ANNA UNIVERSITY TIRUCHIRAPPALLI
Tiruchirappalli - 620024

B.E. (PART TIME) CIVIL ENGINEERING

Regulations 2007

Curriculum

SEMESTER I

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**MA4101**	Mathematics I	3	0	0	100
2	**HS4101**	Physical Sciences	3	0	0	100
3	**CS4104**	Fundamental of Computing	3	0	0	100
4	**CE4101**	Applied Geology	3	0	0	100
5	**CE4102**	Surveying I	3	0	0	100

SEMESTER II

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**MA4151**	Mathematics II	3	0	0	100
2	**CE4154**	Hydro Mechanics	3	1	0	100
3	**CE4153**	Strength of Materials II	3	1	0	100
4	**CE4155**	Surveying II	3	0	0	100
Practical						
5	**CE4156**	Survey Practical	0	0	4	100

SEMESTER III

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**CE4201**	Structural Analysis I	3	1	0	100
2	**GE4151**	Environmental Science and Engineering	3	0	0	100
3	**CE4202**	Soil Mechanics	3	0	0	100
4	**CE4203**	Highway Engineering	3	0	0	100
Practical						
5	**CE4204**	Computer Aided Building Drawing	0	0	4	100

SEMESTER IV

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**CE4251**	Design of Steel Structures	3	0	0	100
2	**CE4252**	Environmental Engineering I	3	0	0	100
3	**CE4253**	Structural Analysis II	3	0	0	100
4	**CE4254**	Applied Hydraulics Engineering	3	0	0	100
5	**CE4255**	Railways, Airports, Docks and Harbours	3	0	0	100

SEMESTER V

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**CE4301**	Design of Reinforced Concrete and Masonry Structures	3	0	0	100
2	**CE4302**	Environmental Engineering II	3	0	0	100
3	**CE4303**	Foundation Engineering	3	0	0	100
4	**E1******	Elective I	3	0	0	100
Practical						
5	**CE4304**	Computer Aided Design and Drafting Laboratory	0	0	4	100

SEMESTER VI

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**CE4351**	Valuation Engineering	3	0	0	100
2	**CE4352**	Irrigation Engineering	3	0	0	100
3	**CE4353**	Fundamentals of Remote Sensing and GIS	3	0	0	100
4	**E2******	Elective II	3	0	0	100
5	**E3******	Elective III	3	0	0	100

SEMESTER VII

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	**MG4401**	Principles of Management	3	0	0	100
2	**CE4401**	Structural Dynamics and Earthquake Engineering	3	0	0	100
3	**E4******	Elective IV	3	0	0	100
Practical						
4	**CE4405**	Project Work	0	0	3	100

LIST OF ELECTIVES FOR B.E (PART TIME) CIVIL ENGINERING

A Student is permitted to select not more than one Elective from any of the following groups

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Elective I						
1	**CE4001**	Geographic Information System	3	0	0	100
2	**CE4002**	Cartography	3	0	0	100
3	**CE4003**	Housing Planning and Management	3	0	0	100
Elective II						
1	**CE4004**	Transportation Planning and Systems	3	0	0	100
2	**CE4005**	Industrial Waste Management	3	0	0	100
3	**CE4006**	Municipal Solid Waste Management	3	0	0	100
Elective III						
1	**CE4007**	Prefabricated Structures	3	0	0	100
2	**CE4008**	Maintenance and Rehabilitation of Structures	3	0	0	100
3	**CE4009**	Pavement Engineering	3	0	0	100
4	**CE4010**	Geotechnical Engineering Processes and Applications	3	0	0	100
Elective IV						
1	**CE4011**	Hydrology	3	0	0	100
2	**CE4012**	Water Resource Engineering	3	0	0	100
3	**GE4001**	Indian Constitution and Society	3	0	0	100
4	**GE4002**	Contract Laws and Regulations	3	0	0	100

ANNA UNIVERSITY TIRUCHIRAPPALLI
Tiruchirappalli - 620024

B.E. (PART TIME) CIVIL ENGINEERING

Regulations 2007

Syllabus

SEMESTER I

MA4101 – MATHEMATICS I

L	T	P
3	0	0

UNIT I MATRICES 9

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Problem solving using Cayley – Hamilton theorem – Similarity transformation – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Orthogonal reduction to its canonical form.

UNIT II THREE DIMENSIONAL GEOMETRY 9

Angle between two lines – Coplanar lines – Shortest distance between skew lines – Equation of a sphere – Plane section of a sphere – Tangent plane – Equation of a Cone – Right circular cone.

UNIT III DIFFERENTIAL CALCULUS 9

Curvature – Cartesian and Parametric Co-ordinates – Centre and Radius of curvature – Circle of curvature – Envelopes – Evolutes.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES 9

Partial derivatives – Euler's theorem for homogeneous functions – Total derivative – Differentiation of implicit functions – Jacobians – Maxima / Minima for functions of two variable – Methods of Lagrange's multipliers – Taylor's expansion.

UNIT V ORDINARY DIFERENTIAL EQUATIONS (ODE) 9

Solution of second and higher order linear ODE with constant coefficients – Simultaneous first order linear equations with constant coefficients – Linear equations of second order with variable coefficients – Cauchy's and Legendre's linear equations – Methods of reduction order.

Total : 45

TEXT BOOK

1. Grewal, B.S., " Higher Engineering Mathematics", Thirty eighth Edition, Kanna Publishers, New Delhi, 2005.
2. V. Sundaram, R. Balasubramaniam, K.A Lakshminarayanan, "Engineering Mathematics", Fifth Edition, Vikas Publishing house Pvt., Ltd., New Delhi, 2006.

REFERENCES

1. Glyn James., " Advanced Modern Engineering Mathematics". Third Edition, Pearson Education Ltd., New Delhi, 2004.
2. Venkataraman. M.K., Engineering Mathematics" Vol. I and II Revised enlarged Fourth Edition, The National Publishing Company, Chennai, 2004.
3. Veerarajan. T., " Engineering Mathematics (for first year)" Fourth Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2005.

HS4101 – PHYSICAL SCIENCES

L	T	P
3	0	0

UNIT I PROPERTIES OF MATTER AND HYDRODYNAMICS 9

Properties of matter: Stress – Strain - Hooke's Law – types of moduli of elasticity – Torsional pendulum – Determination of Rigidity modulus of a wire – Bending of beams – Expression for bending moment – Measurement of Young's modulus by uniform and Non – uniform bending.

Hydrodynamics: Stream line flow – turbulent flow – De poiseuille's formula for flow of liquid through a capillary tube – Determination of coefficient of viscosity of a liquid.

UNIT II OPTICS AND PHOTOELASTICITY 9

Interference: Air Wedge – Testing of Flat surface – Michelson's Interferometer – Types of fringes – Applications: Wavelength determination – Thickness of a transparent medium.

Optical Instruments: Metallurgical microscope and Scanning electron microscope – Applications.

Photo elasticity: Theory of photo elasticity – Stress optic law – Isoclinic and Isochromatic fringes – Photoelastic bench and its use.

UNIT III SEMICONDUCTING AND SUPERCONDUCTING MATERIALS 9

Intrinsic Semiconductor: Expressions for the carrier concentration – Calculation of density of holes and electrons – Fermi level and its variation with temperature – Determination of band gap energy.

Extrinsic Semiconductors: Carrier concentration in n-type and p-type semiconductors (no derivation – qualitative) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient.

Super Conductors: Super Conductivity – Properties – Meissner effect – Type I and Type II Superconductors – High temperature Super conductors – Applications – Magnetic levitation – Josephson effect – SQUID.

UNIT IV WATER TREATMENT PROCESS 9

Hardness of water – CaCO equivalents – Ethyene Diamine Tetra – acetic Acid 3 (EDTA) method of estimation of hardness – Troubles of boiler feed water – Demineralization – Zeolite process – Desalination – Recerse osmosis – Electrodialysis – Water conditioning (Colloidal, Phosphate, Calgon, Carbonate) –

Treatment of domestic water (UV and ozone).

UNIT V THERMODYNAMICS 9

Thermodynamic process – First law of thermodynamics – Limitations – Second law of thermodynamics – Clausius and Kelvin statements – Entropy – Mathematical expressions – c hanges in entropy for isothermal expansion – Reversible and irreversible processes – Free energy – Gibbs Helmholtz equation – Application and simple problems – Van't Hoff isotherm and isochore – Simple problems.

Total: 45

TEXT BOOKS

1. Avadhanulu M.N and Kshirsagar P.G, " A Text Book of Engineering Physics", S. Cand & Company Ltd., 7 Enlarged Revis ed Ed., 2005. th
2. Gaur R.K Gupta S.L., " Engineering Physics" Dhanpat Rai Publishers, New Delhi, 2001.
3. P.C. Jain and Monika Jain, " Engineering chemistry", 13 Edition, Dhanpat th Rai Publishing Company (P) LTd., New Delhi, 2004.

REFERENCES

1. Pillai S.O " Solid State Physics", New Age International Publications, New Delhi, 6 Edition, 2005. th
2. Arumugam M., " Engineering Physics" Anuradha Agencies, Kumbakonam, 2 Edition, 2005. nd
3. Palanisamy P.K " Physics for Engineers", Scitech Publications (India) Pvt., Ltd., Chennai, Second Edition, 2005.
4. J.C Kuriakose and J. Rajaram, " Chemistry in Engineering and Technology", Vol. 1 & 2, Tata McGraw Hill Publishing Company (P) Ltd., New Delhi, 1996.
5. B.K. Sharma, " Engineering Chemistry", Krishna Prakasam Media (P) LTd., Meerut, 2001.

CS4104 – FUNDAMENTALS OF COMPUTING

L	T	P
3	0	0

UNIT I INTRODUCTION 9

Introduction - characteristics of Computers 0 The Evolution of Computers - The Computer Generation - Classification of Computers - Basic Computer organization - Number System.

UNIT II COMPUTER ARITHMETIC AND SOFTWARE 9

Computer Codes - Computer Arithmetic - Binary Arithmetic - Addition - Subtraction - Multiplication - Division - Computer Software - Types of Software - Logical System Architecture - Software Development Steps.

UNIT III PROBLEM SOLVING AND OFFICE AUTOMATION 9

Planning the Computer Program - Purpose - Algorithm - Flowcharts -Pseudocode - Application Software Packages - Word Processing – Spreadsheet - Graphics - Personal Assistance.

UNIT IV INTRODUCTION TO C 9

Overview of C - Constants, Variables and Data Types - Operators and Expression - Managing input and output Operators - Decision Making and Branching - Decision Making and Looping.

UNIT V FUNCTIONS AND POINTERS 9

Arrays - Handling of Character Strings - User - Defined Functions - Structures and Unions - Pointers - The Preprocessor - Developing a C Program: Some Guidelines

Total: 45

TEXT BOOKS

1. Pradeep K. Sinha and Priti Sinha, "Computer Fundamentals: Concepts, System and Applications" BPB Publications, 2003.
2. E. Balagurusamy, "Programming in ANSI C", TMH, New Delhi, 2002.

REFERENCES

1. Allen B. Tucker et.al, "Fundamentals of Computing I" TMH New Delhi, 1998.
2. V. Rajaraman, "Fundamentals of Computers", Prentice - Hall of India, 2002.
3. Herbert Schidt. "C Made Easy", McGraw Hill.

CE4101 – APPLIED GEOLOGY

L	T	P
3	0	0

UNIT I GENERAL GEOLOGY 9

Geology in Civil Engineering - Branches of geology - Earth Structures and composition - Elementary knowledge on continental drift and plate technologies. Earth processes - Weathering - Work of rivers, wind and sea and their engineering importance - Earthquake belts in India. Groundwater - Mode of occurrence - prospecting - importance in civil engineering.

UNIT II MINERALOGY 9

Elementary knowledge on symmetry elements of important crystallographic systems - physical properties of minerals - study of the following rock forming minerals - Quartz family. Feldpar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet - properties, behaviour and engineering significance of clay minerals - Fundamentals of process of formation of ore minerals - Coal and petroleum - Their origin and occurrence in India.

UNIT III PETROLOGY 9

Classification of rocks - distinction between igneous, sedimentary and metamorphic rocks. Description occurrence, engineering properties and distribution of following rocks. Igneous rocks - Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks sandstone, Limestone, shale conglo, Conglomerate and breccia. Metamorphic rocks. Quartizite, Marble, Slate, Phyllite, Gniess and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD 9

Attitude of beds - Outcrops - Introduction to Geological maps - study of structures - Folds, faults and joints - Their bearing on engineering construction. Seismic and Electrical methods for Civil engineering investigations.

UNIT V GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING 9

Remote sensing techniques - Study of air photos and satellite images -Interpretation for Civil Engineering projects - Geological conditions necessary for construction of Dams, Tunnels, Buildings, Road cutting, Land slides - Causes and preventions. Sea erosion and coastal protection.

Total : 45

TEXT BOOKS

1. Parbin Sing, " Engineering and General Geology", Katson Publication House, 1987.
2. Krynine and Judd, " Engineering Geology and Geotechniques", McGraw Hill Book Company, 1990.

REFERENCES

1. Legeet, " Geology and Engineering", McGraw Hill Book Company 1998.
2. Blyth, " Geology for Engineers", ELBS, 1995.

CE4102 – SURVEYING I

L	T	P
3	0	0

UNIT I INTRODUCTION AND CHAIN SUVEYING 8

Definition - Principles - Classification - Field and office work - Scales - Conventional sings - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II COMPASS SURVEYING AND PLANE TABLE SURVEYING 7

Prismatic compass - Surveyor's compass - Bearing - Systems and conversions- Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

UNIT III LEVELLING AND APPLICATIONS 12

Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check leveling- Booking - Reduction - Curvature and refraction - Reciprocal leveling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV THEODOLITE SURVEYING 8

Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables Omitted measurements.

UNIT V ENGINEERING SURVEYS 10

Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways -Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distance - Mine Surveying -instruments - Tunnels - Correlation of under ground and surface surveys -Shafts - Adits.

Total: 45

TEXT BOOKS

1. Bannister A, and Raymond S., Surveying, ELBS, 6th edition, 1992.
2. Kanetkar T.P., Surveying and Levelling, Vol. I and II, United Book Corporation, Pune, 1994.

REFERENCES

1. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, 6th edition, 1971.
2. James M. Anderson and Edward M. Mikhail, Introduction to Surveying, McGraw Hill Book Company, 1985.
3. Heribert Kahmen and Wolfgang Faig, Surveying, Walter de Gruyter, 1995.
4. Punmia B.C. Surveying, Vol. I, II, and III, Laxmi Publications, 1989.

SEMESTER II

MA4151 – MATHEMATICS II

L	T	P
3	0	0

UNIT I MULTIPLE INTEGRALS 9

Double integration - Cartesian and Polar Co-ordinates - Change of order of integration -Area as a double integral - Change of variables between Cartesian and Polar Coordinates - Triple integration - Volume as a triple integral.

UNIT II VECTOR CALCULUS 9

Gradient - Divergence and Curl - Directional derivative - Irrotational and Solenoidal vector fields - Vector integration - Problem solving using Green's theorem - Gauss divergence theorem and Stake's theorem - Simple applications and verifications.

UNIT III FOURIER SERIES AiND TRANSFORMS 9

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series and cosine series - Fourier transform pair - Sine and Cosine transforms -Properties - Transforms of simple functions - Parseval's identity for series and transforms.

UNIT IV COMPLEX INTEGRATION 9

Problems solving using Cauchy's integral theorem and integral formula - Taylor's and Laurent;s expansions - Residues - Cauchy's residue theorem - Contour integration over unit circle - Semicircular contours with no pole on real axis.

UNIT V LAPLACE TRANSFORMS 9

Transforms of elementary functions - Basic properties - Transforms of derivatives and integral - Initial and final value theorems - Inverse Laplace transforms - Convolution theorem — Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms

Total: 45

TEXT BOOKS

1. B.S Grewal, "Higher Engineering Mathematics, Thirty Sixth Edition, Khanna Publishers, Delhi, 2005.
2. Veerarajan.T. "Engineering Mathematics (for first year)" fourth Edition, TataMcGraw - Hill Publishing company Ltd, New Delhi, 2005.

REFERENCES

1. Glyn James., "Advanced Modern Engineering Mathematics: Third Edition,
   Pearson Education Ltd, New Delhi, 2004.
2. Venkataraman, M.K., " Engineering Mathematics" Vol - 1 & II Revised enlarged
   fourth Edition, The National Publishing Company, Chennai, 2004

CE4153 – STRENGTH OF MATERIAL II

L	T	P
3	1	0

UNIT 1 ENERGY PRINCIPLES 9

Strain energy and strain energy density — strain energy due to shear, flexure torsion & axial forces - Castigliano's theorems - principles of virtual of work - applications of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorem.

UNIT II INDETERMINATE BEAMS 9

Propped cantilever and fixed beams - fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) - clapeyron's theorem of three moments - analysis of continuous beams - shear force and bending moments diagrams for continuous beams - slope & deflection in continuous beams (qualitative study only)

UNIT III COLUMNS 9

Eccentrically loaded short columns - middle third rule - cores or kern of the section -columns of unsymmetrical sections - (angle sections) Euler's theory of long columns -critical loads for prismatic columns with different end conditions; Rankine Gordon formula for eccentrically loaded columns.

UNIT IV STATE OF STRESS - THREE DIMENSIONS - TWO DIMENSIONS 9

Spherical and deviatory components of stress tensor - volumetric strain - theories of failures - principal stress - principal strain - shear stress - strain energy and distortion energy theories - interaction problems and interaction curves - residual stresses.

UNIT V ADVANCED TOPICS IN BENDING OF BEAMS 9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - Hook curved beams - Winkler Bach formula - fatigue and fracture endurance limit.

L:45 T:15 Total: 60

TEXT BOOKS

1. Egor P Popov " Engineering Mechanics of Solids" Prentice Hall of India , New Delhi, 2003.
2. V.N Vazirani M.M. Ratwani' Analysis of Structures" Vol-1, Khanna Publishers, New Delhi.

REFERENCES

1. Kazimi S.M.A, Solid Mechanics, Tata McGraw Hill Publishing Co, New Delhi, 2003.
2. William Nash "Theory and Problems of Strength of Materials' Schaum's Outline series, McGraw Hill International Edition.
3. R.S Khurmi "Strength of Materials, S. Chand & Company Ltd., New Delhi, 2003.

CE4154 – HYDRO MECHANICS

L	T	P
3	1	0

UNIT 1 DEFINITIONS AND FLUID PROPERTIES 8

Definition — Fluid and fluid mechanics — Dimensions and units — Fluid properties - Continuum Concept of system volume.

UNIT II FLUID STATICS & KINEMATICS 10

Pascal's Law and Hydrostatic equation - Forces on plane and curved surface - Buoyancy - Meta centre - Pressure measurement - Fluid mass under relative equilibrium. **Fluid Kinematics** Stream, streak and path lines - Classification o flows - Continuity equation (one, two and three dimensional forms) - Stream and potential functions -flow nets - Velocity measurement (Pilot tube, current meter, Hot wire and hot film anemometer, float technique, Laser Doppler Velocimetry)

UNIT III FLUID DYNAMICS 9

Euler and Bernoulli's equations - Application of Bernoulli's equation - Discharge measurement - Laminar flows through pipes and between plates - Hagen Poiseuille equation - Turbulent flow - Darcy Weisbach formula - Moody diagram - Momentum Principle

UNIT IV BOUNDARY LAYER AND FLOW THROUGH PIPES 9

Definition of boundary layer - Thickness and classification - Displacement and momentum thickness - Development of laminar and turbulent flows in circular pipes -Major and minor losses of flow in pipes - Pipes in series and in parallel - Pipe network

UNIT V SIMILITUDE AND MODEL STUDY 9

Dimensional Analysis - Rayleigh's methods Buckingham's Pi-theorem - Similitude and models - Scale effect and distorted models.

L:45 T:15 Total: 60

TEXT BOOKS

1. Kumar, K.L., "Engineering Fluid Mechanics" Eurasia Publishing House (P) Ltd., New Delhi, 1995.
2. Garde, R.J. and Mirajgaoker, A.G., "Engineering Fluid Mechanics" Nem Chand Bros., Roorkee.

REFERENCES

1. Streeter, Victor, L. and Wylie, Benjamin E., Fluid Mechanics" McGraw Hill Ltd., 1998.
2. E. John Einnemore and Josephs B. Franzini, " Fluid Mechanics with engineering Applications" McGraw Hill International Edition.
3. Pernard Messay, " Mechanics of Fluids" 7th Edition, Nelson Thornes Ltd., U.K. 1998.

CE4155 – SURVEYING II

L	T	P
3	0	0

UNIT 1 TACHEOMETRIC SURVEYING 6

TacheOWetfiC system - Tangential, stadia and subtense methods - Stadia system - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs -Stadia constants - Anallactic lens - Subtense bar.

UNIT II CONTROL SURVEYING 8

Working from whole to part - Horizontal and vertical control methods - Triangulation -Signals - Base line - Instruments and accessores - Corrections - Satellite station -Reduction to centre - Trignometric leveling - Single and reciprocal observations -Modern trends - Bench marking

UNIT III SURVEY ADJUSTMENTS 8

Errors- Sources, Precautions and corrections - Classification of errors - True and most probable values - weighted observations - Methods of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UNIT IV ASTRONOMICAL SURVEYING 11

Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - Nautical almanac - Star constellations - Practical astronomy - Field observations and calculations for azimuth.

UNIT V OTHER TOPICS 12

Photogrammetry - Introduction - Terrestial and aerial Photographs - Stereoscopy -Parallax - Electromagnetic distance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying - Cartography - Cartographic concepts and techniques - Cadastral surveying - Definition - Uses - Legal values -Scales and accuracies.

Total: 45

TEXT BOOKS

1. Bannister A and Raymond S., Surveying ELBS, Sixth Edition, 1992.
2. Punima B C, Surveying Vols. I, II and III, Laxmi Publications, 1989.

REFERENCES

1. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S Publishers and Distributors, Delhi, Sixth Edition, 1971.
2. James M. Anderson and Edward M. Mikhail, Introduction to Surveying, McGraw Hill Book Company, 1985.
3. Wolf P.R Elements of Photogrammetry, McGraw Hill Book Company, Second Edition, 1986.

CE4156 – SURVEY PRACTICAL

L	T	P
0	0	4

LIST OF EXERCISES

1. Study of Theodolite
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Theodolite survey traverse
4. Heights and distances - Triangulation - Single plane methods.
5. Tacheometry - Tangential system - Stadia system - Subtense system
6. Setting out works - Foundation marking - Simple curve (right/left-handed) - Transition curve.
7. Field observation for Calculation of azimuth
8. Demonstration of Total station

SEMESTER III

CE4201 – STRUCTURAL ANALYSIS I

L	T	P
3	1	0

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 9

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

UNIT II FLEXIBLITY METHOD FOR INDETERMINATE FRAMES 9

Equilibrium and compatibility - Determinate vs indeterminate structures –Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT III SLOPE DEFLECTION METHOD 9

Continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry – Simplification for hinged end - Support displacements.

UNIT IV 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 - Naylor's simplification.

UNIT V MATRIX STIFFNESS METHOD 9

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

L:45 T:15 Total: 60

TEXT BOOKS

1. Theory of structures – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi, 1999
2. Indeterminate Structural Analysis – S.J. Kinney, Oxford IBH Publishing Co., 1999.

REFERENCES

1. Matrix analysis of framed structures – William Weaver, Jr & James M.Gere, CBS Publishers & Distributors, Delhi, 1995
2. Structural Analysis – A Matrix Approach – G.S.Pandit & S.P.Gupta, Tata McGraw-Hill, 1998

GE4151 – ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P
3	0	0

UNIT I IMPORTANCE OF ENVIRONMENTAL STUDIES 9

Definition, scope and importance - Need for public Awareness - Forest resources – Water resources - Mineral resources - Land resources – Energy resources – Food resources – Equitable use of resources for sustainable lifestyles.

UNIT II ECOSYSTEMS AND BIODIVERSITY 12

Concept of Ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem – Food chains - Food webs - Ecological Pyramids. – Definition of Bio – diversity – Bio-geographical classification in India – Value of Bio-diversity – Bio diversity at Global, National and local levels – India as a mega diversity nation – Hot spots of bio diversity – Threats to bio diversity – Conservation of bio diversity.

UNIT III ENVIRONMENTAL POLLUTION 9

Definition – Causes and Effects of Environmental pollution - Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear hazards – Solid waste management – Societal role in pollution prevention – Environmental Disasters and management.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

Unsustainable to sustainable development – Concept of conservation – Water and energy conservation - Rain water harvesting – Climate change – Global warning – Acid rain – Ozone layer depletion – Nuclear accidents and holocaust – Environmental protection Act – Issues involved in Enforcement of Environmental legislation – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth - 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.

Total: 45

TEXT BOOKS

1. Gilbert M.Masters, “Introduction to Environmental Engineering and Science ‘’, 2nd Edition, Pearson Education ,2004.
2. Miller T.G. Jr., “Environmental Science”, Wadworth publishing Co.

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. KurianJoseph, “ Essential of Environmental Studies”, First Edition, Pearson Education, 2004.
4. Bharucha Erach, ‘The Biodiversity of India”, Maplin Publishing Pvt., Ltd.,
5. Rajagopalan, R, “Environmental Studies-From Crisis to Cure”, Oxford University Press (2005)

CE4202 – SOIL MECHANICS

L	T	P
3	0	0

UNIT I INTRODUCTION 8

Nature of Soil - Problems with soil - phase relation - sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification system.

UNIT II SOIL WATER AND WATER FLOW 8

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – quick sand condition - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problems.

UNIT III STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT 10

Stress distribution in soil media – Boussinesque formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts – Westergaard equation for point load - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test – Field consolidation curve – NC and OC clays - problems on final and time rate of consolidation

UNIT IV SHEAR STRENGTH 9

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand – Stress path for conventional triaxial test.

UNIT V SLOPE STABILITY 10

Slope failure mechanisms - Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - Stability analysis for purely cohesive and C-ϕ soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures – Soil compaction - factors affecting compaction – field compaction methods and monitoring.

Total: 45

TEXT BOOKS

1. Punmia P.C., “Soil Mechanics and Foundations”, Laximi Publications Pvt. Ltd., New Delhi, 1995.
2. Gopal Ranjan and Rao A.S.R., “Basic and applied soil mechanics”, New Age International Publishers, New Delhi, 2000.
3. Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, New Delhi, 1995
4. Khan I.H., “A text book of Geotechnical Engineering”, Prentice Hall of India, New Delhi, 1999.

REFERENCES

1. Coduto, D.P., “Geotechnical Engineering Principles and Practices”, Prentice Hall of India Private Limited, New Delhi, 2002.
2. McCarthy D.F., “Essentials of Soil Mechanics and Foundations Basic Geotechniques”, Sixth Edition, Prentice-Hall, New Jersey, 2002.
3. Das, B.M, “Principles of Geotechnical Engineering”, (fifth edition), Thomas Books/ cole, 2002
4. Muni Budhu, “Soil Mechanics and Foundations”, John Willey & Sons, Inc, New York, 2000.

CE4203 – HIGHWAY ENGINEERING

L	T	P
3	0	0

UNIT I HIGHWAY PLANNING AND ALIGNMENT 9

History of road Development in India – Classification of highways - Institutions for Highway Planning, Design and implementation at different levels – Factors influencing highway alignment – Engineering surveys for alignment, objects, conventional and modern methods.

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9

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

UNIT III DESIGN OF FLEXIBLE AND RIGID PAVEMENTS 9

Design Principles – Pavement components and their role – Design practice of Flexible and Rigid Pavements, pavement joints and IRC Recommendations.

UNIT IV HIGHWAY CONSTRUCTION MATERIAL, EQUIPMENTS AND PRACTICE 9

Highway construction materials, properties, testing methods - Construction practice including modern methods, concrete road constructions (problem not included), highway drainage – Special considerations for hilly roads.

UNIT V HIGHWAY PROJECT FORMULATIONS AND MAINTENANCE 9

Highway project formulation - Pavement distress in flexible and rigid pavement - Pavement evaluation, roughness, present serviceability index, skid resistance, structural evaluation, evaluation by deflection measurements - Strengthening of pavements - Highway maintenance - Highway and environment.

Total: 45

TEXT BOOKS

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 2000.

REFERENCES

1. Blunden W.R, and J.A Black, The Land Use Transport Systems, Pergamon Press, 1994
2. Vazirani V.N., and P.Chandola, Transportation Engineering, Vol.1, Khanna Publishers, Delhi, 1999.
3. Clarkson H., Oglesby and R.Gary Hicks: Highway Engineering, John Wileysons, 1992.

CE4204 – COMPUTER AIDED BUILDING DRAWING

L	T	P
0	0	4

1.	Buildings with load bearing walls (R.C.C roof)	12
2.	Building with Sloping roof (R.C.C roof and Tiled roof)	12
3.	R.C.C. framed structures	12
4.	Industrial buildings – North light roof structures – Trusses	12
5.	Perspective view of one and two storey buildings	12

Total: 60

TEXT BOOKS

1. Mastering in Autocad2002 – George Omura BPB Publications, New Delhi, 2002.
2. Building drawing & detailing – Balagopal & T.S. Prabhu, Spades Publishers, Calicut.

REFERENCES

1. Building drawing – Shah.M.G., Tata McGraw-Hill,1992
2. Building planning & Drawing –Kumaraswamy N., Kameswara Rao A., Charotar Publishing
3. Shah, Kale and Patki, Building Drawing with integrated approach to built environment, Tata McGraw-Hill.
4. Civil Engg. Drawing & House Planning – Varma B.P., Khanna publishers, Delhi
5. M.G. Shah, C.M. Kale and S.Y. Patki, "Building Drawing with an integrated Approach to built Environment, Tata McGraw Hill Publishers Limited, New Delhi, 2004.
6. K. Venugopal, " Building Drawing", Wiley Eastern Limited, Madras, 1984.

EXAMINATION DURATION 3 HOURS

SEMESTER IV

CE4251 – DESIGN OF STEEL STRUCTURES

L	T	P
3	0	0

UNIT I SECTION AND JOINTS 12

Type of steel structures- Properties of rolled steel sections and light gauge steel sections - Allowable stresses as per IS codes - Riveted and bolted connections - Failure of joints- Simple and multiple riveted lap and butt joints under axial and eccentric loading – Strength of fillet and butt welded joints - Design of riveted 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 8

Maximum slenderness ratio of compression members - IS code provisions of compression members - Design of simple and built up compression members with lacing and battens - Design of column bases

UNIT IV BEAMS 11

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

UNIT V TIMBER 6

Study of properties and strength of natural and laminated timber-allowable stresses in compression, tension and flexure - 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

TEXT BOOKS

1. Ramachandra, Design of steel structures Vol. 1, Standard Book House, New Delhi 1992
2. V.N Vazirani and M.M Ratwani, Steel Structures and Timber Structures, Khanna publishers, New Delhi 1995.

REFERENCES

1. Kazimi S.M.A and Jindal R.S. Design of Steel Structures, Prentice- Hall of India (P) Ltd., New Delhi, 1990.
2. Arya & Ajmani, Design of Steel Structures, Nem Chand & Brors, 1997
3. P Dayaratnam, Design of Steel Structures, A H Wheeler & Co., 1999
4. Ramamrutham S., Design of Steel, Timber and Masonry Structures, Dhanpat Rai and Sons, New Delhi, 1989.

CE4252 – ENVIRONMENTAL ENGINEERING I

L	T	P
3	0	0

UNIT I PRINCIPLES OF ENVIRONMENTAL ENGINEERING 3

Scope of environmental engineering – Role of Environmental Engineer – Environmental impacts of Development – sustainable development – Environmental pollution – Water, Air and Land – sources and effects.

UNIT II PLANNING FOR WATER SUPPLY AND SEWERAGE SYSTEMS 16

Public water supply and sewerage systems – Objectives – Design period – Population forecasting – Water demand Municipal industrial treatment – Factors affecting demand - Sources of water – Source Selection – Water quality – Physico chemical biological Characterisation – Water quality standards – Development of water supply source; Impounding reservoirs, Intakes, Aquifers, Wells, Infiltration gallery, Collector wells, Deep Bore wells - Sources of wastewater – Quantity of sanitary sewage – Estimation of storm runoff – Characteristics and composition of sewage and their significance – Effluent standards.

UNIT III CONVEYANCE SYSTEM 14

Water supply – intake structures – Pipe materials - Hydraulics of flow in pipes – Transmission main design – Laying, jointing & testing of pipes – appurtenances – Pumps – Sewerage – Hydraulics of flow in sewers – Design of sanitary and storm sewers – Computer applications – Laying, jointing & testing of sewers – appurtenances – Pumps.

UNIT IV WATER DISTRIBUTION 7

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

UNIT V WATER SUPPLY AND DRAINAGE IN BUILDINGS 5

Principles of design of water supply and drainage in buildings – House service connection – Sanitary fixtures and fittings – Systems of sanitary plumbing – House drainage – House sewer connection.

Total: 45

TEXT BOOKS

1. Garg, S.K., Environmental Engineering, Vols. I and II, Khanna Publishers, New Delhi, 1994
2. C.S.Shah, Water Supply and Sanitation, Galgotia Publishing Company, New Delhi, 1994

REFERENCES

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993
3. H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering, McGraw-Hill Book Company, New Delhi, 1995.

CE4253 – STRUCTURAL ANALYSIS II

L	T	P
3	0	0

UNIT I MOVING LOADS AND INFLUENCE LINES 9

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

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 IV THEORY OF PLASTICITY 9

Statically indeterminate axial problems – 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

TEXT BOOKS

1. B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Theory of Structures – Laxmi Publications, New Delhi, 2004.
2. Jain A.K. and Arya A.S., Structural Analysis, Vol.II, Nemchand Publishers, Roorkee, 1996
3. Bhavikatti, SS, Structural Analysis Vol.1 and 2, Vikas Publishing House Pvt Ltd., New Delhi-4, 2003

REFERENCES

1. Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers, Delhi, 1994
2. Vaidyanathan, R and Perumal, P, Structural Analysis Vol.1 and 2 Laxmi Publications, New Delhi, 2004.
3. Jain A.K. and Arya A.S., Structural Analysis, Vol.II, Nemchand Publishers, Roorkee, 1996

CE4254 – APPLIED HYDRAULIC ENGINEERING

L	T	P
3	0	0

UNIT I CHANNEL FLOW 9

Steady uniform flow – Best hydraulic sections for uniform flow – Specific energy and specific force.

UNIT II STEADY GRADUALLY VARIED FLOWS 10

Dynamic Equation – Water surface flow profile classifications – Profile determination by graphical method, direct step method and standard step methods.

UNIT III RAPIDLY VARIED FLOWS 8

Hydraulic jump - types - energy dissipation - surges - surge through channel transitions.

UNIT IV TURBO MACHINES 10

Turbines - classification - Reaction turbines – Francies turbine, Radial flow turbines - draft tube and cavitation – Propeller and Kaplan turbines, Impulse turbines - Performance of turbines - Similarity laws - Centrifugal pump - Minimum speed to start the pump – NPSH – Cavitation in pumps – Operating characteristics - Multistage pumps.

UNIT V POSTIVE DISPLACEMENT PUMPS 8

Reciprocating pump - Negative slip - Flow separation conditions - Air vessels - indicator diagram and its variation - Savings in work done - Rotary pumps.

Total: 45

TEXT BOOKS

1. Subramanya K., " Flow in Open channels ", Tata McGraw Hill Publishing Company, 1994.
2. Kumar K.L., " Engineering Fluid Mechanics ", Eurasia Publishing House (P) Ltd., New Delhi, (7th Edition), 1995.
3. Jain A.K., " Fluid Mechanics (including Hydraulic Machines) ", Khanna Publishers, 8th edition, 1995.

REFERENCES

1. Ven Te Chow, " Open-Channel Hydraulics ", McGraw - H:Q Book company, 1996.
2. Mays L.W., Water Resources Engineering, John Willey and Sons (WSE), New York, 2004.,
3. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 1995..

CE4255 – RAILWAYS, AIRPORTS, DOCKS AND HARBOURS

L	T	P
3	0	0

UNIT I RAILWAY PLANNING AND CONSTRUCTION 10

Route alignment surveys, modern methods – Elements of permanent way – Rails, sleepers, ballast, rail fixtures and fastenings, coning of wheels, creep in rails, defects in rails – Geometric design of railway track, gradient, superelevation, widening of gauge on curves – Railway track construction and maintenance, modern methods, track drainage, unigauge.

UNIT II RAILWAY STATION YARDS AND OPERATIONS 9

Planning and development of railway station yards, railway track – Turnouts, Points and Crossings - Signaling, track design - Interlocking and Track Circuiting – Modern developments in railways, urban railways, urderground and tube railways, construction and maintenance – Basic planning for MRTS and Suburban railways – Electric traction.

UNIT III AIRPORT ENGINEERING 10

Airport Planning - Components of Airports, Airport Site Selection - Runway Design-Orientation, Geometric Design and Correction for LENGTH (PROBLEM INCLUDED) – Airport drainage - Terminal area, Airport Layout, Airport Buildings, Passenger Facilities – Planning construction and maintenance of Parking Area and Airport Zoning laws.

UNIT IV DOCKS AND HARBOUR ENGINEERING 8

Littoral Drift, Harbour – Requirements, types, planning, location and design, concepts, Components of a harbour, concept of satellite ports, dry and wet docks, berthing structures – Selection and design components, break, waters piers, wharves, quay walls, jetties, dolphins, mooring, accessories, terminal facilities and other coastal structures.

UNIT V COASTAL SHIPPING 8

Coastal Shipping - Inland Water Transport - Container Transport – coastal erosion and protection – Beach erosion and protection works, environmental concerns in port construction, coastal regulation zones.

Total: 45

TEXT BOOKS

1. Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 1998.
2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994.
3. Seetharaman, S, Dock and Harbour Engineering, Umesh Publications, New Delhi.

REFERENCES

1. Vazirani, V.N. and Chandola S.P., Transportaion Engineering – Vol.1, Khanna Technical Publications, New Delhi 1991..
2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.
3. Shahani P., Airport Technique, New Delhi.
4. Agarwal M.M., Railway Track, New Delhi.

SEMESTER V

CE4301 – DESIGN OF REINFORCED CONCRETE AND MASONRY STRUCTURES

L	T	P
3	0	0

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES 5

Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code – Design of beams and slabs by elastic method.

UNIT II LIMIT STATE DESIGN FOR FLEXURE, SHEAR AND TORSION 17

Analysis and design of one way and two way slabs – Design of rectangular and flanged beams – use of design aids for flexure - deflection and crack width control - Behaviour of RC beams in shear and torsion – Shear and torsional reinforcement - Limit State design of R.C members for combined bending, shear and torsion – Use design aids, Design requirement for bond and anchorage as per current code.

UNIT III LIMIT STATE DESIGN OF SLABS AND COLUMNS 13

Design of one way and two way slabs – Design of rectangular slabs under uniformly distributed load and concentrated loads – various edge conditions and corner effects. Types of columns - Analysis and design short column for axial, uniaxial and biaxial bending - use of design of aids.

UNIT IV LIMIT STATE DESIGN OF FOOTING 5

Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only - Design of raft.

UNIT V MASONRY MEMBERS 5

Design of masonry walls, pillars and footings as per Codes - BIS.

Total: 45

TEXT BOOKS

1. Dayaratnam, P., “Brick and Reinforced Brick Structures”, Oxford & IBH Publishing House, 1997
2. Varghese, P.C., “Limit State Design of Reinforced Concrete Structures”

REFERENCES

1. Mallick, D.K. and Gupta A.P., “Reinforced Concrete”, Oxford and IBH Publishing Company
2. Syal, I.C. and Goel, A.K., “Reinforced Concrete Structures”, A.H. Wheelers & Co. Pvt. Ltd., 1994
3. Krishna Raju, N., “Design of RC Structures”, CBS Publishers and Distributors, Delhi

CE4302 – ENVIRONMENTAL ENGINEEERING II

L	T	P
3	0	0

UNIT I WATER TREATMENT 10

Objectives - Unit operations and processes - Principles of function and design flash mixer, flocculators, clari- flocculators, sedimentation tanks and sand filters - Disinfection chlorinators - Aeration - Iron and manganese removal , Defluoridation and Demineralisation – Water softening – Advances in water treatment.

UNIT II PRIMARY TREATMENT OF SEWAGE 6

Objectives – On site – sanitation; Composting Toilets, Two pit pan flush toilets, Septic tank, Grey water harvesting – Primary treatment – Principles, functions and design of screen, grit chambers and primary sedimentation tanks.

UNIT III SECONDARY TREATMENT OF SEWAGE 13

Secondary treatment - Objectives - unit operation and process - Selection of treatment processes – Activated Sludge Process and Trickling filter; other treatment of methods - Oxidation ditches, UASB – Waste Stabilisation Ponds – Advances in sewage Treatment; Reclamation and Reuse of sewage.

UNIT IV SEWAGE DISPOSAL 7

Methods – Dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system.

UNIT V DISPOSAL OF SEWAGE 9

Thickening - digestion – Biogas recovery – Conditioning and Dewatering - Sludge Drying beds - Sludge disposal – Advances in Sludge treatment.

Total : 45

TEXT BOOKS

1. Garg, S.K., “Environmental Engineering I & II”, Khanna Publishers, New Delhi 2007.
2. Modi, P.N., “Environmental Engineering I & II”, Standard Book House, Delhi – 6

REFERENCES

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999
2. Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993
3. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987
4. Metcalf and Eddy, M.C., “Wastewater Engineering – Treatment & Reuse”, Tata McGraw-Hill Publications, New Delhi, 2003

CE4303 – FOUNDATION ENGINEERING

L	T	P
3	0	0

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives – Methods of exploration-averaging and boring – Water boring and rotatory drilling – Depth of boring – Spacing of bore hole - Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Data interpretation (Strength parameters and Liquefaction potential) – Selection of foundation based on soil condition.

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 insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimising settlement, differential settlement.

UNIT III FOOTINGS AND RAFTS 9

Types of foundation – Contact pressure distribution below footings & raft - Isolated and combined footings – types – proportioning - mat foundation – types – use - proportioning – floating foundation – Seismic design of foundation – 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 Hiley's) – 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 – Forces on pile caps – under reamed piles – Capacity under compression and uplift.

UNIT V RETAINING WALLS 9

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesion less and cohesive soil - Coloumb's wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.

Total: 45

TEXT BOOKS

1. Murthy, V.N.S, “Soil Mechanics and Foundation Engineering”, UBS Publishers Distribution Ltd, New Delhi, 1999.
2. Gopal Ranjan and Rao, A.S.R. ”Basic and Applied Soil Mechanics”, Wiley Eastern Ltd., New Delhi (India), 2003.

REFERENCES

1. Das, B.M. “Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2003
2. Kaniraj, S.R, “Design aids in Soil Mechanics and Foundation Engineering”, Tata McGraw Hill publishing company Ltd., New Delhi, 2002
3. Bowles J.E, “Foundation analysis and design”, McGraw-Hill, 1994
4. Punmia, B.C., “Soil Mechanics and Foundations”, Laxmi publications pvt. Ltd., New Delhi, 1995.

CE4304 – COMPUTER AIDED DESIGN AND DRAFTING LABORATORY

L	T	P
0	0	4

1. Design and drawing of RCC cantilever and counterfort type retaining walls with reinforcement details
2. Design of solid slab and RCC Tee beam bridges for IRC loading and reinforcement details
3. Design of pressed, rectangular and hemispherical bottomed steel tank – Staging – Detailed drawings
4. Design and drafting of Intz type water tank, Detailing of circular and rectangular water tanks
5. Design of plate girder bridge – Twin Girder deck type railway bridge – Through type and deck type Highway bridges - Truss Girder bridges – Detailed Drawings - riveted and welded connections.

Total: 60

TEXT BOOKS

1. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers
2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi publications Pvt. Ltd.

REFERENCES

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

EXAMINATION DURATION 3 HOURS

SEMESTER VI

CE4351 – VALUATION ENGINEERING

L	T	P
3	0	0

UNIT I ESTIMATION AND RATE ANALYSIS 10

Philosophy – purpose – methods of estimation, Main items of work, deduction for opening R.C.C. and R.B. work, flooring and roofing etc., - Advantages – Types of estimates – Approximate estimates – Definite estimate – Estimation of quantities for buildings, roads, canals and hydraulic structures.

UNIT II SPECIFICATIONS AND TENDERS 10

Specifications – Detailed and general specifications – constructions – sources – Types of specifications – TTT Act 2000 – Tender notices – types – tender procedures – Drafting model tenders, E-tendering – Reverse auctions.

UNIT III CONTRACTS 10

Contract – Types of contracts – Formation of contract – Contract conditions – Contract for labour, material, design, construction – Drafting of contract documents standard bidding documents – Contract problems – Arbitration and legal requirements.

UNIT IV BASICS OF VALUE ENGINEERING 7

Basics - Value and cost – Various phases in value engineering – Case Study.

UNIT V VALUATION ENGINEERING 8

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

Total: 45

TEXT BOOKS

1. B.N. Dutta, Estimation and costing in Civil Engineering, UBS Publishers Ltd., 1995.
2. JaganathanG., Getting more at less cost – The values Engineering way, Tata McGraw Hill Company, New delhi, 1992.

REFERENCES

1. Hand Book of Consoildated Data – 8 / 2000, Vol.I, 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, IRG, New Delhi, 2003.

CE4352 – IRRIGATION ENGINEERING

L	T	P
3	0	0

UNIT I IRRIGATION SYSTEM 10

Need for Irrigation – Advantages and ill-effects – Development of irrigation – National water policy – Tamil Nadu scenario-Components of irrigation network – Diversion head works, Canal regulators, Canal drop, - Cross drainage works, canal outlets – Functions of the above components – Canal lining – On farm development works.

UNIT II SOIL–WATER RELATIONS 11

Physical properties of soil that influence soil moisture characteristics – concept of soil water potential and its components – Retention of water in soils and the 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 is held – Irrigability of soils and the irrigation related degradation of soil resource (such as water logging, salinity and sodicity).

UNIT III CROP WATER REQUIREMENTS 9

Water as a constituent of plants - Soil, Plant, Atmosphere continuum – Terminology in plant – Water relationships (Evapotranspiration, Consumptive use Crop factor) – Critical stages of crop growth for water requirement – Analysis of crop water demand: basic concepts and estimation.

UNIT IV IRRIGATION SCHEDULING METHODS 8

Irrigation Scheduling: concepts – methods of Irrigation Scheduling – supply of irrigation water: Duty delta and Base period. Land levelling and drainage – Irrigation methods: relative merits and limitations – Evaluation of Irrigation methods - Irrigation efficiency - Irrigation Water quality.

UNIT V IRRIGATION WATER MANAGEMENT 7

Need for interdisciplinary approach - irrigation beneficiaries - Participatory approach On farmer's organisation and turn over - Water users associations – Economics aspects of irrigation.

Total: 45

TEXT BOOKS

1. Michael A.M., "Irrigation – Theory and Practice, Vikas Publishing House, New Delhi ,1990
2. Sharma R.K., and Sharma T.K., "Irrigation Engineering", S. Chand and company, New Delhi
3. Gupta, B.L, & Amir Gupta, "Irrigation Engineering", Satya Praheshan, New Delhi

REFERENCES

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd.
2. Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co.
3. Sathyanarayana Murthy, Water Resources Engineering priciples and Practices, New Age International Publishers, New delhi,1997.

CE4353 – FUNDAMENTALS OF REMOTE SENSING AND GIS

L	T	P
3	0	0

UNIT I EMR AND ITS INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL 9

Definition of Remote Sensing and its components – Electromagnetic Spectrum – wavelength regions important for remote sensing – wave theory, Particle theory, Stefan-Boltzman and Wein's Displacement law Atmospheric scattering, absorption - Atmospheric windows – Spectral signature concepts – Typical spectral reflective characteristics of water, vegetation, soil.

UNIT II PLATFORMS AND SENSORS 9

Types of platforms – orbit types, Sun synchronous and Geosynchronous – Passive and Active sensors – Resolution concepts – Payload description of important Earth resources and Meteorological satellites – Airborne and Space borne TIR and microwave sensors – Types of data products.

UNIT III IMAGE INTERPRETATION AND ANALYSIS 9

Types of image interpretation – Visual interpretation keys – Basic elements of image interpretation – Digital image processing – Pre-processing – Image enhancement techniques – Multi spectral image classification – supervised and unsupervised.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

Introduction – Maps – definitions – Map projections – Types of projections – Map analysis – GIS Definition – Basic components of GIS – Standard GIS soft wares – data type – Spatial and Non Spatial (attribute data) – Measurement scales – Data Base Management Systems (DBMS).

UNIT V DATA-ENTRY, STORAGE AND ANALYSIS 9

Data models: vector and raster – Data compression – Data input by digitization and scanning – Attribute data analysis and integrated data analysis – Modeling in GIS – Highway Alignment Studies – Land information System.

Total : 45

TEXT BOOKS

1. Lillesand.M Thomas, and Kiefer. W Ralph(2002). Remote Sensing and image Interpretation. John Wiley and Sons, New York.
2. Anji Reddy, M. (2006). Text book of remote Sensing and Geographical information Systems. Third edn.BS publications, Hyderabad.

REFERENCES

1. C.P.Lo, Albert K.W.Yeung (2002) Concepts and Techniques of GIS Prentice Hall of India Pvt.Ltd.,
2. Peter A.Burrough, Rachael A.Mc.Donnell (2006). Principles of GIS, Univ.Press.
3. Lan Heywood (2000). An introduction to GIS, Pearson Education Asia.

SEMESTER VII

MG4401 – PRINCIPLES OF MANAGEMENT

L	T	P
3	0	0

UNIT I BASIC CONCEPT OF DEVELOPMENT 9

Types of business Operations – Sole proprietorship – partnership – Company – Public and private sector enterprises / Joint Ventures, collaborations.

Functions of Management – Principles of Management – Functions of Management – Functions of a manager.

Production Management – Planning – Scheduling – procurement – Inventory control – management tools – L.P. – PERT, CPM, etc.,

UNIT II INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT 9

Market – Marketing, Segmentation, Positioning, Marketing Research, Market planning, Scope of financial management – Cost accounting Vs Financial accounting, Appraisal of projects, Investment decisions – concept of pay back.

UNIT III MATERIALS AND EQUIPMENT MANAGEMENT 9

Planning - Identification, Procurement, Schedule and cost control – systems approach in resource management – ABC analysis, VED analysis, FSN analysis, vendor rating evaluation, buying versus leasing of equipment.

UNIT IV HUMAN RESOURCE MANAGEMENT 9

Scope and objectives of HRM – Man power policy and planning – Requirement and selection – Training performance appraisal – Wage policy and compensation system – company union relationship qand collective bargaining – Accidents – Absenteeism and turn over – Grievances / conflicts – Identification and resolution.

UNIT V INTRODUCTION TO COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT 9

Planning – Scheduling AND Resource analysis – Recording and operations – Project accounting, costing and finance – usage of project management software.

Total: 45

TEXT BOOKS

1. Konni, Donnel C.O and Weighnrich.H., ManagementEight edition McGraw Hill International Book Company, 1997.
2. Philip Kotler, Marketing management, Prentice-Hall of India, Edition 1998..

REFERENCES

1. Momoria, Personal Management, Himalaya Publishing Co., 1992.
2. Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
3. Srinath, L.S. An Introduction to project management, Tata McGraw Hill Publication, 1995..

CE4401 – STRUTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

L	T	P
3	0	0

UNIT I SINGLE DEGREE OF FREEDOM SYSTEMS 9

Formulation of equation of motion, free and forced vibrations, Response to dynamics loading, Effects of damping.

UNIT II MODEL ANALYSIS 9

Free and forced vibration of undamped and damped MDOF systems, Equation of motions, Evaluation of natural frequencies and modes.

UNIT III INTRODUCTION TO EARTHQUAKE ENGINEERING 9

Elements of Engineering Seismology, Characteristics of Earthquake Engineering, Earthquake history, Indian Seismicity.

UNIT IV BEHAVIOUR OF STRUCTURES AND SOIL 9

Performance of structures under past earthquakes, Lessions learnt from past earthquake. Behavior of soil under earthquake loading – soil liquefaction. Soil – structure – interaction effects.

UNIT V EARTHQUAKE RESISTANT DESIGN 9

Concept of Earthquake Resistant Design, Provisions of Seismic Code IS 1893 (Part –I) – 2002, Response Spectrum, Design Spectrum, Design of Buildings.

Total: 45

TEXT BOOKS

1. Clough R.W. and Penzien J, Dynamics of Structures, Second edition McGraw Hill International Edition, 1993.
2. Mario Paz, Structural Dynamics – Theory and Computations, third Edition, CBS publishers, 1990.
3. Course Notes “Design of Reinforced Concrete Buildings”, IIT Kanpur, June, 1999.

REFERENCES

1. Minoru Wakabayashi “Design of Earthquake Resistant Buildings”, McGraw Hill Book Company, New York, 1986.
2. Humar J L “Dynamics of Structures”, Prentice hall, 1990.
3. Roy R Craig, “Structural Dynamics - An Introduction to Computer Methods”, John Wiley and sons, 1981.

CE4405 – PROJECT WORK

L	T	P
0	0	3

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.

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.

LIST OF ELECTIVES FOR B.E. (PART TIME) CIVIL ENGINERING

CE4001 – GEOGRAPHICAL INFORMATION SYSTEM

L	T	P
3	0	0

UNIT I BASICS OF CARTOGRAPHY 9

Maps – Definition – Scale - Types of Maps – General purpose maps, Thematic Maps, Isopleth maps, Choropleth Maps – Digital Maps – Co-ordinate system – Spheriod – Map projection – Types of projection – Polyconic Projection, UTM

UNIT II INTRODUCTION 9

GIS – Definition – History of GIS – IS vs GIS - Components of GIS – Hardware, software, Data, Methods and people – GIS Software – Data Types: Spatial data – Levels of measurement: Nominal, Ordinal, Interval and Ratio – Data base – Types: Hierarchical, Network, Relational – RDBMS: Structure, SQL.

UNIT III DATA MODELS AND DATA INPUT 9

Data models – Types: Raster and Vector – comparison – Raster: Run length coding , Quadtree – Vector; Topology, Arc Node data structure – Data input – Digitizer , Scanner – On Screen Digitization.

UNIT IV DATA ANALYSIS AND OUTPUT 9

Analysis of Non-spatial data – Integrated Analysis of Spatial and Non-Spatial data: Raster data analysis, vector data analysis – Digital Elevation Model: Sources, Gridded DEM and TIN, Uses – Data Output Map compilation.

UNIT V GIS APPLICATIONS IN CIVIL ENGINEERING 9

Highway Alignment studies – earth work Volume computation – Implementation of SCS methods using GIS – Environmental Impact Assessment Studies – Land Information System.

Total: 45

TEXT BOOKS

1. C.P. Lo, Albert K.W. Yeung, Concepts and Techniques of GIS, Prentice Hall of India Pvt. Ltd., 2002.
2. Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000.

REFERENCES

1. Paul A Longley, Geographical Information Systems and Science John Wiley & Sons inc., 2001.
2. Lan Heywood, An Introduction to GIS, Pearson Education Asia, 2000.

CE4002 – CARTOGRAPHY

L	T	P
3	0	0

UNIT I INTRODUCTION 9

Definition of Cartography - Nature of Cartography Geospatial data – Elements of Cartography – Graticules - Cartometry – Map characteristics – The Cartographic communication process – Map functions and Map types.

UNIT II EARTH 9

Earth-Map Relations - Basic Geodesy - Map Projections, Scale, Reference and Coordinate system - WGS84 Coordinate system and its parameters - Transformation - Basic Transformation - Affine Transformation.

UNIT III SOURCES OF DATA 9

Sources of data - Ground Survey and Positioning - Remote Sensing data collection – Demographic data - Models for digital cartographic information – Deriving data from existing Maps Control and accuracy.

UNIT IV MAP PERCEPTION AND DESIGN 9

Cartographic design - Color theory and models - Color and pattern creation and specification - Color and pattern - Typography and lettering the map - Map compilation.

UNIT V CARTOGRAPHY ABSTRACTION 9

Selection and Generalization Principles - Symbolization - Topographic and thematic maps - Map production and Reproduction – off set printing process - Map series.

Total: 45

TEXT BOOKS

1. R.W. ANSON and F.J. ORMELING, Basic Cartography for students and Technicians. Vol. I, II and III, Elsevrir Applied Science Publishers 2nd Edition, 1994.
2. ARTHUR, H. ROBINSON Et al Elements of Cartography, Sixth Edition, John Wiley and Sons, 1995.
3. John Campbell, Introductory Cartography Second Edition, Wm.C. Brown Publishers, 1994.

REFERENCE

1 M.J.Kraak and F.J. Ormeling, Cartography: Visualisation and spatial data. Prentice Hall – 1996

CE4003 – HOUSING PLANNING AND MANAGEMENT

L	T	P
3	0	0

UNIT I INTRODUCTION TO HOUSING 7

Meaning of House and Household – Census classification of housing condition - Importance of housing and quality of life – UNCHS recommendation on shelter provision - National Housing Policies - Sustainable Housing Development.

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organizations - Housing legislations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 12

Site analysis – Layout design - Design of Housing Units - Development Control Rules – Planning standards – Design of housing disaster prone areas - Design of housing disable and other persons.

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 8

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation – Case studies.

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, case studies – Management of housing estates.

Total: 45

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.
3. National Housing Policy, 1994, Government of India.

CE4004 – TRANSPORTATION PLANNING AND SYSTEMS

L	T	P
3	0	0

UNIT I STUDY AREA AND SURVEYS 10

Importance of planning for 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 8

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

UNIT III PLAN PREPARATION AND EVALUATION 7

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

UNITIV BUS TRANSPORTATION 10

Characteristics of 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

TEXT BOOKS

1. Micheael J.Bruton, Introduction to Transportation Planning, Hutchinson, London, 1995.
2. Kadiyali LR, 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.

CE4005 – INDUSTRIAL WASTE MANAGEMENT

L	T	P
3	0	0

UNIT I INDUSTRIAL POLLUTION SCENARIO 9

Types of industries and industrial pollution – Characteristics of industrial wastes - effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes – Role of Environmental Engineer – Regulation.

UNIT II CLEANER PRODUCTION 8

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Life cycle assessment – Zero discharge concept.

UNIT III TREATMENT OF INDUSTRIAL WASTEWATER 9

Equalization – Neutralization – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved in organics – Combined treatment of industrial and municipal wastes – Residue management.

UNIT IV TREATMENT AND DISPOSAL OF HAZARDOUS WASTES 9

Physico chemical treatment – solidification – incineration – Secured land fills – Legal Provisions.

UNIT V CASE STUDIES 10

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Dairy, Sugar, Paper, distilleries, Steel plants, Fertilizer, Thermal power plants.

Total : 45

TEXT BOOKS

1. M.N.Rao and A.K.Dutta, “Wastewater Treatment”, Oxford - IBH Publication, 1995.
2. W .W. Eckenfelder Jr., “Industrial Water Pollution Control”, McGraw-Hill Book Company, New Delhi, 2000.

REFERENCES

1. T.T.Shen, “Industrial Pollution Prevention”, Springer, 1999.
2. R.L. Stephenson and J.B.Blackburn, Jr., “Industrial Wastewater Systems Hand book”, Lewis Publisher, New Yark, 1998
3. H.M.Freeman, “Industrial Pollution Prevention Hand Book”, McGraw-Hill Inc., New Delhi, 1995.
4. Bishop, P.L., “Pollution Prevention: Fundamental & Practice”, McGraw-Hill, 2000.

CE4006 – MUNICIPAL SOLID WASTE MANAGEMENT

L	T	P
3	0	0

UNIT I SOURCES AND TYPES OF MUNICIPAL SOLID WASTES 7

Sources and types of 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 & economic aspects; Public awareness; Role of NGOs; Municipal solid waste rules – Hazardous and Biomedical wastes – Integrated management.

UNIT II ON-SITE STORAGE AND PROCESSING 9

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options – Source reduction of waste.

UNIT III COLLECTION AND TRANSFER 11

Methods of Collection – Collection of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions – Field problems – Solving..

UNIT IV OFF-SITE PROCESSING 9

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, biomethanation, options under Indian conditions.

UNITV DISPOSAL 9

Hand disposal of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills – Management of Leachate and land fill gas – Land fill bioreactor.

Total: 45

TEXT BOOKS

1. George Tchobanoglous et.al., “Integrated Solid Waste Management”, McGraw-Hill Publishers, 1993.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, “Waste Management”, Springer, 1994.

REFERENCES

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
2. R.E.Landreth and P.A.Rebers, “Municipal Solid Wastes – problems and Solutions”, Lewis Publishers, 1997.
3. Bhide A.D. and Sundaresan, B.B., “Solid Waste Management in Developing Countries”, INSDOC, 1993.

CE4007 – PREFABRICATED STRUCTURES

L	T	P
3	0	0

UNIT I INTRODUCTION 10

Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.

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

Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT IV JOINT IN STRUCTURAL MEMBERS 8

Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT V DESIGN FOR ABNORMAL LOADS 7

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

Total: 45

TEXT BOOKS

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

REFERENCES

1. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
2. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.

CE4008 – MAINTENANCE AND REHABILITATION OF STRUCTURES

L	T	P
3	0	0

UNIT I MAINTENANCE AND REPAIR STRATEGIES 9

Definitions : Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

UNIT II SERVICEBILITY AND DURABILITY OF CONCRETE 9

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking.

UNIT III MATERIALS AND TECHNIQUES FOR REPAIR 9

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning. , methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection

UNIT IV REPAIR TO STRUCTURES 9

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure.

UNIT V DEMOLITION TECHNIQUES 9

Engineered demolition techniques for Dilapilated structures - case studies.

Total: 45

TEXT BOOKS

1. Denison Campbell, Allen and Harold Roper, " Concrete Structures ", Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T. Allen and S.C.Edwards, " Repair of Concrete Structures ", Blakie and Sons, UK, 1987.

REFERENCES

1. M.S.Shetty, " Concrete Technology - Theory and Practice ", S.Chand and Company, New Delhi, 1992.
2. Raikar, R.N., " Learning from failures - Deficiencies in Design ", Construction and Service - R & DCentre (SDCPL), Raikar Bhavan, Bombay, 1987.

CE4009 – PAVEMENT ENGINEERING

L	T	P
3	0	0

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 9

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

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 9

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS 8

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geosynthetics (geotextiles & geogrids) in roads.

Total: 45

TEXT BOOKS

1. Kadiyali, L.R., “Principles and Practice of Highway Engineering”, Khanna tech. Publications, New Delhi, 1989.
2. Croney, D., Design and Performance of Road Pavements, HMO Stationary Office, 1979.
3. Wright, P.H., “Highway Engineers”, John Wiley & Sons, Inc., New York, 1996
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001

REFERENCES

1. Yoder R.J and Witczak M.W., “Principles of Pavement Design”, John Wiley, 1975.
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 Roads Congress, New Delhi.

CE4001 – HYDROLOGY

L	T	P
3	0	0

UNIT I HYDROMETROLOGY 6

Definition and scope - Hydrologic cycle – Natural Disasters – Hydrometrology - Meteorologic measurements.

UNIT II PRECIPITATION AND ABSTRACTIONS 12

Precipitation – Requirements - Types and forms of precipitation – Adequacy of rain gauges – recording and non- recording gauges – Consistency analysis - Frequency analysis – Intensity-duration analysis - Spatial analysis using Thiessen and isohyetal methods. Interception – depression and detention storages – Evaporation, Horton's equation, pan evaporation measurements and evaporation suppression – Infiltration, Horton's equation, double ring infiltrimeter, infiltration indices.

UNIT III RUNOFF 12

Watershed, catchment and basin – catchment characteristics – factors affecting runoff – runoff estimation using empirical, Stage's table and SCS methods – stage discharge relationships – flow measurements. Hydrograph Analysis – factors affecting shape of hydrograph – Components – Baseflow – Unit hydrograph – Synthetic unit hydrograph.

UNIT IV HYDROLOGIC EXTREMES 9

Natural Disasters – flood estimation – frequency analysis - Flood control – Definitions of droughts – Meteorologic, Hydrologic and agricultural droughts – IMD method – NDVI Analysis – Drought prone Areas programme (DPAP).

UNIT V RAIN WATER HARVESTING 6

Importance - rainwater harvesting (RWH) in rural and urban areas – RWH from building roof and open areas – direct storage in sumps – Artificial recharge structures.

Total: 45

TEXT BOOKS

1. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2000
2. Raghunath, H.M., "Hydrology", Wiley Eastern Ltd., 2000

REFERENCES

1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2000
2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd., 2000

CE4012 – WATER RESOURCES ENGINEERING

L	T	P
3	0	0

UNIT I WATER RESOURCES DEVELOPMENT 7

History of Water resources Development – Water resources of India and Tamilnadu – problems and perspectives, conceptual frame work – Physical and socio-economic data - National Water Policy.

UNIT II HYDROLOGICAL DATA AND NETWORK DESIGN 10

Collection of meteorologic and hydrologic data for water resources development - Hydrologic measurement - Analysis of hydrologic data - Hydrologic station network – Station network design – Statistical techniques in network design.

UNIT III WATER USE AND ESTIMATION 8

Principle of water uses - Consumptive and non-consumptive water use - Estimation of water requirements for irrigation, for drinking and industrial purposes.

UNITIV MASTER PLAN FOR WATER 8

Scope and aims of water plan – Concept of Drainage basin as a unit for development – Elements of master plan – Planning areas and their characteristics – Water budget and development plan – Project appraisal.

UNIT V RESERVOIR PLANNING MANAGEMENT 12

Planning procedure for Single and multipurpose projects – Dams – Types – Reservoir - Fixation of Storage capacity - Strategies for reservoir operation - Sedimentation of reservoirs – Economics of water resources planning: Discounting techniques – Benefits-cost analysis of water resources projects.

Total: 45

TEXT BOOKS

1. Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc, 2000.
2. Douglas J.L. and Lee R.R., “Economics of Water Resources Planning”, Tata McGraw-Hill Inc. 2000.

REFERENCES

1. Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw-Hill Inc., New Delhi, 1997.
2. Goodman Alvin S., “Principles of Water Resources Planning”, Prentice-Hall, 1984.
3. Maass et al. “Design of Water Resources Systems”, Macmillan, 1968.

CE4010 – GEOTECHNICAL ENGINEERING PROCESSES AND APPLICATIONS

L	T	P
3	0	0

UNIT I SOIL REINFORCEMENT 8

Concept of Reinforcement earth – Types of Reinforcement – Applications to footings and earth retaining walls.

UNIT II GEOTEXTILES AND GEOGRIDS 5

Geogrids as Reinforcement: Geotextiles in filtration, drainage and road works: Applications.

UNIT III GROUND IMPROVEMENT 10

In-situ treatment of soils: Dynamic consolidation, Vibroflotation, Sand pile, Stone columns – Grouting – Equipments and methods – In-situ treatment of cohesive soils, preloading with sand drains, lime piles: Electrical and thermal methods.

UNIT IV ENVIRONMENTAL PROBLEMS ASSOSIATED WITH GEOTECHNICAL ENGINEERING 10

Environmental problems relating to geotechnical engineering: vibration problems and controls: Rain induced land slides – Bearing capacity and compressibility of sanitary land fills: Geotechnical aspects of waste managements.

UNIT V REGIONAL DEPOSITS AND WASTE MATERIALS 12

Geotechnical problems associated with alluvial, lateritic and black cotton soils; solid wastes like municipal waster and fiyash; characterization, prediction and improvement of their properties; Application; case studies.

Total: 45

TEXT BOOKS

1. Purshothama Raj, P. Ground Improvement Techniques, Laxmi Publications (P) Ltd., New Delhi, 1999.
2. Koerner R.M., Construction and Geotechnical methods in Foundation Engineering, McGraw Hill, 1994.

REFERENCES

1. Ingold, T.S., Reinforced Earth, Thomas Telford Ltd., 1982.
2. Hsai-Yang Fang, Environmental Geotechnology, Envo Publishing Company inc., 1987.

GE4001 – INDIAN CONSTITUTION AND SOCIETY

L	T	P
3	0	0

UNIT I **9**

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II **9**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III **9**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV **9**

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V **9**

Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women and Children, Scheduled Castes, Scheduled Tribes and other Weaker Sections.

Total : 45

TEXT BOOKS

1. Durga Das Basu, " Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, " (1997) Indian Political System ", S.Chand and Company, New Delhi.
3. Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, " (1997) Social Stratification in India: Issues and Themes ", Jawaharlal Nehru University, New Delhi.

REFERENCES

1. Sharma, Brij Kishore, "Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, " (1998) Indian Political System ", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.
4. Yogendra Singh, " (1997) Social Stratification and Charge in India ", Manohar, New Delhi.

GE4002 – CONTRACT LAWS AND REGULATIONS

L	T	P
3	0	0

UNIT I CONSTRCTION CONTRACTS 10

Indian Contracts Act – Elements of Contracts – Types of Contracts – features – Suitability – Design of Contract documents – International contract document – Standard Contract Document – Law of Torts.

UNIT II TENDERS 10

Prequalification – Bidding – Accepting – Evaluation of tender from Technical, Contractual and Coomercial Points of View – contract Formation and Interpretation – Potential – Contractual Problems – World Bank Procedures and Guidelines – Transparency in Tenders Act.

UNIT III ARBITRATION 5

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and duties of Arbitrator – Rules of Evidence – Enforcement of Award – costs.

UNIT IV LEGAL REQUIREMENTS 10

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for planning – Property law – Agency law – Local Government Laws for approval – Statutory Regulations.

UNIT V LABOUR REGULATIONS 10

Society Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety regulations – Workmen's Compensation Act – Indian Factory Act – Tamil Nadu Factory Act –Child Labour Act – Other Labour Laws.

Total : 45

TEXT BOOKS

1. Gajaria G.T., Laws Relating to Building and engineering contracts in India, M.M. Tripathi Private Ltd., Bombay,1982.
2. Tamil Nadu PWD Code, 1986.

REFERENCES

1. Jimmie Hinze, construction contracts, 2nd edition, McGraw Hill, 2001.
2. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, 6ht Edition, McGraw Hill, 2000.