PROGRAMME EDUCATIONAL OBJECTIVES (PEOS) –B.E. CIVIL ENGG.,

I. To prepare students for successful careers in soil mechanics and foundation engineering field that meets the needs of Indian and multinational companies.
II. To develop the confidence and ability among students to synthesize data and technical concepts and thereby apply it in real world problems.
III. To develop students to use modern techniques ,skill and mathematical engineering tools for solving problems in soil mechanics and foundation engineering
IV. To provide students with a sound foundation in mathematical , scientific and engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them for graduate studies.
V. To promote students to work collaboratively on multi-disciplinaryprojects and make them engage in life-long learning process throughout their professional life.

PROGRAMME OUTCOMES (B.E. - CIVIL)

a) Graduates will demonstrate basic knowledge in mathematics, science and engineering.
b) Graduates will demonstrate the ability **to design and conduct experiment, interpret and analyse data and report results**.
c) Graduates will demonstrate the ability **to design basic structural elements or a structure that meets desired specifications and requirements.**
d) Graduates will demonstrate the ability to **function on engineering and science laboratory teams as well as on multidisciplinary design team**.
e) Graduate will demonstrate the ability to **identify,formulate, and solve civil engineering problems.**
f) Graduate will demonstrate an understanding of their professional ethical responsibilities.
g) Graduate will be able to communicate effectively in both verbal and written form.
h) Graduate will have confidence to apply engineering solutions in global and societal context.
i) Graduate should be capable ofself education and clearly understand the value of lifelong learning.
j) Graduate will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
k) Graduate will be familiar with **modern engineering, software tools, and equipment to analyse civil engineering problems**.

PEOs& POs

The B.E. Civil Engineering Program outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme Educational Objectives	**Programme Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
I	X	X		X	X						X
II		X	X								
III				X			X				
IV	X				X						
V						X		X	X	X	

ANNA UNIVERSITY:CHENNAI 600 025

UNIVERSITY DEPARTMENTS

R - 2013

B. E.CIVIL ENGINEERING (PART TIME)

I - VII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER I

CODE NO.	COURSE TITLE	L	T	P	C
PTMA8151	Applied Mathematics	3	0	0	3
PTPH8101	Physics for Civil Engineering	3	0	0	3
PTCY8101	Chemistry for Civil Engineering	3	0	0	3
PTGE8151	Computing Techniques	3	0	0	3
PTCE8101	Strength of Materials – I	3	0	0	3
		15	**0**	**0**	**15**

SEMESTER II

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
PTAG8201	Engineering Geology	3	0	0	3
PTCE8202	Fluid Mechanics	3	0	0	3
PTCE8203	Strength of Materials – II	3	0	0	3
PTCE8204	Surveying – II	3	0	0	3
PTMA8253	Transforms and Partial Differential Equations	3	0	0	3
PRACTICAL					
PTCE8211	Surveying Laboratory – II	0	0	4	2
	TOTAL	**15**	**0**	**4**	**17**

SEMESTER III

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
PTCE8301	Highway Engineering	3	0	0	3
PTCE8302	Soil Mechanics	3	0	0	3
PTCE8303	Structural Analysis – I	3	0	0	3
PTGE8251	Environmental Science and Engineering	3	0	0	3
	TOTAL	**12**	**0**	**0**	**12**

SEMESTER IV

CODE	COURSE TITLE	L	T	P	C
THEORY					
PTCE8401	Applied Hydraulic Engineering	3	0	0	3
PTCE8402	Design of Reinforced Cement Concrete and Masonry Structures	3	0	0	3
PTCE8403	Railways, Airports and Harbour Engineering	3	0	0	3
PTCE8404	Structural Analysis – II	3	0	0	3
PTCE8405	Water Supply Engineering	3	0	0	3
	TOTAL	**15**	**0**	**0**	**15**

SEMESTER V

CODE	COURSE TITLE	L	T	P	C
THEORY					
PTCE8501	Design of Steel and Timber Structures	3	0	0	3
PTCE8502	Foundation Engineering	3	0	0	3
PTCE8503	Irrigation Engineering	3	0	0	3
PTCE8504	Wastewater Engineering	3	0	0	3
E1	Elective – I	3	0	0	3
	TOTAL	**14**	**0**	**3**	**15**

SEMESTER VI

CODE NO.	COURSE TITLE	L	T	P	C
PTCE8601	Estimation, Costing and Valuation Engineering	3	0	0	3
PTCE8602	Ground Improvement Techniques	3	0	0	3
PTCE8603	Structural Design and Drawing	2	0	3	4
E2	Elective – II	3	0	0	3
E3	Elective – III	3	0	0	3
	TOTAL	**15**	**0**	**0**	**16**

SEMESTER VII

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
PTCE8701	Structural Dynamics and Earthquake Engineering	3	0	0	3
PTMG8551	Principles of Management	3	0	0	3
E4	Elective – IV	3	0	0	3
PRACTICAL					
PTCE8711	Project work	0	0	9	6
	TOTAL	**9**	**0**	**9**	**15**

TOTAL: 105 CREDITS

ELECTIVES FOR CIVIL ENGINEERING*

CODE NO.	COURSE TITLE	L	T	P	C
GROUP I - STRUCTURAL ENGINEERING					
PTCE8004	Computer aided design of structures	3	0	0	3
PTCE8005	Design of plate and shell structures	3	0	0	3
PTCE8006	Design of pre-stressed concrete structures	3	0	0	3
PTCE8013	Industrial structures	3	0	0	3
PTCE8017	Maintenance, repair and rehabilitation of structures	3	0	0	3
PTCE8021	Power Plant Structures	3	0	0	3
PTCE8022	Prefabricated Structures	3	0	0	3
PTCE8024	Tall Structures	3	0	0	3
PTCE 8032	Concrete Technology	3	0	0	3
GROUP II – SOIL MECHANICS AND FOUNDATION ENGINEERING					
PTCE8009	Geo Environmental Engineering	3	0	0	3
PTCE8016	Introduction to Soil dynamics and Machine foundations	3	0	0	3
PTCE8020	Pavement Engineering	3	0	0	3
PTCE8023	Rock Engineering	3	0	0	3
GROUP III – TRANSPORTATION ENGINEERING					
PTCE8026	Traffic Engineering and Management	3	0	0	3
PTCE8027	Transport and Environment	3	0	0	3
PTCE8028	Transportation planning and systems	3	0	0	3
PTCE8029	Urban planning and development	3	0	0	3
GROUP IV– ENVIRONMENTAL ENGINEERING					
PTGE8551	Engineering ethics and human values	3	0	0	3
PTCE8001	Air pollution and Control Engineering	3	0	0	3
PTCE8008	Environmental and Social Impact Assessment	3	0	0	3
PTCE8014	Industrial Wastewater Engineering	3	0	0	3
PTCE8018	Municipal Solid Waste Management	3	0	0	3
PTGE 8071	Disaster Management	3	0	0	3
GROUP V – WATER RESOURCES ENGINEERING					
PTCE8012	Hydrology and Water Resources Engineering	3	0	0	3
PTCE8015	Integrated Water Resources Management	3	0	0	3
PTCE8019	Participatory Water Resources management	3	0	0	3
PTCE8003	Coastal Engineering	3	0	0	3
PTCE8011	Groundwater Engineering	3	0	0	3
PTCE8030	Water resources Systems Engineering	3	0	0	3
GROUP VI – SURVEYING					
PTCE8002	Cartography	3	0	0	3
PTCE8025	Total Station and GPS Surveying	3	0	0	3
PTCE8010	Geographic Information System	3	0	0	3
PTCE8007	Digital Cadastre	3	0	0	3
PTCE8031	Geoinformatics Applications for Civil Engineers	3	0	0	3
PTGE 8072	Human Rights	3	0	0	3

* The students should not take more than one elective course from each group.

PTMA8151 APPLIED MATHEMATICS L T P C
(Common to all branches of B.E / B.Tech (PT) Programmes) 3 0 0 3

OBJECTIVES:

- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

UNIT I MATRICES 9

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 9

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables - Maxima and minima of functions of two variables.

UNIT III ANALYTIC FUNCTION 9

Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions w = a + z , az, 1/z, **-** Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 9

Line Integral – Cauchy's theorem and integral formula – Taylor's and Laurent's Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V LAPLACE TRANSFORMS 9

Existence conditions – Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals –Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL: 45 PERIODS

OUTCOMES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

TEXTBOOKS:

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Forty Second Edition, Delhi, 2012.
2. Ramana, B.V. Higher Engineering Mathematics" Tata McGraw Hill Publishing Company, 2008.

REFERENCES:

1. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall of India, Fouth Edition, 2011.
2. Veerarajan, T., Engineering Mathematics (For First Year), Tata McGraw-Hill Pub. Pvt. Ltd., New Delhi, 2007.

PTPH8101 **PHYSICS FOR CIVIL ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVE:

- To teach the essential principles of physics for civil engineering applications such as acoustical, thermal, air conditioning, etc. and also to introduce importance of new engineering materials.

UNIT I THERMAL APPLICATIONS 9

Principles of heat transfer, steady state of heat flow, conduction through compound media-series and parallel-conductivity of rubber tube and powder materials - heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - Factors affecting the thermal performance of buildings, thermal measurements, thermal comfort, indices of thermal comfort, climate and design of solar radiation, shading devices - Central heating.

UNIT II VENTILATION AND REFRIGERATION 9

Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A. C. Systems.

UNIT III ACOUSTICS AND LIGHTING DESIGNS 9

Methods of sound absorption - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings. Visual field glare, colour - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

UNIT IV NEW ENGINEERING MATERIALS 9

Composites - Definition and Classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

UNIT V HAZARDS 9

Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and fire fighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOMES:

- The students will have the knowledge on physics related to Civil Engineering and that knowledge will be used by them in Various applications.

REFERENCES:

1. Mathur D.S., Properties of Matter, Chand & Co., New Delhi, 2002.
2. William H. Severns and Julian R. Fellows, Air conditioning and Refrigeration, John Wiley and Sons, London, 1988.
3. Stevens W.R. Building Physics:Lighting,Publisher:Oxford New York: Pergaman Press, 1969.
4. Leon Reiter, Earthquake hazard analysis - Issues and insights, Columbia University Press, 1991.
5. B.Hull and V.John, Nondestructive Testing, Mc.Millar Education Ltd., London, 1988.
6. Eugine Hecht, Optics, Pearson Education Inc., 2002.

7. D.Alexander, Natural disaster, UCL Press, London, 1993.
8. P.M.Shearer, Introduction to Seismology, Cambridge University Press, 1999.
9. Kenneth G.Budinski, Michel K., Budinski, Engineering Materials Properties and Selection, 7th Edition, Pearson, Singapore (Prentice Hall), 2002.

PTCY8101 CHEMISTRY FOR CIVIL ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To develop an understanding about the chemistry of building materials.
- Brief elucidation on corrosion and its control.
- To develop sound knowledge about the water science and technology.
- To impart basic knowledge on adhesives, abrasives, refractories and composites.
- To understand the basic concepts of chemical and instrumental methods of analysis.

UNIT I CHEMISTRY OF BUILDING MATERIALS 9

Introduction- lime – types, manufacture, properties - cement – Portland cement, setting and hardening of cement, types of cement, analysis of cement and dolomite, special cement. Concrete- manufacture and its properties-gypsum plasters. Ceramics – clay products - white ware, stone ware and earthen ware. Glass - manufacture, types, properties and uses. Fly ash –properties and uses.

UNIT II CORROSION AND ITS CONTROL 9

Introduction- chemical and electrochemical corrosions- mechanism of electrochemical and galvanic corrosions- concentration cell corrosion- passivity- soil, pitting, inter-granular, water line, stress and microbiological corrosions- galvanic series - factors influencing corrosion - measurement of corrosion rate. Corrosion control – material selection and design - electrochemical protection – sacrificial anodic protection and impressed current cathodic protection. Protective coatings - metallic coatings (hot dipping, metal cladding, galvanizing, tinning, electroplating, electroless plating), non-metallic inorganic coatings, organic coatings (paints).

UNIT III ADHESIVES AND COMPOSITES 9

Adhesives: Introduction on adhesive action, definitions, development of adhesive bond strength-physical and chemical factors influencing adhesive action- classification of adhesives- important synthetic adhesives. Composites - Introduction- definition - constitution- classification- applications of composite materials- fiber reinforced composites- properties of reinforced composites.

UNIT IV ABRASIVES, AND REFRACTORIES 9

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of refractories – general method; acidic refractories – fire clay, silica; basic refractories – magnesite, dolomite; neutral refractories – silicon carbide, zircon.

UNIT V WATER AND INSTRUMENTAL ANALYSIS 9

Properties of water, sources, quality for different uses-significance of water quality parameter Ph, EC, TDS, Hardness, chloride, sulphate, iron, fluoride, nitrate, BOD, COD, and heavy metals (As, Hg, Cr, Pb) and their determination by titrimetry, electrometry, UV-visible, AAS, ICP-AES, softening of water by ion exchange method, municipal water treatment, principle, coagulations, and filtration, and disinfection. Desalination by reverse osmosis method.

TOTAL = 45 PERIODS

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXTBOOKS:

1. DaraS.S,UmareS.S."Engineering Chemistry", S. Chand & Company Ltd., New Delhi , 2010.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2009

REFERENCES:

1. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2008.
2. Mary Jane Shultz "Engineering Chemistry".,Cengage Learning India private Limited., New Delhi., 2007.
3. AshimaSrivastava.,Janhavi N N., Concepts of Engineering Chemistry"., ACME Learning Private Limited., New Delhi., 2010.
4. Vairam S, Kalyani P, SubaRamesh.,"Engineering Chemistry"., Wiley India PvtLtd.,New Delhi., 2011.

PTGE8151 COMPUTING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES: The students should be made to:

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION 9

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS 9

Problem formulation – Problem Solving - Introduction to ' C' programming –fundamentals – structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

UNIT IV FUNCTIONS AND POINTERS 9

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems.

UNIT V STRUCTURES AND UNIONS 9

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Design C Programs for problems.
- Write and execute C programs for simple applications.

TEXTBOOKS:

1. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009
2. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
3. Yashavant P. Kanetkar. " Let Us C", BPB Publications, 2011.

REFERENCES:

1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
2. Byron S Gottfried, " Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007

PTCE8101 STRENGTH OF MATERIALS – I L T P C
3 0 0 3

OBJECTIVE:

- To enable the student to understand the behaviour of deformable structural elements, subjected to different types of loadings

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 10

Rigid and deformable bodies – Stability, strength and stiffness - Axial and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Biaxial state of stress – Elastic Constants - Stresses and deformation of thin cylindrical and spherical shells – Stresses at a point – Stress tensor - Stresses on inclined planes – Principal stresses and principal planes – Mohr's circle of stress.

UNIT II ANALYSIS OF PLANE TRUSSES 8

Stability and equilibrium of plane frames – Perfect frames - Types of trusses – Analysis of forces in truss members – Method of joints – Method of tension co-efficient – Method of sections.

UNIT III BENDING OF BEAMS 10

Beams – Types and transverse loading on beams – Shear force and bending moment in beams – Cantilever beams – Simply supported beams and over-hanging beams - Theory of simple bending – Bending stress distribution – Load carrying capacity – Proportioning of sections – Leaf springs – Flitched beams – Shear stress distribution.

UNIT IV TORSION 8

Theory of simple torsion - Stresses and deformation in circular and hollow shafts – Stepped shafts – Shafts fixed at both ends – Stresses and deflection in helical springs.

UNIT V DEFLECTION OF BEAMS 9

Double Integration method – Macaulay's method – Area moment method – Conjugate beam method for computation of slopes and deflections in determinate beams.

TOTAL: 45 PERIODS

OUTCOMES:

- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behavior of columns, beams and failure of materials

TEXTBOOKS:

1. Egor. P.Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi 2001
2. Vazirani.N, Ratwani.M, Analysis of Structures, Khanna Publishers, New Delhi 2001
3. Rajput.R.K. Strength of Materials, S.Chand & Company Ltd., New Delhi 2006.
4. Elangovan.A, Porul Valimaiyiyal I, Anna University, 2011
5. Timoshenko.S.P. and Young .D.H., Elements of Strength of Materials, V Edition, Affiliated East-West Press Pvt. Ltd., New Delhi, 1998.

REFERENCES:

1. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 2002
2. Roger T.Fenner, " Mechanics of Solids", ELBS, Oseny Mead, Oxford, 1990
3. Beer.F.P. & Johnston.E.R."Mechanics of Materials", Tata McGraw Hill, New Delhi 2004.

PTAG8201 ENGINEERING GEOLOGY L T P C
3 0 0 3

OBJECTIVES:

- At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies. The students of civil engineering will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor. The knowledge of geophysical methods and remote sensing techniques are useful to know the various surface and subsurface features. Based on this, civil engineers can choose the types of foundations and other related aspects.

UNIT I PHYSICAL GEOLOGY 9

Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

UNIT II MINEROLOGY 9

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

UNIT III PETROLOGY 9

Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS 9

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

UNIT V GEOLOGICAL INVESTIGATION 9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings. Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL: 45 PERIODS

OUTCOMES: The students completing this course

- Will be able to understand the importance of geological knowledge such as earth,earthquake, volcanism and the action of various geological agencies.
- Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor Can choose the types of foundations and other related aspects

TEXTBOOKS:

1. Varghese, P.C., Engineering Geology for Civil Engineering PHI Learning Private Limited, New Delhi, 2012.
2. Venkatareddy. D. Engineering Geology, Vikas Publishing House Pvt. Ltd. 2010.
3. KVGK Gokhale, Principles of Engineering Geology, BS Publications, Hyderabad 2011.
4. N. Chenna Kesavulu. Textbook of Engineering Geology, Macmillan India Ltd., 2009.
5. Parbin Singh. A Text book of Engineering and General Geology, Katson publishing house, Ludhiana 2009.

REFERENCES:

1. Muthiayya, V.D.(1969), " A Text of Geology", Oxford IBH Publications, Calcutta.
2. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3. F.G.Bell. Fundamentals of Engineering Geology, B.S. Publications. Hyderabad 2011.
4. Dobrin, M.B An introduction to geophysical prospecting, McGraw-Hill, New Delhi, 1988.

PTCE8202 FLUID MECHANICS L T P C
3 0 0 3

OBJECTIVE:

- To introduce the students to the mechanics of fluids through a thorough understanding of the properties of the fluids, behaviour of fluids under static conditions. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
- To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on vanes.

UNIT I FLUIDS PROPERTIES AND FLUID STATICS 9

Scope of fluid mechanics - Definitions of a fluid - Methods of analysis - Dimensions and units - viscosity, density, perfect gas, vapour pressure and surface tension - Basic equation of fluid statics - Pressure measurements - Manometers. - Forces on plane and curved surfaces - Buoyancy and floatation - Stability of floating bodies - Relative equilibrium.

UNIT II BASIC CONCEPTS OF FLUID FLOW 9

(a) Kinematics – Methods of describing fluid motion - Classification of flows - Streamline, streak-line and path-lines - Stream function and velocity potentials - Flow nets; (b) Dynamics - Dimensional Concepts of System and Control volume - Application of control volume to continuity, energy and momentum - Euler's equation of motion along a stream line - Bernoulli's equation - Applications to velocity and discharge measurements - Linear momentum equation and moment-of-momentum equations and their applications.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 9

Fundamental dimensions - dimensional homogeneity - Rayleigh's method and Buckingham Pi-Theorem - Dimensionless parameters - Similitude and model studies - Distorted Models.

UNIT IV INCOMPRESSIBLE VISCOUS FLOW 9

Laminar flow between parallel plates, and pipes - Development of laminar and turbulent flows in pipes - Reynolds experiment - Darcy-Weisbach equation - Moody diagram - Major and minor losses of flow in pipes - Pipes in series and in parallel.

UNIT V BOUNDARY LAYERS AND TRANSPORT BY ADVECTION AND DIFFUSION 9

Definition of boundary layers - Displacement, momentum and energy thickness - Laminar and turbulent boundary layers - Momentum integral equation – Steady molecular diffusion and conduction – Turbulent transport equations – Channel diffusion and Dispersions and Applications.

TOTAL : 45 PERIODS

OUTCOMES:

- The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- They will also gain the knowledge of the applicability of physical laws in addressing problems in hydraulics.

TEXTBOOKS

1. Streeter, V.L. Wylie, E. B. and Bedford K.W, *Fluid Mechanics.* (9th ed) Tata McGraw Hill, New Delhi, 1998
2. Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House New Delhi. 2003

REFERENCES

1. Fox W.R. and McDonald A.T., Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 1995.
2. Jain A. K. Fluid Mechanics. Khanna Publishers 1995.
3. Roberson J.A and Crowe C.T., Engineering Fluid Mechanics. Jaico Books Mumbai, 2000.

PTCE8203 STRENGTH OF MATERIALS – II L T P C
3 0 0 3

OBJECTIVE:

- To learn the computation of deflection of beams and trusses using energy principles, analysis of indeterminate beams and columns, state of stress in three dimensions.

UNIT I ENERGY PRINCIPLES 9

Strain energy and strain energy density – Strain energy in axial force - Shear, flexure and torsion – Castigliano's and Engessor's theorems – Principle of virtual work – Application of energy theorems for computing deflections in beams – Maxwell's reciprocal theorem.

UNIT II INDETERMINATE BEAMS 9

Propped Cantilever and Fixed Beams – Fixed end moments reactions, slope and deflection for standard cases of loading –– Continuous beams – support reactions and moments – Theorem of three moments – Shear Force and Bending Moment Diagrams.

UNIT III COLUMNS 9

Behaviour of short and long columns. Euler's theory of long columns – Critical loads for prismatic columns with different end conditions - Rankine-Gordon Formula - Eccentrically loaded long columns - Eccentrically loaded short columns - middle third rule – Core of section.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS 9

Determination of principal stresses and principal planes – Volumetric strain – Theories of failure – Principal stress, principal strain, shear stress, strain energy and distortion energy theories – Application in analysis of stress, load carrying capacity and design of members. Interaction problems - Interaction curves.

UNIT V ADVANCED TOPICS 9

Unsymmetrical bending of beams - symmetrical and unsymmetrical sections, shear centre – stresses on curved beams for simple solid sections – Winkler Bach Formula – Thick cylinders – Compound cylinders - Residual stresses – Stress concentration – Fatigue and fracture.

TOTAL: 45 PERIODS

OUTCOMES:

- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behaviour of columns, beams and failure of materials.

TEXTBOOKS:

1. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi 2002.
2. Rajput.R.K, Strength Of Materials, S.Chand & Co, New Delhi, 1996
3. Elangovan.A, Porul Valimaiyiyal-II, Anna University, 2011.
4. Timeshenko, S.P, & Young D.H., Elements of Strength of Materials, V Edition, affiliated East-West Press Pvt. Ltd. New Delhi 1998.
5. Bedi, D.S., Strength of Materials, Khanna Book Publishing Co. (P) Ltd. Delhi 2000

REFERENCES:

1. Malhotra, D.R. Gupta, H.C., The Strength of Materials, Satya Prakashan, No. (Tech. India Publications), New Delhi 1995.
2. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, McGraw Hill International Editions, Third Edition, 1994.
3. Punmia, B.C, Ashok Kumar Jain, Arun Kumar Jain, Strength of Materials and Theory of Structures, Volume I and II, Lakshmi publications, New Delhi, 1998
4. Andrew Pytel Ferdinard L.Singer, Strength of Materials, International Student Edition (ISE Reprint), Harper Collins College Division, 1999.

PTCE8204 **SURVEYING - II** **L T P C**
3 0 0 3

OBJECTIVE:

- This subject deals with geodetic measurements and Control Survey methodology and its adjustments. The student is also exposed to the Modern Surveying.

UNIT I CONTROL SURVEYING 9

Horizontal and vertical control – Methods – specifications – triangulation- baseline – instruments and accessories – corrections – satellite stations – reduction to centre- trigonometrical levelling – single and reciprocal observations – traversing – Gale's table.

UNIT II SURVEY ADJUSTMENT 9

Errors Sources- precautions and corrections – classification of errors – true and most probable values- weighed observations – method of equal shifts –principle of least squares - 0 normal equation – correlates- level nets- adjustment of simple triangulation networks.

UNIT III TOTAL STATION SURVEYING 9

Basic Principle – Classifications -Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparis on between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

UNIT IV GPS SURVEYING 9

Basic Concepts - Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment – Hand Held and Geodetic receivers –data processing - Traversing and triangulation.

UNIT V APPLICATIONS 9

Route Surveying - Reconnaissance - Route surveys for highways, railways and waterways - Simple curves – Compound and reverse curves - Setting out Methods – Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances- hydrographic surveying – Tides - MSL - Sounding methods - Three-point problem - Strength of fix - Sextants and station pointer- Astronomical Surveying – field observations and determination of Azimuth by altitude and hour angle methods – fundamentals of Photogrammetry and Remote Sensing

TOTAL: 45 PERIODS

OUTCOMES: On completion of this course students shall be able to

- Understand the advantages of electronic surveying over conventional surveying methods
- Understand the working principle of GPS, its components, signal structure, and error sources
- Understand various GPS surveying methods and processing techniques used in GPS observations

TEXTBOOKS:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001.
2. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993

PTMA8253 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
(Common to Civil, ECE, Mech, Textile, Chemical) 3 0 0 3

OBJECTIVES:

- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

UNIT I FOURIER SERIES 9

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series –Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM 9

Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation –Solution of homogenous linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem –Formation of difference equation – Solution of difference equation using Z-transform.

TOTAL: 45 PERIODS

OUTCOMES:

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes.
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

TEXTBOOK:

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Forty Second Edition, Delhi, 2012

REFERENCES:

1. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall of India, Fouth Edition, 2011
2. Ramana, B.V. Higher Engineering Mathematics" Tata McGraw Hill Publishing Company, 2008.
3. Bali, N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications Pvt. Ltd., New Delhi, 2006.

PTCE8211 **SURVEYING LABORATORY- II** **L T P C**
0 0 4 2

OBJECTIVE:

- The objective of this course is to train the students to acquire skills in making precise measurements and obtaining accurate results.

I. TOTAL STATION SURVEYING **8**

a) Study of Micro –Optic , Digital Theodolite and Total Station
b) Total station Traversing

II GPS SURVEYING **16**

a) Study of Hand Held GPS
b) Study of geodetic GPS
c) Precise Positioning
d) GPS Traversing

III. FIELD ASTRONOMY **20**

a) Study of motion of the Sun
b) Determination of azimuth using known latitude
c) Determination of azimuth using hour angle
d) Determination of watch error
e) Determination of latitude

IV SETTING OUT WORKS **8**

a) Simple curve using chain and tape only
b) Simple curve by Rankine's method

V ESTABLISHMENT OF BASELINE **4**

VI THEODOLITE TRAVERSING **4**

TOTAL: 60 PERIODS

OUTCOMES:

- Students completing this course would have acquired practical knowledge on handling survey instruments like Theodolite, Tacheometery GPS and Total station and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and curves setting..

REFERENCE:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001.

PTCE8301 **HIGHWAY ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVE:

- To give an overview / basis of highway engineering with respect to the development, planning, design, construction and maintenance of highways.

UNIT I HIGHWAY PLANNING AND ALIGNMENT 8

History of road development in India – Classification of highways – Institutions for Highway planning, design and construction at different levels – factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 10

Typical cross sections of Urban and Rural roads – Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends – Lateral and vertical clearance at underpasses - IRC standards

UNIT III DESIGN OF FLEXIBLE AND RIGID PAVEMENTS 9

Design principles – pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).

UNIT IV HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE 8

Highway construction materials, properties, testing methods – Construction practice including modern materials and methods, Concrete road constructions, Polymer modified bitumen, Recycling, Different materials – Glass, Fibre, Plastic, Geo-Textiles, Geo-Membrane (problem not included) - Highway drainage – Special considerations for hilly roads.

UNIT V EVALUATION AND MAINTENANCE OF PAVEMENTS 10

Pavement distress in flexible and rigid pavement – Pavement Management Systems - Pavement evaluation, roughness, present serviceability index, skid resistance, structural evaluation, evaluation by deflection measurements – Strengthening of pavements –Types of maintenance – Highway Project formulation -IRC standards

TOTAL: 45 PERIODS

OUTCOMES:

- The students completing this course would have acquired knowledge on planning, design, construction and maintenance of highways as per IRC standards and other methods.

TEXTBOOKS:

1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Khanna.K and Justo.C.E.G. Highway Engineering, Khanna Publishers,Roorkee, 1994.
3. Indian Road Congress (IRC), Guidelines and Special Publications of Planning and Design.

REFERENCES:

1. Kadiyali.L.R. Principles and practice of Highway Engineering, Khanna Technical Publications, Delhi, 1997.
2. Blunden W.R and J.A Black, The Land Use Transport Systems, Pergamon Press, 1994
3. Clarkson.H Oglesby and R.Gary Hicks, Highway Engineering, John Wileysons, 1992
4. Sharma.S.K Principles , Practices and Design of Highway Engineering, S.Chand and Company Ltd.1995
5. O'Flaherty.C.A Highways, Butterworth – Heinemann, Oxford,2006

PTCE8302 **SOIL MECHANICS** **L T P C**
3 0 0 3

OBJECTIVES:

- To impart knowledge on behavior and the performance of saturated soil. At the end of this course student attains adequate knowledge in assessing both Physical and Engineering behaviour of soils, mechanism of stress transfer in two-phase systems and stability analysis of slopes.

UNIT I SOIL CLASSIFICATION AND COMPACTION 9

Nature of soil – phase relationships – Soil description and classification for engineering purposes, their significance – Index properties of soils - BIS Classification system – Soil compaction – Theory, comparison of laboratory and field compaction methods – Factors influencing compaction behaviour of soils.

UNIT II SOIL WATER AND WATER FLOW 9

Soil water – static pressure in water - Effective stress concepts in soils – capillary stress – Permeability measurement in the laboratory and field pumping in pumping out tests – factors influencing permeability of soils – Seepage – introduction to flow nets – Simple problems. (sheet pile and wier).

UNIT III STRESS DISTRIBUTION AND SETTLEMENT 9

Stress distribution - soil media – Boussinesq theory - Use of Newmarks influence chart – Components of settlement –– immediate and consolidation settlement – Terzaghi's one dimensional consolidation theory – computation of rate of settlement. - $\sqrt{t}$ and log t methods – e-log p relationship - Factors influencing compression behaviour of soils.

UNIT IV SHEAR STRENGTH 9

Shear strength of cohesive and cohesionless soils – Mohr – Coulomb failure theory – Measurement of shear strength, direct shear – Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – cyclic mobility – Liquefaction.

UNIT V SLOPE STABILITY 9

Slope failure mechanisms – Types - infinite slopes – finite slopes – Total stress analysis for saturated clay – Fellenius method - Friction circle method – Use of stability number - slope protection measures.

TOTAL: 45 PERIODS

OUTCOMES:

- Students have the ability to determine Index properties and classify the soil. They can also know to determine engineering properties through standard tests and empirical correction with index properties.

TEXTBOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2007
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", Wiley Eastern Ltd. New Delhi (India) 2000.
3. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2002.

REFERENCES:

1. McCarthy D.F. "Essentials of Soil Mechanics and Foundations". Prentice-Hall, 2002.
2. Coduto, D.P. Geotechnical Engineering – Principles and Practices, Prentice Hall of India Pvt.Ltd. New Delhi, 2002.

3. Das, B.M. Principles of Geotechnical Engineering". Brooks / Coles / Thompson Learning Singapore, 5th Edition, 2002.
4. Punmia, B.C. Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 2005.

PTCE8303 STRUCTURAL ANALYSIS – I L T P C
3 0 0 3

OBJECTIVE:

- To learn the modern method of analysis of beams and frames.

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 9

Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid plane frames –Williott's diagram.

UNIT II SLOPE DEFLECTION METHOD 9

Slope deflection equations- Analysis of continuous beams and rigid frames - Support settlements.

UNIT III MOMENT DISTRIBUTION METHOD 9

Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway – Support settlement.

UNIT IV FLEXIBLITY MATRIX METHOD 9

Equilibrium and compatibility - Determinate vs. indeterminate structures - Static and Kinematic Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames

UNIT V MATRIX STIFFNESS METHOD 9

Element and global stiffness matrices– Co-ordinate transformations – Rotation matrix -Compatibility matrix – transformations of stiffness matrices, load vectors and displacement vectors – Analysis of Continuous Beams – Analysis of pin-jointed plane frames and rigid frames by direct stiffness method.

TOTAL: 45 PERIODS

OUTCOMES: Students will be able to

- analysis trusses, frames and arches
- analyse structures for moving loads and
- will be conversant with classical methods of analysis.

TEXTBOOKS:

1. Bhavikatti,S.S, Structural Analysis, Vol.1 and 2, Vikas Publishing House Pvt. Ltd., New Delhi-4, 2003.
2. Punmia.B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures, Laxmi Publications, New Delhi, 1999.
3. Hibbeler, R.C., Structural Analysis, Eighth Edition, Prentice Hall, 2012.

REFERENCES:

1. William Weaver, Jr & James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi, 1995
2. Vaidyanathan,R & Perumal P, Structural Analysis, Vol.1 & 2, Laxmi Publications, New Delhi,2004
3. Ashok K.Jain, Advanced Structural Analysis, Nem Chand & Sons, 1996

4. Pandit G.S. and Gupta S.P., Structural Analysis – A Matrix Approach, Tata McGraw Hill Publishing Company Ltd., 2006
5. Reddy .C.S, "Basic Structural Analysis", Tata McGraw Hill Publishing Company, 2005.

PTGE8251 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
(Common to Civil, IT, CSE, ECE, Mech, Manu, Inds, Prod, Textile, Chemical, Printing) **3 0 0 3**

OBJECTIVES:

- To understand the structure and function of an ecosystem. To probe into various kinds of environmental pollution along with measures to control and prevent such pollution. To study the exploitation of various natural resources like Forest, Water, Land and Energy with substantial case studies. The course also enlightens on the steps taken by the Government and NGOs through the implementation of various Legislative protection acts and their impact on the environment. To study the population explosion and its impact on the environment. To focus on explaining the available Family welfare programs through the cognizance of the role of Information Technology in environment protection and human health with apt case studies.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land

degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL : 45 PERIODS

OUTCOMES:

- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2 Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia',Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

PTCE8401 APPLIED HYDRAULIC ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

UNIT I UNIFORM FLOW 9

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

UNIT II VARIED FLOWS 9

Dynamic equations of gradually varied and spatially varied flows - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step method, Graphical method - Applications.

UNIT III RAPIDLY VARIED FLOWS 9

Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Surges and surge through channel transitions.

UNIT IV TURBINES 9

Turbines - Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

UNIT V PUMPS 9

Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps: Gear pump.

TOTAL: 45 PERIODS

OUTCOMES:

- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

TEXTBOOKS:

1. Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 2002.
3. Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2000.

REFERENCES:

1. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.
2. Rajesh Srivastava, Flow through open channels, Oxford University Press, New Delhi, 2008.
3. Bansal, Fluid Mechanics and Hydraulic Machines, Laxmi Publications, New Delhi, 2008.
4. Mays L. W., Water Resources Engineering, John Wiley and Sons (WSE), New York, 2005.

PTCE8402	DESIGN OF REINFORCED CEMENT CONCRETE AND MASONRY STRUCTURES	L T P C 3 0 0 3

OBJECTIVE:

- To introduce the various philosophies of R.C. design and to study in detail the limit state design of structural elements such as beams, columns and footings

UNIT I DESIGN CONCEPTS AND ELASTIC DESIGN OF BEAMS 10

Concept of elastic method, ultimate load method and limit state method – Advantages of Limit State method over other methods – Limit State philosophy as detailed in current IS Code. Design of rectangular beam section by elastic method.

UNIT II LIMIT STATE DESIGN OF BEAMS 10

Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behaviour of R.C. beams in shear and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion – Use of design aids. Design requirement for bond and anchorage as per IS code. Serviceability requirements.

UNIT III LIMIT STATE DESIGN OF SLABS 10

Behaviour of one way and two way slabs –– design of one way simply supported, cantilever and continuous slabs. Design of two-way slabs for various edge conditions. Types of staircases - design of dog-legged staircase.

UNIT IV LIMIT STATE DESIGN OF COLUMNS AND FOOTING 10

Types of columns – design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids. Design of footing for masonry and reinforced walls – design of axially and eccentrically loaded square and rectangular footings – design of combined rectangular footings for two columns only.

UNIT V MASONRY MEMBERS 5

Determination of permissible stresses on masonry, load carrying capacity of masonry walls and pillars - Design of masonry walls, pillars and footings as per IS Codes.

TOTAL: 45 PERIODS

OUTCOMES:

- The student shall be in a position to design the basic elements of reinforced concrete structures.

TEXTBOOKS:

1. Sinha.S.N., Reinforced Concrete Design, Second Edition, Tata McGraw Hill Publishing Company, 2002.
2. Varghese.P.C., Limit State Design of Reinforced Concrete, Second Edition Prentice Hall Inc., 2010,
3. Gambhir.M.L., Fundamentals of Reinforced Concrete Design, Prentice Hall Inc., 2006.
4. Anand.S.Arya, Masonry and Timber Structures including Earthquake Resistant Design, Nem Chand and Bros., 2006.

REFERENCES:

1. IS 456–2000, Indian Standard – Plain and Reinforced Concrete – Code of Practice, Fourth Edition.
2. IS 1905–1987, Indian Code of Practice for Structural use of Unreinforced Masonry.
3. National Building Code of India 2005 (NBC 2005), Bureau of Indian Standards.
4. Dayaratnam.P., Limit State Design of Reinforced Concrete Structures, Oxford, IBH Publishing Company Pvt. Ltd., 2008.
5. Unnikrishna Pillai and Devdass Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., 2002

PTCE8403 RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To introduce the students about Railways planning, design, construction and maintenance and planning design principles of airport and harbour

UNIT I RAILWAY PLANNING AND CONSTRUCTION 10

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of guage on curves- Level Crossings - Mass Rapid Transit System.

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE 8

Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks –Railway Station and yards and passenger amenities

UNIT III AIRPORT PLANNING 8

Air transport characteristics-airport classification-air port planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, typical Airport Layouts, Case Studies, parking and Circulation Area

UNIT IV AIRPORT DESIGN 10

Runway Design: Orientation, Wind Rose Diagram, Problems on basic and Actual Length, Geometric Design, Configuration and Pavement Design Principles – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings.

UNIT V HARBOUR ENGINEERING 9

Definition of Basic Terms: Harbour, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works – Environmental concern of Port Operations – Coastal Regulation Zone, 2011

TOTAL: 45 PERIODS

OUTCOMES:

- On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

TEXTBOOKS:

1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Saxena Subhash, C. and Satyapal Arora, A Course in Railway Engineering,Dhanapat Rai and Sons, Delhi, 1998
3. Khanna.S.K. Arora.M.G and Jain.S.S, Airport Planning and Design, Nemachand and Brothers, Roorkee, 1994

REFERENCES:

1. Vazirani.V.N. and Chandola.S.P.,Transportation Engineering-Vol.1,Khanna Technical Publications, New Delhi 1991
2. Shahini.P., Airport Technique, New Delhi
3. Priyani.V.B., Highway and Airport Engineering, Charotar Book Stall, 1994
4. Rangwala.P.S, Railway Engineering, Charotar Publishing House, 1995
5. Rangwala.P.S, Airport Engineering, Charotar Publishing House, 2011

PTCE8404 **STRUCTURAL ANALYSIS – II** **L T P C**
3 0 0 3

OBJECTIVE:

- To learn the influence lines and its uses in various applications like bridges, arches. Also to learn Plastic analysis of beams and rigid frames.

UNIT I MOVING LOADS AND INFLUENCE LINES 9

Influence lines for reactions in statically determinate structures –Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads - influence lines for member forces in pin jointed frames.

UNIT II INFLUENCE LINES FOR INDETERMINATE STRUCTURES 9

Muller Breslau's principle – Application of Muller Breslau's principle to determinate beams and continuous beams.

UNIT III ARCHES 9

Arches - Structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects

UNIT IV SUSPENSION BRIDGES AND SPACE TRUSSES 9

Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders - Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

UNIT V PLASTIC ANALYSIS 9

Statically indeterminate structures – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism - Static and kinematic methods – Upper and lower bound theorems -Plastic analysis of indeterminate beams and frames.

TOTAL: 45 PERIODS

OUTCOMES:

- The student will have the knowledge on advanced methods of analysis of structures including space and cable structures.

TEXTBOOKS:

1. Bhavikatti.S.S, Structural Analysis, Vol.1 and 2, Vikas Publishing House Pvt. Ltd., 2003.
2. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, Theory of structures, Laxmi Publications, 2004.
3. Vaidyanathan.R and Perumal.P, Structural Analysis, Vol.1 and 2, Laxmi Publications, 2004.

REFERENCES:

1. Jain A.K. and Arya A.S., Structural Analysis, Vol.II, Nem Chand and Bros., 1996
2. Ashok K.Jain, Advanced Structural Analysis, Nem Chand and Bros., 1996
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co. Ltd. 2002.
4. Harry H.West, Fundamentals of Structural Analysis, John Wiley and sons Inc, 2002
5. Gambhir.M.L., Fundamentals of Structural Mechanics and Analysis, PHI Learning Pvt. Ltd., 2011.
6. Cook.R.D., Concepts and applications of Finite Element Analysis, John Wiley and Sons, 1989.

PTCE8405 WATER SUPPLY ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To equip the students with the principles and design of water treatment and distribution

UNIT I SOURCES OF WATER 9

Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand – Sources of water and their characteristics, Surface and Groundwater – Impounding Reservoir – Development and selection of source – Source Water quality – Characterization – Significance – Drinking Water quality standards.

UNIT II CONVEYANCE FROM THE SOURCE 9

Water supply – intake structures – Functions; Pipes and conduits for water – Pipe materials – Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes – appurtenances – Types and capacity of pumps – Selection of pumps and pipe materials.

UNIT III WATER TREATMENT 10

Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, flocculators, sedimentation tanks and sand filters; Disinfection – Iron and Manganese removal, Defluoridation – Residue Management – Corrosion Control; Construction, Operation and Maintenance aspects – Process flow diagram Layout and Hydraulic Profile for water treatment plants.

UNIT IV ADVANCED WATER TREATMENT 7

Water softening – Desalination- R.O. Plant – demineralization – Adsorption - Ion exchange– Membrane Systems – Construction and Operation & Maintenance aspects – Recent advances.

UNIT V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS 10

Requirements of water distribution – Components – Selection of pipe material – Service reservoirs – Functions – Network design – Economics – Analysis of distribution networks -Computer applications – Appurtenances – operation and maintenance – Leak detection.

Principles of design of water supply in buildings – House service connection – Fixtures and fittings, systems of plumbing and types of plumbing.

TOTAL: 45 PERIODS

OUTCOMES: The students completing the course will have

- an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- an understanding of water quality criteria and standards, and their relation to public health,
- the ability to design and evaluate water supply project alternatives on basis of chosen selection criteria

TEXTBOOKS:

1. Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi ,2010.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.
3. Punmia, B.C., Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P)Ltd., New Delhi, 2010.

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

PTCE8501 DESIGN OF STEEL AND TIMBER STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To learn the design of Component and structure using steel (Limit State Design) and timber material subjected to external loading.

UNIT I SECTIONS AND JOINTS 10

Types of steel structures – Properties of rolled steel sections and Light gauge steel sections – Riveted and bolted connections – Failures of joints – Single and multiple riveted lap and butt joints under axial and eccentric loading – Strength of fillet and butt welded joints – Design of riveted, bolted and welded joints.

UNIT II TENSION MEMBERS 8

Design of simple and built-up members subjected to tension –Effective area of angles connected to gussets.

UNIT III COMPRESSION MEMBERS 9

Maximum slenderness ratio of various compression members – IS code provision for compression members – Design of simple and built-up compression members with lacings and battens – Design of column bases.

UNIT IV BEAMS 9

Design of simple beams based on strength and stiffness as per IS code – Design of built–up beams and curtailment of flange plates –Flange splice and web splice- Design of plate girder and stiffeners.

UNIT V TIMBER 9

Study of properties and strength of natural and laminated timber – Allowable stresses in compression, tension and flexure as per IS Code – Types of joints with nails and bolts – Design of simple compression members as per IS code– Design of beams for strength and stiffness as per IS code.

TOTAL: 45 PERIODS

OUTCOMES:

- The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code and also know to design Timber Members.

TEXTBOOKS:

1. Subramanian.N, Design of Steel Structures, Oxford University Press, 2008.
2. Bhavikatti.S.S, Design of Steel Structures By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2009.
3. Punmia, Ashok Kumar Jain, B.C.Punmia, Comprehensive design of Steel Structures, Laxmi Publications, 2005.

REFERENCES:

1. Narayanan.R.et.al. Teaching Resource on Structural Steel Design, INSDAG, Ministry of Steel Publications, 2002.
2. Shah.V.L. and Veena Gore, Limit State Design of Steel Structures IS 800–2007 Structures Publications, 2009.
3. Duggal.S.K, Limit State Design of Steel Structures, Tata McGraw Hill Publishing Company, 2005

PTCE8502 **FOUNDATION ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVE:

- To impart knowledge on common method of sub soil investigation and design of foundation. At the end of this course student acquires the capacity to investigate the soil condition and to select and design a suitable foundation.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives – Methods of exploration – auguring and boring – Wash boring and rotary drilling – Depth of boring – Spacing of bore hole – Sampling techniques – Representative and undisturbed sampling – methods - Split spoon sampler, Thin wall sampler, Stationery piston sampler – Penetration tests (SPT and SCPT) – Data interpretation - strength parameters and Liquefaction potential - Selection of foundation based on soil condition- Bore log report.

UNIT II SHALLOW FOUNDATION 9

Introduction – Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems – Bearing capacity from in-situ tests (SPT, SCPT and plate load)Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

UNIT III FOOTINGS AND RAFTS 9

Types of footings – Contact pressure distribution: Isolated footing – Combined footings – Types and proportioning – Mat foundation – Types and applications – Proportioning – Floating foundation – Seismic force consideration – Codal Provision.

UNIT IV PILE FOUNDATION 9

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – static formula – dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity- Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles – Capacity under compression and uplift.

UNIT V RETAINING WALLS 9

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil – Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann Graphical method – pressure on the wall due to line load – Stability analysis of retaining walls.

TOTAL : 45 PERIODS

OUTCOMES:

- Students will have the ability to select type of foundation required for the soil at a place and able to design shallow, foundation, deep foundation and retaining structures.

TEXTBOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers and Distributers Ltd., New Delhi, 2007.
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", New Age International (P) Ltd, New Delhi,2005.
3. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005.

4. Varghese, P.C., ”Foundation Engineering”, Prentice Hall of India Private Limited, New Delhi, 2005.

REFERENCES:

1. Das, B.M. “Principles of Foundation Engineering” (Fifth edition), Thompson Asia Pvt. Ltd., Singapore, 2003.
2. Kaniraj, S.R. “Design aids in Soil Mechanics and Foundation Engineering”, Tata McGraw Hill publishing company Ltd., New Delhi, 2002.
3. Punmia, B.C. Soil Mechanics and Foundations”, Laxmi Publications Pvt.Ltd., New Delhi, 1995.
4. Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, New Delhi, 2007 (Reprint)
5. IS Code 6403 : 1981 (Reaffirmed 1997) “Bearing capacity of shallow foundation”, Bureau of Indian Standards, New Delhi.
6. IS Code 8009 (Part 1):1976 (Reaffirmed 1998) “Shallow foundations subjected to symmetrical static vertical loads”, Bureau of Indian Standards, New Delhi.
7. IS Code 8009 (Part 2):1980 (Reaffirmed 1995) “Deep foundations subjected to symmetrical static vertical loading”, Bureau of Indian Standards, New Delhi.
8. IS Code 2911 (Part 1) : 1979 (Reaffirmed 1997) “Concrete Piles” Bureau of Indian Standards, New Delhi.
9. IS Code 2911 (Part 2) : 1979 (Reaffirmed 1997) “Timber Piles”, Bureau of Indian Standards, New Delhi.
10. IS Code 2911 (Part 3) : 1979 (Reaffirmed 1997) “Under Reamed Piles”, Bureau of Indian Standards, New Delhi.
11. IS Code 2911 (Part 4) : 1979 (Reaffirmed 1997) “Load Test on Piles”, Bureau of Indian Standards, New Delhi.

PTCE8503 IRRIGATION ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the student to the concept of soil-plant characteristics and their water requirements.
- To understand the necessity of planning an irrigation system to provide water at the right time and right place.

UNIT I IRRIGATION PRINCIPLES 9

Need for irrigation – Advantages and ill effects – Development of irrigation – National Water Policy – Tamil Nadu scenario - Physical properties of soil that influence soil moisture characteristics – Concept of soil water potential and its components: Gravitational, Pressure and Osmotic- Retention of water in soils and concept of plant available water – Movement of water into and within the soils – Measurement of soil moisture content and the matric tension with which it its held

UNIT II CROP WATER REQUIREMENT 8

Irrigation – Necessity and importance - Advantages and disadvantages – Crop and crop seasons in India –Duty, Delta, Base Period– Factors affecting Duty-Irrigation efficiencies– Consumptive use of water-Irrigation requirements of crops - Standards for irrigation water- Planning and Development of irrigation projects.

UNIT III DIVERSION AND IMPOUNDING STRUCTURES 9

Head works –Weirs and Barrage –Types of impounding structures - Factors affecting, location of dams -Forces on a dam -Design of Gravity dams- Earth dams, Arch dams – Spillways -Energy dissipaters.

UNIT IV CANAL IRRIGATION 11

Classification of canals- Alignment of canals – Design of irrigation canals– Regime theories - Canal Head works – Canal regulators - Canal drops – Cross drainage works – Canal Outlet, Escapes – Lining and maintenance of canals – Other methods of Irrigation – Surface, Subsurface – Merits and Demerits.

UNIT V IRRIGATION WATER MANAGEMENT 8

Modernization techniques – Rehabilitation – Command Area Development - Systems of rice intensification - Water delivery systems - Participatory Irrigation Management - Farmer's organization and turn over – Water users associations - Economic aspects of irrigation.

TOTAL: 45 PERIODS

OUT COMES:

- The students will have knowledge and skills on Planning, design, operation and management of reservoir system.
- The student will gain knowledge on different methods of irrigation including canal irrigation.

TEXTBOOKS:

1. Sharma, R.K., and Sharma, T.K., "Irrigation Engineering", S. Chand and Company, New Delhi, 2008.
2. Michael, A.M., "Irrigation Engineering", Vikas Publishers, New Delhi, 2008.
3. Garg, S.K., "Irrigation Engineering," Laxmi Publications, New Delhi, 2008.

REFERENCES:

1. Arora, K.R., "Irrigation, Water Power and Water Resources Engineering", Standard Publishers Distributors, New Delhi, 2009.
2. Basak, N.N., "Irrigation Engineering", Tata McGraw-Hill Publishing Co, New Delhi, 2008.
3. Dilip Kumar Majumdar, "Irrigation Water Management", Prentice-Hall of India, New Delhi, 2008.
4. Punmia, B.C., "Irrigation and Water Power Engineering", Laxmi Publishers, New Delhi, 2008.
5. Asawa, G.L., "Irrigation Engineering", New Age International Publishers, New Delhi, 2000.

PTCE8504 WASTE WATER ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

UNIT I PLANNING AND DESIGN OF SEWERAGE SYSTEM 9

Characteristics and composition of sewage-- population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – Maintenance of sanitary sewerage and storm drainage – sewer appurtenances – corrosion in sewers –prevention and control – sewage pumping- drainage in buildings-plumbing systems for drainage.

UNIT II PRIMARY TREATMENT OF SEWAGE 9

Objectives – Unit Operations and Processes – Selection of treatment processes –- Onsite sanitation - Septic tank- Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks – Construction, Operation and Maintenance aspects.

UNIT III SECONDARY TREATMENT OF SEWAGE 9

Objectives – Selection of Treatment Methods – Principles, Functions, - Activated Sludge Process and Trickling filter- other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

UNIT IV DISPOSAL OF SEWAGE 9

Standards for Disposal - Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – deoxygenation and reaeration - Land disposal – Sewage farming – sodium hazards -Soil dispersion system.

UNIT V SLUDGE TREATMENT AND DISPOSAL 9

Objectives - Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – ultimate residue disposal – recent advances.

TOTAL: 45 PERIODS

OUTCOMES: The students completing the course will have

- ability to estimate sewage generation and design sewer system including sewage pumping stations
- required understanding on the characteristics and composition of sewage, self-purification of streams
- ability to perform basic design of the unit operations and processes that are used in sewage treatment

TEXTBOOKS:

1. Duggal K.N., “Elements of Environmental Engineering” S.Chand and Co. Ltd., New Delhi, 2010.
2. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2003.
3. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010.

REFERENCES:

1. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.
2. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2003.
3. Gray N.F, “Water Technology”, Elsevier India Pvt. Ltd., New Delhi, 2006.

PTCE8601 ESTIMATION, COSTING AND VALUATION ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To offer knowledge in estimation, tender practices, contract procedures, and valuation. The student will be able to prepare estimates, call for tenders and execute works.

UNIT I QUANTITY ESTIMATION 9

Philosophy – Purpose – Methods of estimation – Types of estimates – Approximate estimates – Detailed estimate – Estimation of quantities for buildings, roads, canals and hydraulic structures using computer softwares.

UNIT II RATE ANALYSIS AND COSTING 9

Standard Data – Observed Data – Schedule of rates – Market rates – Assessment of Man Hours and Machineries for common civil works – Rate Analysis – Cost Estimates using Computer softwares

UNIT III SPECIFICATIONS AND TENDERS 9

Specifications – Detailed and general specifications – Constructions – Sources – Types of specifications – TTT Act 2000 – Tender notices – types – tender procedures – Drafting model tenders E-tendering**-**Digital signature certificates- Encrypting -Decrypting – Reverse auctions.

UNIT IV CONTRACTS 9

Contract – Types of contracts – Formation of contract – Contract conditions – Contract for labour, material, design, construction – Drafting of contract documents based on IBRD / MORTH Standard bidding documents – Construction contracts – Contract problems – Arbitration and legal requirements.

UNIT V VALUATION 9

Definitions – Various types of valuations – Valuation methods – Valuation of land – Buildings – Valuation of plant and machineries.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

1. B.S.Patil, 'Civil Engineering Contracts and Estimates', University Press, 2006
2. D.N. Banerjee, 'Principles and Practices of Valuation', V Edition, Estern Law House, 1998

REFERENCES:

1. Hand Book of Consolidated Data – 8/2000, Vol.1, TNPWD
2. Tamil Nadu Transparencies in Tenders Act, 1998
3. Arbitration and Conciliation Act, 1996
4. Standard Bid Evaluation Form, Procurement of Good or Works, The World Bank, April 1996
5. Standard Data Book for Analysis and Rates, IRC, New Delhi, 2003

PTCE8602 GROUND IMPROVEMENT TECHNIQUES L T P C
3 0 0 3

OBJECTIVE:

- At the end of the course student is expected to identify the problematic soil and suitable suggest remedial measures to improve their behaviour.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES 8

Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATEREING 10

Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two – dimensional flow for fully and partially penetrated slots in homogeneous deposits - Simple cases - Design.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 10

Insitu densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibroflotation, Sand compaction piles and deep compaction. Consolidation: Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques – simple design - relative merits of above methods and their limitations.

UNIT IV EARTH REINFORCEMENT 9

Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – simple design - applications of reinforced earth. Role of Geotextiles in filtration, drainage, separation, road works and containment.

UNIT V GROUT TECHNIQUES 8

Types of grouts – Grouting equipments and machinery – injection methods – Grout monitoring – stabilization with cement, lime and chemicals – stabilization of expansive soil.

TOTAL: 45 PERIODS

OUTCOMES:

- Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area and capable of providing alternate methods to improve its character suitable to the project so that the structures built will be stable and serve.

TEXTBOOKS:

1. Purushothama Raj. P, “Ground Improvement Techniques”, Firewall Media, 2005.
2. Koerner, R.M. “Construction and Geotechnical Methods in Foundation Engineering”, McGraw Hill, 1994.

REFERENCES:

1. Moseley, M.P., “Ground Improvement Blockie Academic and Professional”, Chapman and Hall, Glasgow, 1998.
2. Jones J.E.P. “Earth Reinforcement and Soil Structure”, Butterworths, London, 1985.
3. Winterkorn, H.F. and Fang, H.Y. “Foundation Engineering Hand Book”. Van Nostrand Reinhold, 1994.
4. Das, B.M. – “Principles of Foundation Engineering” (seventh edition), Cengage learning,2010.
5. Coduto, D.P. “Geotechnical Engineering – Principles and Practices”, Prentice Hall of India Pvt.Ltd. New Delhi, 2011.
6. Koerner, R.M. “Designing with Geosynthetics” (Fourth Edition), Prentice Hall, Jersey, 1999.
7. IS Code 9759 : 1981 (Reaffirmed 1998) “Guidelines for Dewatering During Construction”, Bureau of Indian Standards, New Delhi.
8. IS Code 15284(Part 1) : 2003 “Design and Construction for Ground Improvement – Guidelines” (Stone Column), Bureau of Indian Standards, New Delhi.

PTCE8603 STRUCTURAL DESIGN AND DRAWING L T P C
2 0 3 4

OBJECTIVES:

- This course aims at providing students with a solid background on the principles of structural engineering design. Students will be exposed to the theories and concepts of both concrete and steel design and analysis both at the element and system levels.

UNIT I INTRODUCTION AND PLANNING 6+9

Introduction - Planning and Design Process – Design Philosophies-Structural Safety, Allowable Stress Design, Limit State Design – Types of Loading – Dead , Live, Wind and Earthquake loads - Fabrication Drawing of Simple Riveted, Bolted and Welded Connections.

UNIT II LIQUID STORAGE STRUCTURES 6+9

RC Water Tanks- Circular and Rectangular – Design and Drawing –Hemispherical Bottomed Steel Water Tank – Design and Drawing.

UNIT III DESIGN OF BRIDGE COMPONENTS 6+9

IRC Specifications and Loading – Design and Drawing of a Solid Slab RC Bridge – Design and Drawing of Steel Foot-over Bridge.

UNIT IV RETAINING WALLS 6+9

Design and Detailing of RC Cantilever and Counterfort Retaining Walls – Horizontal Backfill with Surcharge – Design of Shear Key.

UNIT V INDUSTRIAL STRUCTURES 6+9

Steel Roof Trusses – Design and Drawing of Roofing Elements – Purlins – Design and Drawing of Self supported Chimney.

(L :30 + P :45) TOTAL : 75 PERIODS

OUTCOMES:

- At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

TEXTBOOKS:

1. Krishnaraju N, Structural Design and Drawing, Universities Press, 2009.
2. Punmia B.C, Ashok Kumar Jain and Arun Kumar Jain, Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2003.

REFERENCES:

1. Krishnamurthy D, Structural Design and Drawing Vol I, II and III, CBS Publishers, 2010.
2. Shah V L and Veena Gore, Limit State Design of Steel Structures IS 800-2007, Structures Publications, 2009.

PTCE8701 STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To provide a basic understanding of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant**.**

UNIT I SINGLE DEGREE OF FREEDOM SYSTEM 9

Definition of degree of freedom – Idealization of structure as SDOF system – Formulation of equation of motion for various SDOF system – D' Alemberts Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

UNIT II MULTI DEGREE OF FREEDOM SYSTEM 9

Formulation of equation of motion for multidegree of freedom (MDOF) system – Evaluation of natural frequencies and modes – Eigen values and Eigen vectors – Response to free and forced vibration of undamped and damped MDOF systems – Modal superposition methods.

UNIT III INTRODUCTION TO EARTHQUAKE ENGINEERING 9

Elements of Engineering Seismology – Definitions, Introduction to Seismic hazard, Earthquake phenomenon – Seismotectonics – Seismic Instrumentation – Characteristics of Strong Earthquake motion – Estimation of Earthquake Parameters.

UNIT IV EARTHQUAKE EFFECTS ON STRUCTURES 9

Effect of earthquake on different types of structures – Behaviour of RCC, Steel and prestressed Concrete Structures under earthquake loading – Pinching Effect – Bouchinger Effects – Evaluation of Earthquake forces – IS Code 1893: 2002 – Response Spectra – Lessons learnt from past earthquakes.

UNIT V CONCEPTS OF EARTHQUAKE RESISTANT DESIGN 9

Causes of damage – Planning considerations / Architectural concept (IS 4326–1993) – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry buildings – Design consideration – Guidelines – Earthquake resistant design of R.C.C. buildings – Lateral load analysis – Design and detailing (IS 13920:1993).

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXTBOOKS:

1. Clough. R.W, and Penzien.J, Dynamics of Structures, Second Edition, Mc Graw Hill International Edition, 1995
2. Agarwal.P and Shrikhande.M.,Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. 2007.

REFERENCES:

1. Mario Paz, Structural Dynamics – Theory and Computations, Third Edition, CBS publishers, 1990.
2. Jai Krishna, Chandrasekaran.A.R., and Brijesh Chandra, Elements of Earthquake Engineering, South Asia Publishers, 1994.
3. Minoru Wakabayashi, Design of Earthquake Resistant Buildings, Mc Graw – Hill Book Company, 1986
4. Humar.J.L, Dynamics of Structures, Prentice Hall Inc., 1990.
5. Anil K Chopra, Dynamics of structures – Theory and applications to Earthquake Engineering, Prentice Hall Inc., 2001.
6. Moorthy.C.V.R., Earthquake Tips, NICEE, IIT Kanpur,

PTMG8551 **PRINCIPLES OF MANAGEMENT** **L T P C**

(Common to Civil, CSE, ECE, EEE, Industrial) **3 0 0 3**

AIM

- To learn the different principles and techniques of management in planning, organizing, directing and controlling.

OBJECTIVES

- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management –Science or Art – Manager Vs Entrepreneur- types of managers-managerial roles and skills – Evolution of Management –Scientific, human relations , system and contingency approaches– Types of Business organization- Sole proprietorship, partnership, company-public and private sector enterprises- Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart–organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization –Job Design - Human Resource Management –HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour– motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling –budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management” Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, “ Management”, Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich “Essentials of management” Tata McGraw Hill,1998.
4. Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999

PTCE8711 PROJECT WORK L T P C
0 0 9 6

OBJECTIVE:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

SYLLABUS:

The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

PTCE8004 COMPUTER AIDED DESIGN OF STRUCTURES L T P C
3 0 0 3

OBJECTIVES:

- The overall idea of implementing a computer aided design with advantages and demerits. To learn different software techniques in finite element analysis and to optimize the structural components.

UNIT I INTRODUCTION 9

Fundamental reason for implementing CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS 9

Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3 Dimensional transformations – Concatenation - Wire frame modeling - Solid modeling - Graphic standards - Drafting packages – Auto CAD.

UNIT III STRUCTURAL ANALYSIS 9

Principles of structural analysis - Fundamentals of finite element analysis - Concepts of finite elements – Stiffness matrix formulation – Variational Method – Weighted residual method – Problems – Conditions of convergence of functions – Analysis packages and applications.

UNIT IV DESIGN AND OPTIMIZATION 9

Principles of design of steel and RC structures - Beams and Columns - Applications to simple design problems - Optimization techniques - Algorithms - Linear programming.

UNIT V EXPERT SYSTEMS 9

Introduction to artificial intelligence - Knowledge based expert systems – Applications of KBES- Rules and decision tables - Inference mechanisms - simple applications

TOTAL: 45 PERIODS

OUTCOMES:

- Students will be able to implement ideas of computer aided design with advantages and demerits.

TEXTBOOKS:

1. Groover M.P. and Zimmers E.W.Jr., CAD / CAM, Computer Aided Design and Manufacturing, Prentice Hall of India Ltd, New Delhi, 1984.
2. Krishnamoorthy.C.S., Rajeev,S, Computer Aided Design, Narosa Publishing House, New Delhi,1990.

REFERENCE:

- Harrison H.B., Structural Analysis and Design, Part I and II Pergamon Press, Oxford, 1990.

PTCE8005 DESIGN OF PLATE AND SHELL STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To learn the design of plate and shell and spatial structures

UNIT I THIN PLATES WITH SMALL DEFLECTION 10

Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT II RECTANGULAR PLATES 10

Simply supported rectangular plates - Navier solution and Levy's method – Loading.

UNIT III ANALYSIS OF THIN SHELLS 5

Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic parabolid - Classification of shells - Types of shells - Structural action.

UNIT IV DESIGN OF SHELLS 10

Spherical dome, Conical shell and Cylindrical shell.

UNIT V SPACE FRAMES 10

Space Frames – Configuration – Types of nodes – General principles of design philosophy – Behaviour.

TOTAL: 45 PERIODS

OUTCOMES

- The students will have indepth knowledge in the analysis and design of plates, shells and space frame structures

TEXTBOOKS:

1. P.C.Varghese, Design of Reinforced Concrete Shells and Folded Plates, PHI Learning Private Limited, New Delhi, 2010.
2. R.Szilard, Theory and Analysis of Plates, Prentice Hall Inc., 1995.
3. N.Subramanian, Principles of Space Structures, Wheeler Publishing Co. 1999.

REFERENCES:

1. Billington D.P. Thin Shell Concrete Structures, McGraw Hill,1995.
2. Chatterjee B.K. Theory and design of Concrete Shells, Oxford and IBH Publishing Co., New Delhi 1998.

PTCE8006 DESIGN OF PRESTRESSED CONCRETE STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To understand the behaviour and performance of prestressed concrete structures. Compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures. Understand the performance of composite members. Finally to learn the design of prestressed concrete structures.

UNIT I INTRODUCTION 9

Historical developments – Basic principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel, Lee-McCall and Gifford Udall anchorage systems – Analysis of sections of stresses by stress concept, strength concept and load balancing concept – Losses of prestress in post -tensioned and pre-tensioned members.

UNIT II DESIGN FOR FLEXURE AND SHEAR 9

Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE 9

Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and I.S. 1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS 9

Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V MISCELANEOUS STRUCTURES 9

Design of tension and compression members – Tanks, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

TOTAL: 45 PERIODS

OUTCOMES:

- Student shall have a knowledge on methods of prestressing and able to design various prestressed concrete structural elements.

TEXTBOOKS:

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, 1995.
2. Pandit.G.S. and Gupta.S.P., Prestressed Concrete, CBS Publishers and Distributers Pvt. Ltd., 1993.

REFERENCES:

1. Lin T.Y. and Ned.H.Burns, Design of prestressed Concrete Structures, John Wiley and Sons, 1982.
2. Rajagopalan.N, Prestressed Concrete, Narosa Publishing House, 2002.
3. Arthur H.Nilson, Design of Prestressed Concrete, John Wiley and Sons, 1987.
4. Dayaratnam.P., Prestressed Concrete Structures, Oxford and IBH, 1982.
5. Sinha.N.C. and Roy.S.K., Fundamentals of Prestressed Concrete, S.Chand and Co. Ltd., 1994.

PTCE8013 INDUSTRIAL STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To learn the layout, functional aspects and design of structures used in industries.

UNIT I PLANNING 9

Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components.

UNIT II FUNCTIONAL REQUIREMENTS 9

Lighting – Ventilation - Acoustics – Fire safety – Guidelines from factories act.

UNIT III DESIGN OF STEEL STRUCTURES 9

Industrial roofs – Crane girders – Mills buildings – Bunkers and Silos - Chimney.

UNIT IV DESIGN OF R.C. STRUCTURES 9

Corbels, Brackets and Nibs - Silos and bunkers –Chimney - Principles of folded plates and shell roofs

UNIT V PREFABRICATION 9

Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels.

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of this course the student shall be able to design some of the structures used in industries

TEXT BOOKS:

1. Ramamrutham.S., Design of Reinforced Concrete Structures, Dhanpat Rai Publishing Company, 2007.
2. Varghese.P.C., Limit State Design of Reinforced Concrete, PHI, Eastern Economy Editions, Second Edition, 2003.
3. Bhavikatti.S.S., Design of Steel Structures, J.K. International Publishing House Pvt. Ltd., 2009.

REFERENCES:

1. Henn W. Buildings for Industry, Vol.I and II, London Hill Books, 1995.
2. Handbook on Functional Requirements of Industrial buildings, SP32–1986, Bureau of Indian Standards, 1990.
3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.
4. Koncz,J., Manual of Precast Construction Vol. I and II, Bauverlay GMBH,1971.

PTCE8017 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

UNIT I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - - Effects of cover thickness.

UNIT III SPECIAL CONCRETES 9

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS 9

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, Cathodic protection.

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES 9

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake - Demolition Techniques - Engineered methods - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

- Students must gained knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

REFERENCES:

1. Shetty.M.S., Concrete Technology - Theory and Practice, S.Chand and Company, 2008.
2. Dov Kominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt. Ltd., 2001
3. Ravishankar.K., Krishnamoorthy.T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.
4. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.

PTCE8021 POWER PLANT STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To study the layout, functional aspects and principles involved in the selection of different types of Power Plant Structures.

UNIT I FUNDAMENTALS OF POWER PLANTS 9

Introduction – Classification of Power Plants – Principles of Power Plant – Lay out of Power Plant Building – Selection of type of generation – Resources for power generation – Machine foundation.

UNIT II HYDRO ELECTRIC POWER PLANTS 9

Elements of hydro-electric power plants – Advantages and disadvantages of water power – General and essential elements of Hydro electric Power Plant – Structural requirements – Selection of site for hydro electric plant – Penstocks and surge Tanks in Power Station.

UNIT III THERMAL POWER PLANTS 9

Planning, Analysis of thermal power plants – Layout – Ash handling – Dust collection – Induced draught and natural cooling towers – Air/water pollution by thermal power plants.

UNIT IV NUCLEAR POWER PLANTS 9

General characteristics of Nuclear Power Plants – Classification of reactors – Pressurized Water Reactor, Boiling Water Reactor, Fusion Power Reactor, Heavy Water Reactor - Selection criteria of materials for different systems – Containment structures – Nuclear power plant safety measures – Safety systems and support systems.

UNIT V NON CONVENTIONAL POWER PLANTS 9

Types – Wind power plants – Selection of wind mill – Tidal power plants – Solar thermal power plants – Geothermal power plants – Principles and essential features.

TOTAL: 45 PERIODS

OUTCOMES

- The student will be able to understand the operations of different types of power plants. The students will be able to analyse and design various power plant components like surge tanks, cooling towers and containment structures.

TEXTBOOKS:

1. Raja A.K, Amit Prakash Srivastava and Manish Dwivedi, Power Plant Engineering, New Age International Publishers, 2006.
2. Nag.P.K., Power Plant Engineering, Tata McGraw Hill, 2001.

REFERENCES

1. Lewis.E.E., Nuclear Power Reactor Safety, Willey Inter Science, 1977.
2. Srinivasasulu.P and Vaidyanathan.C.V., Hand book on Machine Foundations, Tata McGraw Hill Publishing Co. Ltd., 2007.
3. Gilbert Gedeon.P.E., Planning and Design of Hydro Electric Power Plants, CECW-ED Engineer Manual, 1110-2-3001 Manual No.1110-2-3001, 1995.

PTCE8022 PREFABRICATED STRUCTURES L T P C
3 0 0 3

OBJECTIVE:

- To learn the design of prefabricated structures

UNIT I INTRODUCTION 10

Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization – Systems Production – Transportation – Erection - Disuniting of Structures.

UNIT II PREFABRICATED COMPONENTS 10

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs Wall panels – Columns – Shear walls.

UNIT III DESIGN PRINCIPLES 10

Design of Structural components - Beam Column Corbel Stress limitations – Handling without cracking, handling with controlled cracking – Design for stripping forces

UNIT IV JOINTS IN STRUCTURAL MEMBERS 8

Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column, Column to Foundation, Connections between wall panels, Connections between floor panels - Dimensions and detailing – Design of expansion joints- Jointing Materials.

UNIT V DESIGN FOR EARTHQUAKES AND CYCLONES 7

Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc. - Importance of avoidance of progressive collapse.

TOTAL: 45 PERIODS

OUTCOMES:

- The student shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods in using these elements.

TEXTBOOKS:

1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge Based Process Planning for Construction and Manufacturing, Academic Press Inc., 1989
2. Koncz T., Manual of Precast Concrete Construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the Use of Precast Concrete, Netherland Betor Verlag, 1978.
4. M.Levitt, “Precast Concrete Material, Manufacture, Properties and Usage” Applied Science Publishers Ltd., 1982.
5. A.S.G. Bruggeling and G.F.Huyghe, Prefabrication with concrete, Netherlands: A.A. Balkema Publishers, 1991.

REFERENCES:

1. Building Materials and Components, CBRI, India, 1990.
2. Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965
3. PCI Design Hand Book, 6th Edition, 2004.

PTCE8024 **TALL STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVE:

- To provide an insight to the design of tall buildings. To enlighten the students on modern techniques available for the analysis of tall buildings.

UNIT I DESIGN CRITERIA AND MATERIALS 8

Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

UNIT II LOADING 9

Gravity Loading – Dead load, Live load – Live load reduction techniques, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT III BEHAVIOUR OF STRUCTURAL SYSTEMS 9

Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV ANALYSIS 10

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis, Evaluation of frequency of vibration of structures – Buckling analysis of tall structures

UNIT V DESIGN PARAMETERS 9

Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of this course the student should have an understanding on the behaviour of tall buildings subjected to lateral building. The students should have knowledge about the principles of designing safer tall structures as per the existing codes

TEXTBOOKS:

1. Bryan Stafford Smith and Alex Coull, Tall Building Structures, Analysis and Design, John Wiley and Sons, Inc., 1991.
2. Taranath B.S, Structural Analysis and Design of Tall Buildings, McGraw Hill, 1988

REFERENCES:

1. Coull, A. and Smith Staford.B, Tall Buildings , Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, Structural Concepts and Systems for Architects and Engineers, John Wiley, 1994.
3. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.
4. Wolfgang Schuler, High Rise Building Structures, John Wiley & Sons, New York, 1976

PTCE 8032 CONCRETE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

UNIT I CONSTITUENT MATERIALS 9

Cement-Different types-Chemical composition and Properties-Tests on cement-IS Specifications-Aggregates-Classification-Mechanical properties and tests as per BIS grading requirements-Water-Quality of water for use in concrete

UNIT II CHEMICAL AND MINERAL ADMIXTURES 9

Accelerators-Retarders- Plasticizers- Super plasticizers- Water proofers- Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline-Their effects on concrete properties

UNIT III PROPORTIONING OF CONCRETE MIX 9

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design- Design Mix and Nominal Mix-BIS and ACI Methods of Mix Design-Mix Design Examples

UNIT IV FRESH AND HARDENED PROPERTIES OF CONCRETE 9

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS-Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young's Modulus

UNIT V SPECIAL CONCRETES 9

Light weight and Heavy weight concretes-High strength concrete- Fibre reinforced concrete- Ferro cement -Ready mix concrete-SIFCON- Shotcrete -Polymer concrete-High performance concrete-Their production, properties and applications

TOTAL : 45 PERIODS

OUTCOMES:

- The student will possess the knowledge on properties of materials required for concrete tests on those materials and design procedures for making conventional and special concretes.

TEXTBOOKS:

1. Santhakumar,A.R; Concrete Technology , Oxford University Press,New Delhi, 2007
2. Shetty,M.S; Concrete Technology, S.Chand and Company Ltd, New Delhi 2003

REFERENCES:

1. Neville, A.M; Properties of Concrete, Pitman Publishing Limited, London,1981
2. Gambir, M.L; Concrete Technology, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007,Third Edition
3. IS: 10262-1982 Recommended Guidelines for Concrete Mix Design,Bureau of Indian Standards, New Delhi

PTCE8009 GEO-ENVIRONMENTAL ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- The student acquires the knowledge on the Geotechnical engineering problems associated with soil contamination, safe disposal of waste and remediate the contaminated soils by different techniques thereby protecting environment.

UNIT I GENERATION OF WASTES AND CONSQUENCES OF SOIL POLLUTION 8

Introduction to Geoenvironmental engineering – environmental cycle – sources, production and classification of waste – causes of soil pollution – factors governing soil pollution interaction clay minerals failures of foundation due to waste movement.

UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE 10

Safe disposal of waste – site selection for land fills – characterization of land fill sites and waste – Risk assessment – Stability of land fills – current practice of waste disposal – monitoring facilities – passive containment system – application of geosynthetics in solid waste management – rigid or flexible liners.

UNIT III TRANSPORT OF CONTAMINANTS 8

Contaminant transport in sub surface, advection – diffusion – dispersion – governing equations – contaminant transformation – sorption – biodegradation – ion exchange – precipitation – hydrological consideration in land fill design – ground water pollution.

UNIT IV WASTE STABILIZATION 10

Stabilization - solidification of wastes – micro and macro encapsulation – absorption, adsorption, precipitation – detoxification – mechanism of stabilization – organic and inorganic stabilization – utilization of solid waste for soil improvement.

UNIT V REMEDIATION OF CONTAMINATED SOILS 9

Exsitu and insitu remediation-solidification, bio-remediation, incineration, soil washing, electro kinetics, soil heating, vetrification, bio-venting

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have ability to

- describe the fundamentals of Geo-environmental engineering and waste soil interactions
- carryout advanced soil characterisation
- apply soil-water-contaminant interactions in the design of waste containment systems and contaminated site remediation

TEXTBOOKS:

1. Hari D. Sharma and Krishna R. Reddy, Geo-Environmental Engineering – John Wiley and Sons, INC, USA, 2004.
2. Daniel B.E., Geotechnical Practice for waste disposal, Chapman & Hall, London 1993.

REFERENCES:

1. Westlake, K, Landfill Waste pollution and Control, Albion Publishing Ltd., England, 1995.
2. Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 1989
3. Proceedings of the International symposium of Environmental Geotechnology (Vol.I and II). Environmental Publishing Company, 1986 and 1989.
4. Ott, W.R. Environmental indices, Theory and Practice, Ann Arbor, 1978.
5. Fried, J.J. Ground Water Pollution, Elsevier, 1975.

6. ASTM Special Tech. Publication 874, Hydraulic Barrier in Soil and Rock, 1985, Lagrega, M.D., Buckinham, P.L. and Evans, J.C. Hazardous Waste Management McGraw Hill Inc. Singapore, 1994.

PTCE8016 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS **L T P C 3 0 0 3**

OBJECTIVE:

- At the end of the course, student is expected to assess various design dynamic properties of soil, design of foundation for common machineries and also about the measures to isolate vibration due to the operations of machines.

UNIT I THEORY OF VIBRATION **9**

Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments.

UNIT II WAVES AND WAVE PROPAGATION **9**

Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space.

UNIT III DYNAMIC PROPERTIES OF SOILS **9**

Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression and shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil-codal provisions.

UNIT IV DESIGN PROCEDURES **9**

Design criteria – dynamic loads – simple design procedures for foundations of reciprocating, impact and rotary type machines - Codal provisions (Simple cases).

UNIT V VIBRATION ISOLATION **9**

Vibration isolation technique - foundation isolation - isolation by location-isolation by barriers-active and passive isolation methods.

TOTAL: 45 PERIODS

OUTCOMES:

- Students are able to perform site specific response analysis to develop design spectra and to do detailed liquefaction analysis using SPT data.

TEXTBOOKS:

1. Swamisaran, “Soil Dynamics and Machine Foundations”, Galgotia Publications Pvt.Ltd. (Second Edition) 2006, (Reprint 2010), New Delhi-110002
2. Kameswara Rao, Dynamics Soil Tests and Applications”, Wheeler Publishing, New Delhi, 2003.

REFERENCES:

1. Kamaswara Rao, Vibration Analysis and Foundation Dynamics”, Wheeler Publishing, New Delhi, 1998.
2. IS Code of Practice for Design and Construction of Machine Foundations, McGrew Hill, 1996.
3. Moore, P.J. “Analysis and Design of Foundation for Vibration”, Oxford and IBH, 2005.

PTCE8020 **PAVEMENT ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVE:

- Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements. Further, he/she will be in a position to assess quality and serviceability conditions of roads.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 8

Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 10

Flexible pavement design factors influencing design of flexible pavement, Empirical - Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 10

Pavement Evaluation - causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index. - Pavement maintenance (IRC Recommendations only).

UNIT V STABILIZATION OF PAVEMENTS 8

Stabilisation with special reference book to highway pavements – Choice of stabilizers – Testing and field control Stabilisation for rural roads in India – use of Geosynthetics in roads.

TOTAL : 45 PERIODS

OUTCOMES:

- Students will have adequate knowledge to design flexible and rigid pavements based on IRC guidelines. Further they know various techniques to evaluate performance of pavements.

TEXTBOOKS:

1. Wright P.H. ”Highway Engineers”, John Wiley and Sons, Inc., New York, 1996.
2. Khanna, S.K. and Justo C.E.G. “Highway Engineering”, New Chand and Brothers (8^{th} Edition), Roorkee, 2001.
3. Kadiyali, L.R. ‘Principles and Practice of Highway Engineering”, Khanna tech.Publications, New Delhi, 1989.

REFERENCES:

1. Yoder, R.J. and Witchak M.W. “Principles of Pavement Design”, John Wiley 2000.
2. Guidelines for the Design of Flexible Pavements, IRC -37 – 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998. The Indian Road Congress, New Delhi.

PTCE8023 **ROCK ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVE:

- To impart knowledge on fundamentals of rock mechanics and its application in solving simple problems associated with rock slopes and underground openings. Student gains the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 6

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 12

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength. Stress - stain behaviour of rock under compression – Mohr -Coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 10

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 10

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING 7

Introduction – Rock bolt systems – Choice of rock bolt based on rock mass condition - rock bolt installation techniques – Testing of rock bolts.

TOTAL: 45 PERIODS

OUTCOME:

- Graduates will demonstrates basic knowledge of rock mechanics and able to design effectively slopes, underground openings, foundations and other geotechnical related problems in different types of rocks.

TEXTBOOKS:

1. Goodman, P.E. “Introduction to Rock Mechanics”, John Wiley and Sons, 1999.
2. Stillborg B., “Professional User Handbook for rock Bolting”, Tran Tech Publications, 1996.
3. Brady, B.H.G. and Brown, E.T., Rock mechanics for underground mining (Third Edition), Kluwer Academic Publishers, Dordrecht, 2004.

REFERENCES:

1. Brown, E.T. “Rock Characterisation Testing and Monitoring”. Pergaman Press 1991.
2. Arogyaswamy, R.N.P., Geotechnical Application in Civil Engineering”, Oxford and IBH, 1991.
3. Hook E.and Bray J., Rock slope Engineering, Institute of Mining and Metallurgy”, U.K. 1991.

PTCE8026 **TRAFFIC ENGINEERING AND MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVE:

- To give an overview of Traffic engineering, various surveys to be conducted, traffic regulation, management and traffic safety.

UNIT I TRAFFIC CHARACTERISTICS 10

Road Characteristics – Classification – Functions and standards – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India

UNIT II TRAFFIC SURVEYS 7

Traffic Surveys – Speed, journey time and delay surveys – Vehicle Volume Survey – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – level of service – Concept, application and significance.

UNIT III TRAFFIC ENGINEERING REGULATION AND CONTROL 8

Capacity of Rotary intersection and Design – Capacity of signalized intersections – Traffic signals, warrants, type – Design and coordination – Intersection channelisation – Grade separation - Traffic signs and road markings.

UNIT IV TRAFFIC SAFETY AND ENVIRONMENT 10

Road accidents – Causes, effect, prevention, and cost – street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, health effects and abatement measures.

UNIT V TRAFFIC MANAGEMENT 10

Area Traffic Management System – One way street system, exclusive traffic lanes, tidal flow operation, staggering of work hours and road pricing – Non road pricing options _ Parking charges, Public transport, Subsidies, Vehicle License fees, Road Building, Permit system, Physical Traffic Management Transport System Management (TSM) and Transport Demand Management (TDM)

TOTAL: 45 PERIODS

OUTCOME

- Students would have gained knowledge on characteristics of traffic elements, traffic survey, traffic regulation and traffic management measures.

TEXTBOOKS:

1. Khanna .K and Justo C.E.G. Highway Engineering, Khanna Publishers, Roorkee, 1995.
2. Salter.R.I and Hounsell N.B, Highway Traffic Analysis and design, Macmillan Press Ltd.1996.
3. Kadiyali.L.R. Traffic Engineering and Transport Planning, Khanna Publishers, Delhi,1997.
4. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.
5. Agarwal M.K Urban Trnsportation in Indai, Allied Publishers Limited, 1996.

REFERENCES:

1. Manual of Transportation Engineering Studies, Institute of Transportation Engineering, Prentice Hall Publications,1994
2. John E Tyworth, Traffic Management Planning, Operations and control, Addison Wesly Publishing Company, 1997.
3. Hobbs.F.D. Traffic Planning and Engineering, University of Brimingham, Peragamon Press Ltd, 1994.
4. Taylor MAP and Young W, Traffic Ansalysis – New Technology and New Solutions, Hargreen Publishing Company , 1998.
5. Jason C.Yu Transportation Engineering, Introduction to Planning, Design and Operations , Elseevier, 1992.

PTCE8027 TRANSPORT AND ENVIRONMENT L T P C
3 0 0 3

OBJECTIVE:

- The objective of this course is to create an awareness / overview of the impact of Transportation Projects on the environment and society..

UNIT I INTRODUCTION 8

Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.

UNIT II METHODOLOGIES 8

Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT III ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT 10

Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT IV ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN 10

Mitigation of the impact on Natural and Man-made Environment, Health, Water, Land, Noise, Air, Public participation, Environmental Management Plan, Energy Conservation, Methods to reduce Global Warming.

UNIT V EIA CASE STUDIES 9

EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL: 45 PERIODS

OUTCOME

- Students would have understood the impact of Transportation projects on the environment, Environmental Laws on Transportation Projects and the mitigative measures adopted in the planning stage

TEXTBOOKS:

1. Canter, L.R., Environmental Impact Assessment, McGraw Hill, New Delhi, 1996.
2. Indian Road Congress (IRC), Environmental Impact of Highway Projects, IRC, Delhi, 1998.
3. P.Meenakshi, Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2006
4. Thirumurthy A.M., Introduction to Environmental Science and Management, Shroff Publishers, Bombay, 2005

REFERENCES:

1. John G.Rau and David, C.Hooten, Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1995
2. James H.Banks, Introduction to Transportation Engineering, McGraw Hill Book Company, 2000
3. World Bank, A Handbook on Roads and Environment, Vol.I and II, Washington DC, 1997
4. Priya Ranjan Trivedi, International Encyclopedia of Ecology and Environment – EIA, Indian Institute of Ecology and Environment, New Delhi, 1998

PTCE8028 TRANSPORTATION PLANNING AND SYSTEMS L T P C
3 0 0 3

OBJECTIVE:

- To give an exposure on overview of the principles of the bus and rail transportation planning and evaluation of the transportation projects.

UNIT I STUDY AREA AND SURVEYS 10

Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters.

UNIT II MODES 7

Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT III PLAN PREPARATION AND EVALUATION 8

Preparation of alternative plans – Evaluation techniques – Economic and financial evaluation – Environment Impact Assessment (EIA) – Case Studies.

UNIT IV BUS TRANSPORTATION 10

Characteristics and bus transportation in urban areas – Fare policy – Route planning – Planning of terminals – Break even point and its relevance.

UNIT V RAIL TRANSPORTATION 10

Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy – Unified traffic and transport authority.

TOTAL: 45 PERIODS

OUTCOME

- The students would have gained knowledge on comprehensive traffic and transport planning for cities with special emphasis on bus and rail system planning.

TEXTBOOKS:

1. Michael J.Bruton, Introduction to Transportation Planning, Hutchinson, London, 1995.
2. Kadiyali. L.R., Traffic Engineering and Transport Planning, Khanna Publishers,Delhi, 1997.

REFERENCES:

1. John W.Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1990.
2. Comprehensive Traffic and Transportation Studies for Madras Metropolitan Development Area, Madras Metropolitan Development Authority, 1995.

PTCE8029 URBAN PLANNING AND DEVELOPMENT L T P C
3 0 0 3

OBJECTIVES:

- To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.

UNIT I BASIC ISSUES 8

Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II PLANNING PROCESS 8

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION 10

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones.

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS 9

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM 10

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

TOTAL : 45 PERIODS

OUTCOMES:

The students completing the course will have the ability to

- describe basic issues in urban planning
- formulate plans for urban and rural development
- plan and analyse socio economic aspects of urban and rural planning

REFERENCES:

1. Chennai Metropolitan Development Authority, Second Master Plan for Chennai, Government of Tamil Nadu, Chennai, 2008
2. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
3. Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi, 2002
4. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005

PTGE8551 ENGINEERING ETHICS AND HUMAN VALUES L T P C

(Common to Civil, CSE, ECE, EEE, Mech, Printing, Auto, Industrial, Textile) **3 0 0 3**

OBJECTIVES:

- The course explains various moral issues through predominant theories. It educates the code of ethics as well as the industry standards and how they can be used for ensuring safety and reducing the risk. The course enunciated the Rights and Responsibilities of individuals. Various other ethical global issues also have been explained along with case studies.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl Case Studies

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Conduct

TOTAL : 45 PERIODS

OUTCOMES:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXTBOOK

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Thompson Wadsworth, A Division of Thomson Learning Inc., United States, 2000
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001

WEB SOURCES:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

PTCE8001 AIR POLLUTION AND CONTROL ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.

UNIT I INTRODUCTION 7

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II METEOROLOGY 6

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Atmospheric Diffusion Theories – Dispersion models, Plume rise.

UNIT III CONTROL OF PARTICULATE CONTAMINANTS 11

Factors affecting Selection of Control Equipment – Gas Particle Interaction – Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations.

UNIT IV CONTROL OF GASEOUS CONTAMINANTS 11

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations.

UNIT V INDOOR AIR QUALITY MANAGEMENT 10

Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

- an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
- ability to identify, formulate and solve air and noise pollution problems
- ability to design stacks and particulate air pollution control devices to meet applicable standards

TEXTBOOKS:

1. Lawrence K. Wang, Norman C. Parelra, Yung Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.
2. Noel de Nevers, Air Pollution Control Engineering, Mc Graw Hill, New York, 1995.
3. Anjaneyulu. Y, 'Air Pollution and Control Technologies', Allied Publishers (P) Ltd.,India, 2002.

REFERENCES:

1. David H.F. Liu, Bela G. Liptak 'Air Pollution', Lweis Publishers, 2000.
2. Arthur C.Stern, 'Air Pollution (Vol.I – Vol.VIII)', Academic Press, 2006.
3. Wayne T.Davis, 'Air Pollution Engineering Manual', John Wiley & Sons, Inc.,2000.

PTCE8008 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT L T P C
3 0 0 3

OBJECTIVE:

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I INTRODUCTION 9

Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types – EIA in project cycle – EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants – Screening and Scoping in EIA – Drafting of Terms of Reference

UNIT II ENVIRONMENTAL ASSESSMENT 9

Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives

UNIT III ENVIRONMENTAL MANAGEMENT PLAN 9

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance – Environmental Audit

UNIT IV SOCIO ECONOMIC ASSESSMENT 9

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis- Public Consultation

UNIT V CASE STUDIES 9

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – Wastewater Treatment Plants- Waste Processing and Disposal facilities – Mining Projects.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have ability to

- carry out scoping and screening of developmental projects for environmental and social assessments
- explain different methodologies for environmental impact prediction and assessment
- plan environmental impact assessments and environmental management plans
- evaluate environmental impact assessment reports

TEXTBOOKS:

1 Canter, R.L (1995). Environmental impact Assessment, 2nd Edition, McGraw Hill Inc., New Delhi.
2 Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. (1997). Environmental Impact Assessment for Developing Countries in Asia. Volume 1 – Overview, Asian Development Bank
3 Peter Morris, Riki Therivel (2009)," Methods of Environmental Impact Assessment", Routledge Publishers

REFERENCES:

1. Becker H. A., Frank Vanclay (2003), The International handbook of social impact assessment: conceptual and methodological advances, Edward Elgar Publishing
2. Barry Sadler and Mary McCabe (2002), "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme.
3. Judith Petts, Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, New York, 1998.
4. Ministry of Environment and Forests (2010), EIA Notification and Sectoral Guides, Government of India, New Delhi.

PTCE8014 INDUSTRIAL WASTEWATER ENGINEERING L T P C
3 0 0 3

OBJECTIVE:

- To provide knowledge on sources and characteristics of Industrial Wastewaters, Techniques and approaches for minimizing the generation of wastewaters at the source and application of physico-chemical, biological and advanced treatment methods for recovery, reuse and disposal of wastewaters in Indian Industries.

UNIT I INTRODUCTION 8

Industrial scenario in India – Uses of water by Industry – sources, generation rates and characteristics of Industrial wastewaters – Toxicity of Industrial Effluents and Bioassay Tests – Environmental Impacts of Industrial Wastewaters – Regulatory requirements for Industrial wastewaters.

UNIT II INDUSTRIAL POLLUTION PREVENTION 8

Prevention Vs Control of Industrial Pollution – Benefits and Barriers – Waste Minimization Strategies – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay back period.

UNIT III TREATMENT OF INDUSTRIAL WASTEWATERS 10

Physico–Chemical Treatment Processes – Equalisation, Neutralisation, Oil Seperation, Flotation – Precipitation, Aerobic and Anaerobic Biological Treatment Processes – Sequencing batch reactors, membrane bioreactors, Advanced oxidation and Tertiary Treatment processes for removal of dissolved organics and inorganics- Ozonation, photocatalysis, Evaporation and membrane Technologies.

UNIT IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT 9

Individual and Common Effluent Treatment Plants –Zero Effluent Discharge Systems and Management of RO Rejects, Quality requirements for wastewater reuse – Industrial reuse, Disposal on water and land – Residuals of Industrial Wastewater treatment – Quantification and Characteristics of Sludge – Thickening, Digestion, Conditioning, Dewatering and Disposal of Sludge – Solidification – Incineration – Secured Landfills.

UNIT V CASE STUDIES 10

Industrial manufacturing process description, Wastewater characteristics , Pollution Prevention Options and Treatment Flow sheets for selected Industries – Tanneries- Textiles- Pulp and Paper – Metal finishing – Sugar and Distilleries.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

- an insight into the pollution from major industries including the sources and characteristics of pollutants

- ability to plan minimization of industrial wastes
- ability to design facilities for the processing and reclamation of industrial waste water

TEXTBOOKS:

1. S.C.Bhatia, Handbook of Industrial Pollution and Control, Volume I & II, CBS Publishers, New Delhi, 2003.
2. Mahajan, S.P.Pollution Control in Process Industries, Tata McGraw Hill Publishing Co., New Delhi, 1991.

REFERENCES:

1. Eckenfelder, W.W., 'Industrial Water Pollution Control', Mc-Graw Hill, 2000.
2. Nelson Leonard Nemerow, " Industrial waste treatment – contemporary practice and vision for the future", Elsevier, Singapore, 2007.
3. Frank Woodard, ' Industrial waste treatment Handbook', Butterworth Heinemann, New Delhi,2001.
4. World Bank Group, ' Pollution Prevention and Abatement Handbook – Towards Cleaner Production', World Bank and UNEP, Washington D.C., 1998
5. Paul L. Bishop, ' Pollution Prevention:- Fundamentals and Practice', Mc-Graw Hill International, Boston,2000.
6. Wang L.K., Yung-Tse Hung, Howard H.Lo and Constantine Yapijakis, 'Handbook of Industrial and Hazardous Wastes Treatment', Marcel Dekker, Inc., USA, 2004.

PTCE8018 MUNICIPAL SOLID WASTE MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

- To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

UNIT I SOURCES AND TYPES 8

Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO's.

UNIT II ON-SITE STORAGE AND PROCESSING 8

On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions – source reduction of waste – Reduction, Reuse and Recycling.

UNIT III COLLECTION AND TRANSFER 8

Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems- solving.

UNIT IV OFF-SITE PROCESSING 12

Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V DISPOSAL 9

Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor – Dumpsite Rehabilitation

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

- an understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management
- ability to plan waste minimisation and design storage, collection, transport, processing and disposal of municipal solid waste

TEXTBOOKS:

1. George Tchobanoglous and Frank Kreith (2002). Handbook of Solid waste Management, Mc Graw Hill, New York.
2. Paul T Willams (2000), Waste Treatment and Disposal, John Wiley and Sons

REFERENCES:

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000.
2. Bhide A.D. and Sundaresan, B.B. Solid Waste Management Collection, Processing and Disposal, 2001, ISBN 81-7525-282-0
3. Manser A.G.R. and Keeling A.A.(1996), Practical Handbook of Processing and Recycling of Municipal solid Wastes, Lewis Publishers, CRC Press.

PTGE 8071 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOK:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

PTCE8012 HYDROLOGY AND WATER RESOURCES ENGINEERING L T P C

3 0 0 3

OBJECTIVE:

- To introduce the student to the concept of hydrological aspects of water availability and requirements and should be able to quantify, control and regulate the water resources**.**

UNIT I PRECIPITATION AND ABSTRACTIONS 9

Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation-Rain gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods- Interception-Evaporation. Horton's equation, pan evaporation measurements and evaporation suppression-Infiltration-Horton's equation-double ring infiltrometer, infiltration indices.

UNIT II RUNOFF 9

Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Runoff estimation using empirical - Strange's table and SCS methods – Stage discharge relationships-flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT III FLOOD AND DROUGHT 9

Natural Disasters-Flood Estimation- Frequency analysis- Flood control- Definitions of droughts-Meteorological, hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT IV RESERVOIRS 9

Classification of reservoirs, General principles of design, site selection, spillways, elevation – area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

UNIT V GROUNDWATER AND MANAGEMENT 9

Origin- Classification and types - properties of aquifers- governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

TOTAL: 45 PERIODS

OUTCOMES

- The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.
- The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
- The students will know the basics of groundwater and hydraulics of subsurface flows

TEXTBOOKS

1. Subramanya .K. Engineering Hydrology- Tata McGraw Hill, 1999.
2. Jayarami Reddy .P. Hydrology, Tata McGraw Hill, 1999.

REFERENCES

1. David Keith Todd. Groundwater Hydrology, John Wiley & Sons, Inc. 2007
2. Ven Te Chow, Maidment, D.R. and Mays, L.W. Applied Hydrology, McGraw Hill International Book Company, 1998.
3. Raghunath .H.M., Hydrology, Wiley Eastern Ltd., 1998.
4. Linsley, R.K. and Franzini, J.B. Water Resources Engineering, McGraw Hill International Book Company, 1995

PTCE8015 INTEGRATED WATER RESOURCES MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To introduce the students to the interdisciplinary analysis of water and design of intervention strategies.
- To develop knowledge base on capacity building on IWRM.

UNIT I IWRM FRAMEWORK 9

Definition – meanings –objectives- evolution of IWRM- IWRM relevance in water resources management – Importance of paradigm shift in India: processes and prospective outcomes.

UNIT II CONTEXTUALIZING IWRM 9

IWRM in Global and Regional water partnership - MDG goals - UN formulations-Institutional Transformation- bureaucratic reforms and inclusive development.

UNIT III EMERGING ISSUES IN WATER MANAGEMENT 9

IWRM and Irrigation – Domestic - Drinking water Management in the context of Climate change-Flood –Drought – Pollution – Water poverty-sanitation and health-Conceptual problems and policy issues.

UNIT IV IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA 9

Rural Development-Ecological sustainability- -Watershed Development and conservation-Ecosystem Regeneration – waste water reuse-Sustainable livelihood and food security-Links between water – health- and poverty.

UNIT V ASPECTS OF INTEGRAL DEVELOPMENT 9

Capacity building - Solutions for effective Water Management. Case studies on conceptual framework of IWRM – IWRM and regional and global partnership – Emerging issues – IWRM and water resources development

TOTAL: 45 Periods

OUTCOME

- At the completion of the course the student should be able to apply appropriate management techniques for planning, operating and maintaining the different components of integrated water resources and drainage system.

TEXTBOOKS:

1. Mollinga .P. etal " Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006
2. Sithamparanathan, Rangasamy, A., and Arunachalam, N., "Ecosystem Principles and Sustainable Agriculture", Scir Publisher, Chennai, 1999.

REFERENCES:

1. Cech Thomas V., Principles of Water Resources: History, Development, Management and Policy. John Wiley and Sons Inc., New York. 2003.
2. Murthy, J.V.S., "Watershed Management in India", Wiley Eastern Ltd., New York, 1995.
3. Dalte, S.J.C., "Soil Conservation and Land Management", International Book Distribution, India, 1986.

PTCE8019 PARTICIPATORY WATER RESOURCES MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To gain an insight on local and global perceptions and approaches on participatory water resource management

UNIT I FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH 6

Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach

UNIT II UNDERSTANDING FARMERS PARTICIPATION 10

Farmers participation –need and benefits – Comparisons of cost and benefit -Sustained system performance - Kinds of participation – Context of participation, factors in the environment – WUA - Constraints in organizing FA – Role of Community Organiser – Case Studies.

UNIT III ISSUES IN WATER MANAGEMENT 9

Multiple use of water – Issues in Inter-sectoral Water Allocation - domestic, irrigation, industrial sectors - modernization techniques – Rehabilitation – Command Area Development - Water delivery systems

UNIT IV PARTICIPATORY WATER CONSERVATION 10

Global Challenges -Social – Economic – Environmental - Solutions –Political - Water Marketing – Water Rights -Consumer education – Success Stories Case Studies

UNIT V PARTICIPATORY WATERSHED DEVELOPMENT 10

Concept and significance of watershed - Basic factors influencing watershed development –- Principles of watershed management - Definition of watershed management – Identification of problems - Watershed approach in Government programmes –- People's participation – Entry point activities - Evaluation of watershed management measures.

TOTAL: 45 PERIODS

OUTCOME

- The students shall gain knowledge on the various processes involved in participatory water resource management.
- The students shall be aware of the issues related to water conservation.

TEXTBOOKS:

1. Sivasubramanium, K. Water Management, SIMRES Publication, Chennai 2009
2. Uphoff.N., Improving International Irrigation management with Farmer Participation – Getting the process Right – Studies in water Policy and management, New West - View press, Boulder and London, 1986.
3. Tideman, E.M., "Watershed Management", Omega Scientific Publishers, New Delhi, 1996.

REFERENCES:

1. Chambers R., Managing canal irrigation, Oxford IBM publishing Co.

PTCE8003 COASTAL ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To provide an overview of the analysis and design procedures used in the field of coastal engineering
- To enable students to determine the characteristics of waves, coastal structures and shore protection and modeling in coastal engineering

UNIT I INTRODUCTION TO COASTAL ENGINEERING 9

Introduction - Wind and waves – Sea and Swell - Introduction to small amplitude wave theory – use of wave tables- Mechanics of water waves – Linear (Airy) wave theory – Wave measurement. .

UNIT II WAVE PROPERTIES AND ANALYSIS 9

Introduction to non-linear waves and their properties – Waves in shallow waters – Wave Refraction, Diffraction and Shoaling –Hindcasting of waves - Short term wave analysis – wave spectra and its utilities - Long term wave analysis- Statistical analysis of grouped wave data.

UNIT III TYPES AND WAVE TRANSFORMATION 9

Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV COASTAL STRUCTURES AND SHORE PROTECTION 9

Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V MODELING IN COASTAL ENGINEERING 9

Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

TOTAL: 45 PERIODS

OUTCOME:

On successfully completing this course unit, students will be able to:

- Calculate the wave transformations
- Appreciate the multi-faceted nature of coastal problems and the techniques of coastal engineering analysis, modeling and design of coastal structures and shore protection.

TEXT BOOKS:

1. Kamphuis, J.W., Introduction to coastal engineering and management, 2000
2. Dean, R.G. and Dalrymple, R.A., Water wave mechanics for Engineers and Scientists, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1994.

REFERENCES:

1. Ippen, A.T., Estuary and Coastline Hydrodynamics, McGraw-Hill Book Company, Inc., New York, 1978.
2. Sorenson, R.M., Basic Coastal Engineering, A Wiley-Interscience Publication, New York, 1978.
3. Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC, 2006.

PTCE8011 GROUNDWATER ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the student to the principles of Groundwater governing equations and characteristics of different aquifers,
- To understand the techniques of development and management of groundwater.

UNIT I HYDROGEOLOGICAL PARAMETERS 9

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – Ground water table fluctuation and its interpretations – Groundwater development and Potential in India – GEC norms.

UNIT II WELL HYDRAULICS 9

Objectives of Groundwater hydraulics – Darcy's Law - Groundwater equation – steady state flow - Dupuit Forchheimer assumption - Unsteady state flow - Theis method - Jacob method -Slug tests - Image well theory – Partial penetrations of wells.

UNIT III GROUNDWATER MANAGEMENT 9

Need for Management Model – Database for groundwater management –groundwater balance study – Introduction to Mathematical model – Conjunctive use – Collector well and Infiltration gallery.

UNIT IV GROUNDWATER QUALITY 9

Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements

UNIT V GROUNDWATER CONSERVATION 9

Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes - Ground water Pollution and legislation.

TOTAL: 45 PERIODS

OUTCOMES:

- Students will be able to understand aquifer properties and its dynamics after the completion of the course. It gives an exposure towards well design and practical problems of groundwater aquifers.
- Students will be able to understand the importance of artificial recharge and groundwater quality concepts.

TEXT BOOKS:

1. Raghunath H.M., Ground Water Hydrology, New Age International (P) Limited, New Delhi, 2010.
2. Todd D.K., Ground Water Hydrology, John Wiley and Sons, New York, 2000.

REFERENCES:

1. Fitts R Charles. Groundwater Science. Elsevier, Academic Press, 2002.
2. Ramakrishnan, S, Ground Water, K.J. Graph arts, Chennai, 1998.

PTCE8030 WATER RESOURCES SYSTEMS ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the student to the concept of Mathematical approaches for managing the water resources system.
- To make the students apply an appropriate system approach to optimally operate a water resource system.

UNIT I SYSTEM APPROACH 7

Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – scopes and steps in systems engineering.

UNIT II PHYSICAL AND SOCIO - ECONOMIC DATA 6

Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

UNIT III LINEAR PROGRAMMING 10

Operation research - introduction - Problem Formulation-graphical solution- Simplex method – Sensitivity analysis - simple applications

UNIT IV DYNAMIC PROGRAMMING 11

Optimality criteria Stage coach problem – Bellman's optimality criteria Problem formulation and Solution - simple applications

UNIT V SIMULATION 11

Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications

TOTAL: 45 PERIODS

OUTCOMES:

- The students will be exposed to the economical aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.
- The students will develop skills in solving problems in operations research through LP, DP and Simulation techniques.

TEXT BOOK:

1. Vedula, S., and Majumdar, P.P. Water Resources Systems – Modeling Techniques and Analysis Tata McGraw Hill, New Delhi, Fifth reprint, 2010.

REFERENCES:

1. Hall Warren, A. and John A. Dracup., Water Resources System Engineering, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1998
2. Chadurvedi M.C., Water resource Systems Planning and Management, Tata McGraw Hill inc., New Delhi,1997
3. Taha H.A., Operation Research, McMillan Publication Co., New York, 1995.
4. Maass A., Husfchimidt M.M., ,Dorfman R., ThomasH A., Marglin S.A and Fair G. M., Design of Water Resources System, Hardward University Press, Cambridge, Mass.,1995.
5. Goodman Aluvin S., Principles of Water Resources Planning, Prentice-Hall, India 1984.

PTCE8002 CARTOGRAPHY L T P C

3 0 0 3

OBJECTIVES:

- To introduce Cartography as science and technology of Map Making.
- The course also introduces its connections with Communication Science, Computer technology and IT.
- To outline the Cartography as a creative art.

UNIT I MAP – A SPECIAL GRAPHIC COMMUNICATOR 6

Maps, their functions and use – Definition of Cartography – Types of Maps – other cartographic products – map making steps – surveying and mapping – Role of IT and computers, RS, GIS and GPS– Map Scales and Contents –accuracy and errors- History of Cartography – Mapping organizations in India.

UNIT II ABSTRATION OF EARTH AND MAP PROJECTION 12

Concepts of sphere, ellpsoid and geoid - latitudes, longitudes and graticules –map projections – shape, distance, area and direction properties - role of aspect, development surface, secant and light source / view points – perspective and mathematical projections – Indian maps and projections – Map co-ordinate systems – UTM and UPS references – common projections and selections– projections for hemispheres and the world maps.

UNIT III MAP COMPILATION AND DESIGN 9

Base map concepts – scanning and digitization – planimetric, topographic and thematic information – sample and census surveys – attribute data tables – Elements of a map - Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolization – map lettering

UNIT IV MAP MAKING 9

Definition of chropleth , daysimetric and isopleth maps – class interval selection and shading – isopleth maps and interpolation strategies – located symbol maps – flow maps – cadestral and engineering maps – demographic and statistical mapping –sequential maps – map production – map printing– colours and visualization – map reproduction – printing soft copies and standards.

UNIT V MAP TRANSFORMATIONS 9

Map generalization – attribute conversions and transforms – reduction and enlargement - fusions - geometric transformations – bilinear and affine transformations - hardware and software in map making – conversion to multimedia, internet and web objects - mobile maps– cartometry.

TOTAL: 45 PERIODS

OUTCOME

At the end of the course, the student shall

- Be familiar with appropriate map projection and co-ordinate system for production of maps.
- Be able compile and design maps for the required purpose.
- Be familiar with co-ordinate and datum transformations.

TEXT BOOKS:

1. R.W. Anson and F.J. Ormeling, Basic Cartography for students and Technicians. Vol.I, II and III, Elsevier Applied Science Publishers, 3rd Edition, 2004.
2. Arthur, H. Robinson et al, Elements of Cartography, Seventh Edition, John Wiley and Sons, 2004.

REFERENCES:

1. John Campbell, introductory Cartography, Wm.C. Brown Publishers, Third Edition, 2004.
2. Menno Jan Kraak & Ferjan Ormeling, Cartography Visualization of Geospatial Data, Second Edition, Pearson Education, 2004
3. Geographic Visualization, Martin Dodge, Marrs Mc derby & Martin Turner. John wiley & srena, west sin sex, England, 2008
4. Thematic Cartography and Geovisualisation 3rd edition by Terry A slocum, Robert B Mc Master, fritz C Kessler, Hugh H Howard, 2008 Pretice Hall

PTCE8025 **TOTAL STATION AND GPS SURVEYING** **L T P C**
3 0 0 3

OBJECTIVE:

- To understand the working of Total Station equipment and solve the surveying problems.

UNIT I FUNDAMENTALS OF TOTAL STATION AND GPS 9

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler's Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept – GNSS

UNIT II ELECTROMAGNETIC WAVES 9

Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI- Computation of group for light and near infrared waves at standard and ambient conditions- Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.

UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM 9

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparis on between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

UNIT IV SATELLITE SYSTEM 9

GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT V GPS DATA PROCESSING 9

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data -data processing – software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

TOTAL: 45 PERIODS

OUTCOME

- The student shall acquire through working knowledge of modern surveying equipment such as Total Station and GPS so that they will be able to solve all surveying problem faced by our Country.

TEXT BOOKS:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.
2. Satheesh Gopi, rasathishkumar, Nmadhu, " Advanced Surveying , Total Station GPS and Remote Sensing " Pearson education , 2007 isbn: 978-81317 00679

REFERENCES :

1. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.
2. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.

3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

PTCE8010 GEOGRAPHIC INFORMATION SYSTEM L T P C
3 0 0 3

OBJECTIVES :

- To introduce the fundamentals and components of Geographic Information System
- To provide details of spatial data structures and input, management and output processes.

UNIT I FUNDAMENTALS OF GIS 9

Introduction to GIS - Basic spatial concepts - Coordinate Systems - GIS and Information Systems – Definitions – History of GIS - Components of a GIS – Hardware, Software, Data, People, Methods – Proprietary and open source Software - Types of data – Spatial, Attribute data- types of attributes – scales/ levels of measurements.

UNIT II SPATIAL DATA MODELS 9

Database Structures – Relational, Object Oriented – Entities – ER diagram - data models - conceptual, logical and physical models - spatial data models – Raster Data Structures – Raster Data Compression - Vector Data Structures - Raster vs Vector Models- TIN and GRID data models.

UNIT III DATA INPUT AND TOPOLOGY 9

Scanner - Raster Data Input – Raster Data File Formats – Georeferencing – Vector Data Input – Digitiser – Datum Projection and reprojection -Coordinate Transformation – Topology - Adjacency, connectivity and containment – Topological Consistency – Non topological file formats - Attribute Data linking – Linking External Databases – GPS Data Integration

UNIT IV DATA QUALITY AND STANDARDS 9

Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability - OGC - Spatial Data Infrastructure

UNIT V DATA MANAGEMENT AND OUTPUT 9

Import/Export – Data Management functions- Raster to Vector and Vector to Raster Conversion - Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS-distributed GIS.

(L:45) TOTAL : 45 PERIODS

OUTCOME

- This course equips the student to have basic knowledge about the GIS its structure, quality and standards.

TEXT BOOKS:

1. Kang-Tsung Chang, Introduction to Geographic Information Systems, Mc-Graw Hill Publishing, 2nd Edition, 2011.
2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, “An Introduction Geographical Information Systems, Pearson Education, 2nd Edition, 2007.

REFERENCE:

1. C.P. Lo Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall India Publishers, 2006

PTCE8007 **DIGITAL CADASTRE** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the students to the cadastral survey Methods and its applications in generation of Land information system. Cadastral surveys are those classes of land surveys which are executed for the purpose of systematically recording the land rights, producing register of land holdings or an inventory of land areas, land use and determine land tax.

UNIT I INTRODUCTION **9**

History of cadastral survey - Types of survey - Tax - Real Property – Legal cadastre -Graphical and Numerical Cadastre, Legal Characteristics of Records, Torrens System.

UNIT II METHODS OF SURVEYING **9**

Cadastral Survey Methods - Steps in survey of a village - Instruments used for cadastral survey & mapping - Orthogonal, Polar survey methods - Boundary survey - Rectangulation - Calculation of area of Land- GPS and Total Station in Cadastral survey.

UNIT III MAINTENANCE AND MEASUREMENTS **9**

Cadastral survey maintenance - Resurveys - Measurement of sub-division - Measurement of obstructed lines - Survey of urban areas - Control requirement for Urban survey use of Satellite Imagery in boundary fixing.

UNIT IV PHOTOGRAMMETRIC METHODS **9**

Photogrammetry for cadastral surveying and mapping - Orthophoto map – Quality control measures - Organisation of cadastral offices – international scenario.

UNIT V MAPPING PROCEDURES AND LIS **9**

Cadastral map reproduction - Map projection for cadastral maps – Conventional symbols -map - reproduction processes - Automated cadastral map, Management of Digital Cadastral. Creation of Land Information System. Integrating LIS –Land administration.

TOTAL : 45 PERIODS

OUTCOME

- The courses give the knowledge about Land Record System and computational procedure for modernization of the same.
- The students will be in position to understand the Government procedure in Land Record Management.

TEXTBOOKS:

1. James, M. Anderson and Edward N. Mikhail, Introduction to Surveying, McGraw Hill Book Co, 1985
2. Survey of India, Hand book of Topography 1971.

REFERENCES:

1. Chain Survey and Land records Manuals I & II of Government of Tamil Nadu.
2. Alias Abdul Rahman, Siyka Zlatanova,Volker Coors, Innovations in 3D geo information systems
3. Kahmen & Faig, Surveying, Walter de Gruyter, Berlin, 1993.
4. Peter F. Dall, John D. MeLauglin, Land information management, Oxford Press.1988

PTCE8031 GEOINFORMATICS APPLICATIONS FOR CIVIL ENGINEERS L T P C
3 0 0 3

OBJECTIVE

- To solve the Civil Engineering problems with the help of Geoinformatics technique

UNIT I LAND RESOURCE MANAGEMENT 6

Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information – Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

UNIT II STRUCTURAL STUDIES 6

Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

UNIT III SOIL CONSERVATION AND MANAGEMENT 9

Soil survey interpretation and mapping - impact of agricultural and industrial activity on soil properties - soil erosion - factors influencing soil erosion - soil contamination using Hyper spectral Remote Sensing - mining pollution- EMR responses with contaminated soil - modeling soil characteristics using satellite data - soil degradation assessment using Remote Sensing and GIS - Land reclamation studies -

UNIT IV URBAN AND TRANSPORTATION MANAGEMENT 12

Monitoring Urban Growth through Remote Sensing - Geo-demographic Analysis – Property Market Analysis Urban Renewal - traffic analysis - accident analysis - site suitability analysis for transport infrastructure –transportation databases: creation and maintenance - Vehicle routing – Highway maintenance system – Intelligent Transportation System

UNIT V WATER RESOURCES PLANNING AND MANAGEMENT 12

Location of storage/diversion works – capacity curve generation – sediment yield - modelling of catchments – Delineation of watershed - Watershed modelling for sustainable development - Rainfall – Runoff modelling –LiDAR Mapping for Urban area –Water quality mapping and monitoring – Flood Risk Zoning - Flood damage assessment – Flood Modelling - Assessment of droughts and mitigation

TOTAL: 45 PERIODS

OUTCOME

- The student shall be capable of solving Civil Engineering problems with Geoinformatics technology.

REFERENCES:

1. Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley & Sons Inc, April 2004
2. Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition. 2010
3. Harvey J. Miller, Shih-Lung Shah, Geographic Information Systems for Transportation – Principles and Applications, Oxford University Press, 2001.
4. Gert A.Schulitz . Edwin T. Engman, Remote Sensing in hydrology and Water Management,Springer-verlay Barlin Heilelberg Germany - 2000.

PTGE 8072 **HUMAN RIGHTS** **L T P C**
3 0 0 3

OBJECTIVES :

- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.