures.

References

1. *Punmia, B.C., Irrigation and Water Power Engineering, Standard Publishers, 2001.*
2. *Garg, S.K., Irrigation and Hydraulics Structures, Khanna Publishers, 1992.*
3. *Sharma, S.K., Principles and Practice of Irrigation Engg, S.Chand & Co, 1984.*

Course outcomes:

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

- assess the irrigation needs of crops
- design weirs on pervious foundation
- design gravity dam and earthen dam
- design the canal systems
- select and design canal fall

HM401 INDUSTRIAL ECONOMICS

Course objectives:

- To introduce the students to economic theories and their role in decision making in the corporate world
- To familiarize the students with microeconomics and macroeconomics theories
- To enable the students have a clear understanding of the real-world causes and effects of various market structures
- To equip the students with necessary economic tools to analyse the price and output determination in companies
- To familiarize fiscal and monetary policy responses to macroeconomic instabilities such as unemployment, inflation and economic growth

Course Content

Demand and Supply - Forecasting techniques
Cost and Revenues -Competitive nature of the firms - Keynesian economics - National Income
Trade cycle - Inflation - Index numbers Capital budgeting - Impact of Liberalization, Privatization and Globalization - Locating the firm in a global economy
Fiscal Policy - Taxation - Principles. Monetary policy - Functions of banks - Credit creation by commercial banks.

References

1. *Manb, Adhikari, Business Economics, Excel books.*
2. *Mishra S.K and Purin V.K, Economic Environment of business, HPH.*

Course outcomes:

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

- apply economic theories
- compare microeconomic and macroeconomic theories
- determine price, output and profit in the market structure
- apply appropriate tools and frameworks to analyse the different aspect of industry and market conditions
- evaluate fiscal and monetary policy responses to macroeconomic instabilities

CE407 COMPUTER AIDED DESIGN – II

Course objectives:

- To learn the software developing skills for structural design
- To understand the computing techniques in the field of transportation
- To gain knowledge in networking and flowcharts in water resources
- To understand the computing skills in the field of geotechnical engineering
- To study the different software packages for analysis and design

Course Content

R.C.C: Slabs - Beams- Columns - Retaining walls.
Steel: Trusses - Beams - Columns - Column Bases - Plate girders - Gantry girders - Connections.
Transportation planning process- Trip generation and distribution- Network analysis - Shortest path algorithms.
Water resources - Pipe networks - Canal design - Backwater profile - Synthetic derivation of stream flows using random numbers - Dam stability
Analysis and design packages in Structural Engineering, Transportation Engineering, Water Resources Engineering and Geotechnical Engineering

References

1. *Krishnamoorthy, C.S. and Rajeev, S., Computer Aided Design and Analytical Tools, Narosa, 1993.*
2. *Papacostas, C.S., Fundamentals of Transportation Engineering Prentice-Hall of India, 2001.*

3. *Loucks, D.P., Stedinger, J.R. and Haith, D.A., Water Resource Systems Planning and Analysis, Prentice-Hall INC, 1981.*

Course outcomes:

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

- apply the software skills in the design of infrastructure
- apply computing techniques to transportation engineering
- analyze water resource networks
- apply computing skills to geotechnical engineering
- run various software packages

SEMESTER VIII

MB491 MANAGEMENT CONCEPTS & PRACTICES

Course objectives:

- To enrich the students with the concepts and applications of Management
- To make the learners understand the basic functions of Financial Management
- To facilitate the students with the fundamental concepts of Technology management
- To enhance the understanding of Project Management techniques
- To impart the importance of Human Resources in the organizational context

Course Content

Introduction to management- Evolution of Scientific and Modern Management Principles-Functions of Management-Types of Business Organization – Managerial Roles – Levels of Management.
Decision Making. Nature Purpose and Steps involved in Planning. Objectives – Strategies and Planning Premises. Nature and purpose of Organizing. Formal and informal Organization. Span of control – Delegation of Authority.
Introduction to Human Resource Management. Creativity and Innovation. Motivation theories (Hierarchy of Needs by Maslow, Herzberg's Two-Factor theory) – Motivational Techniques – Monetary & Non-monetary, Job Enrichment.
Types of Leadership – Leadership Theories. Communication – Process of Communication – Barriers and Breakdown- Effective Communication.
System and process of Controlling – Requirements for effective control – The budget as control Technique. Globalization and Liberalization – International Management and Global Theory of Management, Corporate Social Responsibility.

References

1. *Harold Kooritz & Heinz Weihrich "Essentials of Management", Tata McGraw-Hill.*
2. *L.M. Prasad, Principles of Management , Sultan Chand & sons, New Delhi.*
3. *Sherlekar & sherlekar, Principles of Management, Himalaya Publishing House, New Delhi.*
4. *Stephen Robbins, Organizational Behavior, Pearson Education, New Delhi.*

Course outcomes:

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

- demonstrate the nuances of management functions
- analyze the framework of a business organization
- adopt an empirical approach toward business situations
- apply various Project Management techniques
- implement roles of team players

CE402 PRESTRESSED CONCRETE STRUCTURES

Course objectives:

- To learn the principles, materials, methods and systems of prestressing
- To know the different types of losses and deflection of prestressed members
- To learn the design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam
- To learn the design of anchorage zones, composite beams, analysis and design of continuous beam
- To learn the design of water tanks

Course Content

Principles of prestressing - Materials of prestressing - Systems of prestressing - Loss of prestress - Deflection of Prestressed Concrete members.
Slabs - Pre-tensioned and Post-tensioned beams - Design for flexure, bond and shear - IS code provisions - Ultimate flexural and shear strength of prestressed concrete sections - Design of end anchorage zones using IS code method.
Composite beams - Analysis and design.Partial prestressing - non-prestressed reinforcements.
Analysis of Continuous beams - Cable layout - Linear transformation - Concordant cables.
Design of compression members and tension members. Circular prestressing - Water tanks - Pipes - Analysis and design - IS Codal provisions.

References

1. *Lin. T.Y., Burns, N.H., Design of Prestressed Concrete Structures, John Wiley & Sons, 1982.*
2. *RajaGopalan N. Prestressed Concrete, Narosa Publishing House, New Delhi, 2002.*

Course outcomes:

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

- design a prestressed concrete beam accounting for losses
- design the anchorage zone for post tensioned members
- design composite members
- design continuous beams
- design water tanks

ELECTIVES

CE352 GROUND WATER HYDROLOGY

Course objectives:

- To know the types of aquifers
- To understand the surface and subsurface investigation in detail
- To integrate the fundamental and basic knowledge of ground water movement
- To understand the process of sea water intrusion and recharge
- To introduce the different model studies

Course Content

Groundwater occurrence – distribution – aquifer – types - Surface investigation - Geophysical - electrical resistivity - Seismic refraction - Gravity and magnetic - Geologic - Air photo interpretation - Dowsing.
Subsurface investigation - test drilling - resistivity logging- potential logging - temperature and caliper logging.
Steady unidirectional flow - well in a uniform flow - steady flow with uniform recharge - unsteady radial flow to a well - well flow near aquifer boundaries - Multiple well systems - partially penetrating wells - characteristic well losses.
Secular and seasonal variations - Fluctuations due to evapo-transpiration, Meteorological phenomena, tides, external loads and earthquakes - control by drains and wells.
Recharge through sewage pits, shafts and wells.
Occurrence of sea water intrusion - Ghypon-Heizberg relation between fresh and saline waters - shape length and structure of the fresh salt water interface - prevention and control of seawater intrusion - role of sea water in ground water - coastal zoning.
Sand models - Electrical models - Viscous fluid models - membrane models - numerical analysis methods

References

1. *Raghunath H.M., Ground Water Hydrology, New-Age International, 2nd Edition, 1990.*

Course outcomes:

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

- identify types of aquifers
- carry out surface and subsurface investigation to locate groundwater
- visualise the occurrence and movement of groundwater
- select suitable type of ground water recharge
- assess sea water intrusion and its control

CE451 EXPERIMENTAL STRESS ANALYSIS

Course objectives:

- To study the working principles of different types of strain gauges

- To understand the model analysis
- To know the fundamentals of photo elastic coatings
- To study the effects of 2-D photo elasticity
- To study the working principle of load, pressure and displacement transducers

Course Content

Strain gauges – Mechanical, optical, acoustic, electrical inductance and capacitance pneumatic types – description and working principles
Electrical resistance strain gauges, gauge characteristics and types – Equipment for recording static strain – reduction of strain gauge data.
Load, pressure and displacement transducers.
Model analysis – direct and indirect models – law of structural similitude – choice of scales – Model materials – limitations of model studies –Buckingham PI theorem – design of direct and indirect models – Beggs deformeter and its applications.
Two dimensional photo – elasticity – optical principles stress optic law – Methods of producing isoclines and isochromatics using polariscopes – Methods of measuring fractional fringe orders – model materials – separation techniques
Fundamental of Photo elastic coatings, Moire fringe and brittle coating techniques – Introduction to stress freezing techniques – Introduction to non-destructive testings

References

1. *Daley and Riley, Experimental Stress Analysis, McGraw Hill Book Company, 1987*
2. *Srinath, L.S. et al., Experimental Stress Analysis, Tata McGraw Hill 1984.*
3. *Hetenyi, M., Hand Book of Experimental Stress Analysis, John Wiley & Sons. Inc New York. 1980.*

Course outcomes:

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

- identify the different types of strain gauges
- carry out model analysis
- apply the concepts of photo elastic coatings
- analyze the behavior of 2-D photo elasticity
- apply the working principles of transducers

CE452 EARTHQUAKE RESISTANT STRUCTURES

Course objectives:

- To introduce the basics of Earthquake Engineering
- To introduce the engineering seismology, building geometrics & characteristics, structural irregularities,
- To introduce tips on earthquake engineering - do's and don'ts
- To introduce cyclic loading behaviour of RC, steel and pre-stressed concrete elements
- To discuss code provisions and their application on different types of structures

Course Content

Elements of Engineering Seismology - Theory of Vibrations -Indian Seismicity -Earthquake History - Behavior of structures in the past Earthquakes.
Seismic Design Concepts - Cyclic loading behavior of RC, Steel and Prestressed Concrete elements - Response Spectrum- Design spectrum - capacity based design.
Provision of Seismic Code frames, shear walls, Braced frames, Combinations - Torsion.
Performance of Regular Buildings 3D Computer Analysis of Building Systems (Theory only) - Design and Detailing of frames - Shear walls and Frame walls.
Seismic performance - Irregular Buildings -Soil performance, Modern Concepts - Base Isolation - Adoptive systems - Case studies.

References

1. *Pankaj Agarwal and Manish ShriKhande, Earthquake Resistant Design of Structures, Prentice- Hall of India, New Delhi, 2003.*
2. *Bullen K.E., Introduction to the Theory of Seismology, Great Britain at the University Printing houses, Cambridge University Press 1996.*

Course outcomes:

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

- apply the basics of Earthquake Engineering
- demonstrate the dynamics of structural system under earthquake load
- analyze the influence of the structural / geometrical design in building characteristics
- demonstrate the cyclic loading behaviour of RC steel and pre-stressed concrete elements
- apply codal provisions on different types of structures

CE453 REMOTE SENSING AND GIS

Course objectives:

- To know about the principles of remote sensing and spectral signatures
- To know about satellites, types of remote sensing and digital image processing
- To study about the history and components of GIS
- To study about data types and operations
- To know the applications of remote sensing and GIS

Course Content

Remote Sensing – Principle - Electro-magnetic energy, spectrum - EMR interaction with atmosphere – Atmospheric Windows and its Significance – EMR interaction with Earth Surface Materials – Spectral Signature and Spectral Signature curves for water, soil and Earth Surface.
Satellites - Classification – Satellite Sensors – satellite and sensor parameters - Resolution – Types of Remote Sensing - Visual Interpretation of Satellite Images – Digital Image processing – Characteristics of different platforms: Landsat, SPOT, IRS series, IKONOS, QUICKBIRD – Radar, LIDAR, SAR, MODIS, AMSRE, Sonar remote sensing systems.

GIS - History of Development - Components of GIS – Hardware, Software and Organizational Context – Data – Spatial and Non-Spatial – Data Input Sources— DBMS – Data Output - Data models - Raster and Vector data structures – Data compression – Raster vs. vector comparison
Analysis using Raster and Vector data – Operations – Overlaying - Buffering – Modelling in GIS - Digital Terrain Modelling, Analysis and application – Products of DEMs and their uses – Sources of errors in GIS and their elimination
Applications of Remote Sensing and GIS – Advanced applications of GIS – Disaster management, Water resource, Landuse – Land cover – Urban planning - Intelligent Transport Systems - Development of Resources Information Systems.

References

1. *Burrough P.A. and Rachel A. McDonell, Principles of Geographical Information Systems, Oxford Publication, 2004.*
2. *C.P. Lo and Albert K. W. Yeung, Concepts and Techniques of Geographical Information Systems, Prentice- Hall India, 2006.*
3. *Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, 2003.*

Course outcomes:

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

- demonstrate the concepts of Electro Magnetic energy, spectrum and spectral signature curves
- apply the concepts of satellite and sensor parameters and characteristics of different platforms
- apply the concepts of DBMS in GIS
- analyze raster and vector data and modelling in GIS
- apply GIS in land use, disaster management, ITS and resource information system

CE454 ADVANCED FOUNDATION ENGINEERING

Course objectives:

- To explain the analysis of sheet pile wall under different support conditions
- To explain overall stability analysis of well foundation
- To explain fundamentals of soil dynamics and its application to machine foundation analysis including codel provisions
- To explain problems related to expansive soils and solution to overcome
- To explain the concept of slope stability analysis for various slope conditions including graphical methods

Course Content

Sheet pile structures - cantilever sheet pile walls in granular and cohesive soils - Anchored bulk heads - Free earth support and fixed earth support methods - Anchors.
Cofferdams - types - cellular cofferdam - uses - Design by TVA and Cumming's method.
Well foundations - Types of caissons - Analysis of well foundations - determination of scourdepth - steining thickness - well sinking.
Foundations subjected to vibrations - elements of vibrations - Free, damped, free and forced vibrations - Design criteria - Pauw's analogy - IS Code of practice for impact and reciprocating machines.

Foundation drainage and water proofing - Dewatering well points system, sand drains.
Foundations in expansive soils - Mechanism - factors influencing swelling - Use of Geosynthetics.
Stability analysis of slopes - infinite slopes in sand and clays - finite slope - Swedish circle - stability of earth dam slope during steady and sudden draw down - friction circle method - Taylor's stability number. Sheet pile structures - Anchored bulk heads

References

1. *Bowles, J.E., Foundation Analysis and Design, McGraw Hill., 1996.*
2. *Braja M. Das, Principles of Foundation Engineering, Thomos Asia Pvt. Ltd., Singapore, 2005.*
3. *Shamsher Prakash, Soil Dynamics, McGraw - Hill Book Company, 1985.*

Course outcomes:

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

- analyze and design any kind of sheet pile wall system including coffer dam
- analyze and design well foundation including complete stability analysis
- estimate soil parameters under dynamic conditions including machine foundations
- design a suitable foundation system for any kind of problematic soils
- analyze the stability of any kind of slope by using both theoretical and graphical methods

CE455 HYDROLOGY

Course objectives:

- To provide knowledge in the hydrological cycle, precipitation, evapotranspiration, infiltration and its measurements
- To understand the physics of translate of rainfall into runoff modeling of various runoff techniques
- To estimate the runoff
- To develop ability to apply the analytical and numerical techniques to ground and surface water models
- To understand hydrographs and IUH

Course Content

Precipitation circulation - temperature - Humidity – wind formation and forms of precipitation - Interpretation of precipitation data - snow cover and snow fall. Factors affecting and methods of determining evaporation, infiltration and evapo-transpiration- Run-off cycle - factors affecting run-off - estimation of run-off by stream gauging - stage - discharge rating curves - Selection of site for a stream gauge station.
Derivation of unit hydrograph from complex storms - unit hydrographs for various duration - Synthetic unit hydrograph - Transposing unit hydrograph - Application of the unit hydrograph. Linear Regression - Statistical and probability analysis of hydrological data - Flood frequency probability and stochastic methods - Basics of Stochastic and Deterministic models.

References

1. *Ragunath, H.M., Hydrology, Wiley Eastern, 1990.*

Course outcomes:

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

- demonstrate the concepts of hydrograph, S-hydrograph, Unit hydrograph and IUH
- estimate the hydrological parameters
- carry out statistical and probability analysis of hydrological data
- demonstrate the concepts of hydrological systems
- develop regression models for the analysis of hydrological data

CE456 WATER POWER ENGINEERING

Course objectives:

- To estimate the available hydropower
- To understand types of hydro-power stations
- To understand the components and functions of hydro-power system
- To expose to the types of hydro-power system
- To study the different types of loads on power plants

Course Content

Source of energy – Statistics of power - hydro power estimation of water power potential - mini and pumped storage plant - cost and value of water power.
Mini and Pumped storage plants- Penstocks - types and design criteria - anchor blocks - conduit valves - bends and manifolds - water hammer - Intakes - canals - forebay - trash rack tunnels - surge tank - power plant operation- surface and sub surface power stations.
Description and function of various hydraulic, electrical and mechanical equipment - power plant operation pertaining to base load and peak load
Principles included in the planning of a surface and sub surface power stations.
Elementary treatment of the principles involved in tidal power.

References

1. *Barrows, H.K., Water Power Engineering, McGraw Hill, 1990.*

Course outcomes:

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

- estimate the available hydropower in a project
- select suitable types of hydro-power system
- design penstock and anchor blocks
- analyze the different types of loads on power plants
- design the components of Tidal power plant

CE457 STRUCTURAL DYNAMICS

Course Objectives:

- To introduce the concepts of dynamic systems
- To study the dynamic response of SDOF
- To study the dynamic response of MDOF
- To introduce the continuous systems subjected to different types of dynamic loads
- To learn free and forced vibrations response of structural systems

Course Content

Dynamic analysis - Elements of vibratory systems and simple Harmonic Motion- Mathematical models of SDOF systems - Principle of Virtual displacements - Evaluation of damping resonance.
Fourier series expression for loading - (blast or earthquake) - Duhamel's integral - Numerical evaluation - Expression for generalized system properties - vibration analysis Rayleigh's method - Rayleigh - Ritz method.
Differential equation of motion - Beam flexure including shear deformation and rotatory inertia - Vibration analysis using finite element method for beams and frames
Evaluation of structural property matrices - Natural vibration - Solution of the eigen value problem - Iteration due to Holzer and Stodola
Idealization of multi-storeyed frames - analysis to blast loading - Deterministic analysis of earthquake response - lumped SDOF system - Design of earthquake resistant structures.

References

1. *Mario Paz, Structural Dynamics, CBS, Publishers, 1987.*
2. *Roy R Craig, Jr., Structural Dynamics, John Wiley & Sons, 1981.*
3. *A.K. Chpora "Dynamics of Structures Theory and Application to Earthquake Engineering" Pearson Education, 2001.*

Course outcomes:

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

- apply the concepts of dynamic systems
- identify, formulate and solve dynamic response of SDOF
- identify, formulate and solve dynamic response of MDOF
- analyze continuous systems subjected to different types of dynamic loads
- identify, formulate and solve free and forced vibrations response of structural systems

CE458 FINITE ELEMENT METHOD

Course objectives:

- To study the strain –displacement and linear constitutive relation
- To understand the numerical techniques applied in FEM
- Establishment of element stiffness and load vector
- To study about the 2-D isoparametric concepts
- To analyze the 2-D frame elements using FEM techniques

Course Content

Differential equilibrium equations - strain displacement relation - linear constitutive relation - special cases - Principle of stationary potential energy - application to finite element methods - Some numerical techniques in finite element Analysis
Displacement models - convergence requirements. Natural coordinate systems - Shape function. Interpolation function. Linear and quadratic elements - Lagrange & Serendipity elements. Strain displacement matrix - element stiffness matrix and nodal load vector
Two dimensional isoparametric elements - Four noded quadrilateral elements - triangular elements. Computation of stiffness matrix for isoparametric elements - numerical integration (Gauss quadrature) Convergence criteria for isoparametric elements.
Assemblage of elements – Direct stiffness method. Special characteristics of stiffness matrix - Boundary condition & reaction - Gauss elimination and LDLT decomposition. Basic steps in finite element analysis.
Analysis of framed Structures: 2D – truss element - 2D - beam element. Analysis of plate bending-displacement functions - plate bending Elements. Plane stress and plane strain analysis: Triangular elements - Rectangular elements

References

1. *Krishnamoorthy, C.S, Finite Element Analysis Theory & Programming, McGraw- Hill, 1995.*
2. *Desai C.S and Abel, J.F., Introduction to the finite element Method, Affiliated East west Press Pvt. Ltd. New Delhi 2000.*

Course outcomes:

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

- demonstrate the differential equilibrium equations and their relationship
- apply numerical methods to FEM
- demonstrate the displacement models and load vectors
- compute the stiffness matrix for isoperimetric elements
- analyze plane stress and plane strain problems

CE459 MODELS FOR AIR AND WATER QUALITY

Course objectives:

- To introduce the mathematical models and the modeling approach to water quality
- to present the mass balance basis for water quality models, simplified water quality models for streams and rivers, lakes and reservoirs for conservative and non-conservative materials
- to describe the various models for microbial growth and limitations
- to address the simple air quality models for point and line sources
- to review the simple models for estuaries

Course Content

Introduction to Mathematical Models: Modeling approaches to water quality - classification of models Mathematical models for water quality - model development, calibration and verification - cost: benefit analysis using models, Model requirements and limitations. D.O. Models for Streams: Dissolved oxygen model for streams - sources and sinks of dissolved oxygen

Estimation of system parameters - Streeter - Phelps model - oxygen 'sag' curve - determination of deoxygenation and reaeration coefficients - Benthal oxygen demand - mass transport mechanisms - Advective and diffusive mass transport
Models by O'connor, Dobbins and Thomann. Models for Estuary and Lakes: Physical chemical and biological processes in estuaries - water quality distribution in estuaries - modeling estuaries and lakes for water quality - temperature models for lakes and rivers
Models for microorganisms decay, nitrogen and phytoplankton. Air quality models: Micrometeorological processes, wind rose, dispersion, coefficients and stability classes, Gaussian and dispersion model, Regional air quality models,

References

1. *Chapra, Steven C., "Surface water quality modeling", McGraw Hill Book Company, New York, 1997.*
2. *Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Prentice Hall, 1998.*

Course outcomes:

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

- evaluate the physical, chemical and biological water quality which is essential for the abatement of water pollution
- predict the quality of water and air through modeling
- recognize the risks of disposal of treated wastewater into the river
- design sound and sustainable water and air models under specified conditions

CE460 TRANSPORTATION PLANNING

Course objectives:

- To know about the process and concepts of transportation planning
- To study about trip generation
- To study about trip distribution
- To study about modal split analysis
- To study about trip assignment

Course Content

Transportation Planning Process and Concepts- Role of transportation - Transportation problems - Urban travel characteristics - Concept of travel demand - Demand function - demand estimation - Sequential, recursive and simultaneous processes
Trip Generation Analysis - Zoning - Types and sources of data - Expansion factors - Accuracy checks - Trip generation models - Zonal models - Household models - Category analysis - Trip attractions of work centers.
Trip Distribution Analysis - Trip distribution models - Growth factor models - Gravity models - Opportunity models.
Mode Split Analysis - Mode split Models - Mode choice behavior, Competing modes, Mode split curves, Probabilistic models.

Traffic Assignment - Route split analysis: Elements of transportation networks, Nodes and links - minimum path trees - all-or-nothing assignment - Multipath assignment - Capacity restraint.

References

1. *Hutchinson B.G., Principles of Urban Transportation System Planning, McGraw Hill, 2007.*
2. *Bruton M.J., Introduction to Transportation Planning, Hutchinson, London, 1992.*
3. *C. Jotin Khisty, B. Kent Lall, Transportation Engineering, Prentice Hall of India, 2002.*

Course outcomes:

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

- apply the principles of the transportation planning process and demand estimation
- analyse the trip production and trip attraction models
- analyse the growth factor, gravity and opportunity models
- apply the mode choice behaviour and mode split models
- apply the shortest path models for route assignment

CE461 PAVEMENT ANALYSIS AND DESIGN

Course objectives:

- To study about the types and components of pavements
- To learn about the stresses in flexible pavements and equivalent single wheel load
- To study the design of flexible pavements
- To learn about the stresses in rigid pavements
- To study the design of rigid pavements

Course Content

Pavements - Types and Component - Factors affecting Design and Performance of Pavements, Comparison between Highway and Airport pavements - Functions and Significance of Sub grade properties

Stresses in Flexible Pavements - Stresses and Deflections in Homogeneous Masses - Burmister's 2-layer, 3-layer Theories - Wheel Load Stresses, ESWL of Multiple Wheels Repeated Loads and EWL factors

Flexible Pavement Design - Empirical - Semi-empirical and Theoretical Approaches; Principles and procedure, design, Advantages and Applications of different Pavement Design Methods - Stresses in Rigid pavements - Types of Stresses and Causes - Factors influencing the Stresses, General conditions in Rigid Pavement Analysis, ESWL, Wheel Load Stresses, Warping Stresses, Friction Stresses, Combined Stresses

Rigid Pavement Design - Types of Joints in Cement Concrete Pavements and their Functions, Joint Spacings, Design of Slab Thickness, Design of Joint Details for Longitudinal Joints, Contraction Joints and Expansion Joints, IRC Method of Design

References

1. *Yoder and Witezak, Principles of pavement design¸ John Wiley and sons, 1975*
2. *Yang, Design of functional pavements, Mc Graw -Hill, 2004.*
3. *IRC: 58 - 2002, Guidelines for the Design of Plain Jointed Rigid Pavements for Highways*

4. *IRC:37 - 2001, Guidelines for the Design of Flexible Pavements*

Course outcomes:

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

- identify the pavement components and compare highway and airport pavements
- calculate stresses and ESWL in flexible pavements
- design the flexible pavement using empirical and semi empirical methods
- analyze the warping, friction, wheel load stress and calculate the combined stress
- design rigid pavements by IRC method and evaluate the pavements

CE462 ADVANCED SURVEYING TECHNIQUES

Course Objectives:

- To know about significance of advanced surveying in field measurements in terms of utility and precision of data collection
- To learn on the principles of Electronic distance measurements, Total station and their accuracy
- To get introduced to the concept of photogrammetry in preliminary identification and map making
- To know in detail the concept of remote sensing in identification of land features from space and to get introduced to different data acquisition techniques like LIDAR, RADAR
- To get introduced to the field of geodesy, coordinate systems, Map projections, GPS, its working principles, data collection, data processing and analysis

Course Content

Electromagnetic distance measurement (EDM) – Principle of EDM Carrier waves – Types of EDM instruments – Distomat – Total Station – Principle – procedure & surveying using Total Station – precise leveling - micro-optic theodolite.
Photogrammetry – Terrestrial and Aerial Photogrammetry – Horizontal position of a point from photographic measurement – elevation of a point – Determination of focal length of camera - Geometry and scale of vertical photographs – Ground co-ordinates from vertical photographs - Relief displacement – Planimetric mapping from vertical photos – Stereoscopy– Photo interpretation.
Remote sensing – concepts – Idealized remote sensing system – characteristics – Types of remote sensing system – Remote sensing from space – Data interpretation – application of remote sensing – LIDAR – RADAR - SONAR.
Geodesy – Figure of earth – Classification – Earth surface - Geodetic reference surfaces - Coordinate systems – Geodetic datums and elements – Map – Scale of map – projection – UTM – Map projection of India – Space Geodesy – VLBI – SLR - LLR.
GPS Basics – system overview – working principle of GPS – Satellite ranging –calculating position – Ranging errors and its correction – GPS surveying Methods – static, Rapid static, DGPS and Kinematic methods – Real time and post processing DGPS – visibility diagram – GAGAN.

References

1. *Duggal, S.K. Surveying Vol. II, Tata McGraw Hill, 2004.*
2. *Punmia, B.C. Surveying Vol.III, Standard Publishers, 2005.*

3. *Arora, K. R. Surveying Vol. III, Standard Book House, 1996.*
4. *Satheesh Gopi. Advanced Surveying, Pearson Education, 2007.*
5. *Satheesh Gopi. The Global Positioning System and Surveying using GPS, Tata McGraw, 2005.*

Course outcomes:

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

- apply advanced surveying techniques in different fields of civil engineering
- select the advanced surveying technique which is best suited for a work
- apply total station and EDM in distance measurement and traversing
- demonstrate the principles of the earth surface, its projections and different coordinates involved in map making
- apply GPS in transportation engineering, structural engineering and land use planning

CE463 STEEL-CONCRETE COMPOSITE STRUCTURES

Course Objectives:

- To introduce the concept of composite construction and their applications in engineering
- To discuss shear connector types, degree of shear connector, interaction and their strength
- To introduce design of composite beams under propped and un-propped condition
- To introduce design of different types of composite deck slabs
- To discuss effects of temperature, shrinkage and creep and cyclic loading on composite sections

Course Content

Introduction – types – advantages – comparison – applications - limit states of composite sections – introduction to plastic analysis – mechanism of composite members
Shear connectors – types of shear connectors – degree of shear connection – partial and complete shear connections – strength of shear connectors – experimental evaluation of shear connectors.
Analysis and design of composite beams without profile sheet - propped condition – un-propped condition – deflection - design of partial shear connection
Design of composite beam with profile sheet – propped and un-propped condition – deflection of composite beams –design of partial shear connection
Introduction – Composite slabs – profiled sheeting – sheeting parallel to span – sheeting perpendicular to span – analysis and design of composite floor system.

References

1. *Johnson R.P., "Composite Structures of Steel and Concrete"' Volume-I, Black Well Scientific Publication, U.K., 1994*
2. *Teaching Resources for "Structural Steel Desgin". Vol.2 of 3, Institute of Steel Development and Growth (INSDAG), 2000*
3. *Narayanan R., "Composite Steel Structures – Advances, Design and construction, Elsevier, Applied Science, U.K., 1987*
4. *Owens, G.W & Knowels, P., Steel Designers Manual," (fifth edition), Steel Concrete Institute (U.K), Oxford Blackwell Scientific Publication, 1992.*
5. *IS 11384 – 1985 Indian Standard Code of Practice for Composite Construction in Structural Steel and Concrete, Bureau of Indian Standards, New Delhi*

Course outcomes:

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

- apply the concepts of composite construction in engineering
- analyze the behaviour of shear connectors, degree of shear connection and their interaction
- design composite beams under propped and un-propped condition
- design different types of composite deck slabs
- analyze the effects of temperature, shrinkage and creep and cyclic loading on composite sections

CE464 GEOTECHNICAL EARTHQUAKE ENGINEERING

Course objectives:

- To explain the mechanism of earthquake and its related causes to build structures and in-situ soils
- To explain how ground motion is recorded and how do quantify the earthquake intensity and frequency related parameters
- To explain how seismic site investigation will be done and seismic soil design parameters are estimated
- To explain how seismic resistant design of foundation will be done and also explain the concept of liquefaction and related causes including codal recommendations
- To explain how to do hazard assessment and mitigation and explain how do prepare a risk and microzonation mapping

Course Content

Mechanism of Earthquakes - Causes of earthquake - Earthquake Fault sources - Elastic Rebound theory - Seismic wave in Earthquake shaking - terminology - Locating an earthquake - Quantification of earthquakes. Strong Motion Records -characteristics of ground motion - Factors influencing Ground motion - Estimation of frequency content parameters
Seismic site investigations – Selected Case Studies - Evaluation of Dynamic soil properties – Codal Provisions
Design Ground Motion - Developing Design Ground Motion-Codal recommendations.
Earthquake Resistant Design of foundation of buildings - Design considerations -. Earthquake Response of slopes - Evaluation of slope stability - Liquefaction-Susceptibility - Liquefaction Resistance-Codal recommendations.
Risk mapping - Hazard assessment – Mitigation measures - Seismic microzonation and its importance

References

1. *Kameswara Rao, N.S.V., Dynamics soil tests and applications, Wheeler Publishing - New Delhi, 2000.*
2. *Krammer S.L., Geotechnical Earthquake Engineering, Prentice Hall, International Series, Pearson Education (Singapore) Pvt. Ltd., 2004.*
3. *Kameswara Rao, Vibration Analysis and Foundation Dynamics, Wheeler*
4. *Robert W. Day, Geotechnical Earthquake Engineering Hand book, McGraw Hill, 2002*

Course outcomes:

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

- demonstrate the principles of earthquake loading
- quantify earthquake intensity and ground motion
- estimate seismic soil design parameters
- analyze and design seismic resistant foundation for buildings
- prepare soil risk and microzonation maps

AR451 URBAN AND REGIONAL PLANNING

Course objectives:

- To understand the trend of urbanization and planning process
- To study about various types of plans
- To study about the planning principles
- To know how to implement the plan and financing for plan
- To know about the urban development control regulations

Course Content

Definition and classification of urban areas - Trend of urbanization - Planning process - Various stages of the planning process - Surveys in planning.
Plans - Delineation of planning areas- Regional plan, Master plan, Structure plan, detailed development plan and Transportation plan.
Planning principles of Ebenezer Howard (Garden city movement), Patrick Geddes, Dr.C.A.Doxiades, Soria Y Mata (Linear city) and Clarence, A. Perry (The neighborhood concept).
Plan implementation- Urban Planning agencies and their functions - Financing- Public, private, Non-governmental organizations- Public participation in Planning.
Development control regulations- Town and country planning act- Building bye-laws.

References

1. *Hutchinson, B.G., Principles of Urban Transport Systems Planning, Scripta, McGraw-Hill, New York, 1974.*
2. *Claire, Hand Book of Urban Planning, Van Nostrand Book Company, 1974.*
3. *Gallian, B. Arthur and Simon Eisner, The Urban Pattern - City Planning and Design, Affiliated Press Pvt. Ltd., New Delhi, 1985.*
4. *Margaret Roberts, An Introduction to Town Planning Techniques, Hutchinson, London, 1980.*
5. *Hiraskar,G.K., Fundamentals of Town Planning, Dhanpat Rai Publications, 1992.*

Course outcomes:

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

- identify the stages of planning process and surveys in planning
- apply the principles of the regional, master, structural and detailed development plans
- apply the concepts of the garden city movement, linear city and neighbourhood

- demonstrate the functions of planning and financing agencies
- apply the town and country plan act and building by-laws

MA302 OPERATIONS RESEARCH TECHNIQUES IN CIVIL ENGINEERING

Course objectives:

- To study various optimization techniques in real world problems related to civil engineering
- To study the inventory models
- To study about assigning jobs to people in an efficient way
- To study about sequencing techniques

Course Content

Inventory with uniform demand with finite rate of replenishment without and with shortage - Buffer stock - Price break
Queuing Theory - M/M/1 and M/M/C models with infinite and finite waiting space.
Dynamic programming - Principle of optimality - recursive equation approach - application to allocation shortest path and production schedule - Sequencing - Johnson's algorithm - n jobs through 2 machines, n jobs through m machines, 2 jobs through 2 machines.
Replacement problem - Present worth factor - Group replacement - Nonlinear programming - Lagrange's multiplier's method - Kuhn-Tucker's condition - Quadratic programming - Wolfe's method.

References

1. *Taha, H.A., Operations Research: An Introduction, Prentice Hall of India, New Delhi, 2003.*

Course outcomes:

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

- solve the optimization problems
- apply LPP to Transportations problems which is essential for a Civil Engineer
- solve assignment problems in an easy way
- assess the real conditions of a project so that loss can be avoided
- solve the Linear programming problems for minimizing the project cost and maximizing its profit

HM404 CREATIVE WRITING THROUGH LITERATURE

Course objectives:

- To motivate the students for creative writing
- To familiarize them with literary Forms and Figures of speech
- To expose them to the attractions and the challenges involved in creative writing
- To emphasize the need for sustained effort at developing creativity
- To enable them to write poems. Short stories, blogs, essays which can be published in magazines or web journals

Course Content

Understanding literary forms - Thinking about texts: Role-playing the Reader, the Author, and the Individual as both the Reader-Author - Intensive reading of a poem, short story, a novel, a bestseller, a film, a drama, an essay, a news story, an Ad-campaign, an Interview - Designing the individual reading list. Pursuing one's own competence.
Dissertation: Performance in the chosen genre.

References

1. *Abrams, M.H. A Glossary of Literary Terms. (Seventh Edition). Thomson: New York. 1999.*
2. *Packard, William. The Poet's Craft. Virago: New York. 2003.*
3. *Tuchman, Barbara. Practising History. Routledge: London, 2006.*
4. *Bowra, C.M. The Romantic Imagination.Faber: London. 1965.*
5. *Wallace, Irving. The Making of a Bestseller. Corgi: New York, 1984*

Course outcomes:

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

- apply various sources of creative writing like a museum, an Archive, the Library, the newspaper, Film, the advertisement
- demonstrate a variety of genres of Creative Literature like the Poem, the Novel, the Film, and the image
- demonstrate ideas like Postcolonialism, De-Colonizing the mind, working in white spaces, Postmodernism, Existentialism
- develop the language, methodology and vocabulary to read and criticize a poem, a film, a novel, an advertisement
- apply the methods of Creative thinkers and writers like S T Coleridge, Ngugi Wa Thiongo, Sri Aurobindo, Vikram Chandra, Raja Rao, and Salman Rushdie