ANNA UNIVERSITY :: CHENNAI – 600 025

DEGREE OF BACHELOR OF ENGINEERING
(8 SEMESTER PROGRAMME)

BRANCH: B.E. CIVIL ENGINEERING
CURRICULUM

Code No.	Course Title	L	T	P	M
	SEMESTER 1 **(Applicable to candidates to be admitted in 2003–2004)**				
THEORY					
CM125	Chemistry I	3	0	0	100
GE131	Engineering Mechanics	3	1	0	100
L1	Language Elective I	3	1	0	100
MA131	Mathematics I	3	1	0	100
PH125	Physics I	3	0	0	100
PRACTICAL					
PH126	Physics Laboratory	0	0	2	100
GE132	Computer Practice I	1	0	3	100
GE133	Workshop Practice	0	0	4	100
CM126	Chemistry Laboratory	0	0	2	100
Code No.	**Course Title**	**L**	**T**	**P**	**M**
	SEMESTER 2 **(Applicable to candidates to be admitted in 2003–2004)**				
THEORY					
CE131	Building Science I	3	0	0	100
EE151	Electrical Engineering	2	0	0	100
EC151	Electronics Engineering	2	0	0	100
AG151	Engineering Geology	3	0	0	100
L2	Language Elective II	3	1	0	100
MA132	Mathematics II	3	1	0	100
ME151	Mechanical Engineering	2	0	0	100
PH233	Applied Material Science	3	0	0	100
CM132	Chemistry II	3	0	0	100
PRACTICAL					
GE135	Computer Practice II	1	0	3	100
GE134	Engineering Graphics	1	0	3	100

The following curriculum is applicable to all candidates studying 2nd and 3rd year in the academic year 2003- 2004

Code No.	Course Title	L	T	P	M
	SEMESTER 3				
THEORY					
CE235	Architecture	3	0	0	100
CE232	Building Science II	3	0	0	100
CE233	Fluid Mechanics	3	1	0	100
MA231	Mathematics III	3	1	0	100
CE231	Mechanics of Solids	3	1	0	100
CE234	Surveying I	3	0	0	100
PRACTICAL					
CE242	Strength of Materials Laboratory	0	0	2	100
CE241	Survey Practical I	0	0	4	100
	SEMESTER 4				
THEORY					
CE238	Applied Hydraulic Engineering	3	1	0	100
CE237	Concrete and Construction Technology	2	0	2	100
MA038	Numerical Methods	3	1	0	100
CE240	Soil Mechanics	3	0	0	100
CE236	Strength of Materials	3	0	0	100
CE239	Surveying II	3	0	0	100
PRACTICAL					
CE244	Hydraulics Engineering Laboratory	0	0	2	100
CE243	Soil Engineering Laboratory	0	0	2	100

Code No.	Course Title	L	T	P	M
	SEMESTER 5				
THEORY					
CE331	Structural Analysis I	3	1	0	100
CE332	Structural Design I	3	0	0	100
CE333	Basics of Remote Sensing and GIS	3	0	0	100
CE334	Environmental Engineering I	3	0	0	100
CE335	Transportation Engineering I	3	0	0	100
E1***	Elective I	3	0	0	100
PRACTICAL					
CE341	Computer Aided Building Drawing	0	0	4	100
CE342	Survey Practical II	0	0	4	100

Code No.	Course Title	L	T	P	M
	SEMESTER 6				
THEORY					
CE336	Structural Analysis II	3	1	0	100
CE337	Structural Design II	3	0	0	100
CE338	Transportation Engineering II	3	0	0	100
CE339	Environmental Engineering II (Including Drawing)	3	0	2	100
CE340	Foundation Engineering	3	0	0	100
E2***	Elective II	3	0	0	100
PRACTICAL					
CE343	Computer Aided Design and Drawing	0	0	4	100
CE344	Survey Camp (3 Weeks during Winter Vacation)	-	-	-	100
	SEMESTER 7				
THEORY					
CE431	Estimating and Cost Engineering	3	1	0	100
CE432	Irrigation Engineering (Including Drawing)	3	0	2	100
CE433	Economics and Business Finance for Civil Engineers	3	0	0	100
CE071	Principles of Environmental Science and Engineering	3	0	0	100
GE035	Professional Ethics	3	0	0	100
PRACTICAL					
CE441	Mini Project and Practical Training (4 Weeks During Summer)	0	0	6	100
	SEMESTER 8				
THEORY					
CE434	Engineering Sociology	3	0	0	100
CE435	Management Concepts for Civil Engineers	3	0	0	100
E3***	Elective III	3	0	0	100
E4***	Elective IV	3	0	0	100
GE406	Total Quality Management	3	0	0	100
PRACTICAL					
CE444	Project Work	0	0	12	200

GROUPING OF ELECTIVE SUBJECTS

Elective III, IV Code No.	Course Title	L	T	P	M
	STRUCTURES				
CE034	Bridge Structures	3	0	0	100
CE035	Storage Structures	3	0	0	100
CE036	Design of Plate and Shell Structures	3	0	0	100
CE037	Tall Buildings	3	0	0	100
CE038	Structural Dynamics	3	0	0	100
CE039	Prefabricated Structures	3	0	0	100
CE040	Wind Engineering	3	0	0	100
CE041	Computer Aided Design of Structure	3	0	0	100
CE042	Pre-Stressed Concrete Structures	3	0	0	100
CE043	Industrial Structures	3	0	0	100
CE072	Smart Structures and Smart Materials	3	0	0	100
ME046	Finite Element Techniques	3	0	0	100
	HYDROLOGY AND WATER RESOURCES				
CE045	Ground Water Engineering	3	0	0	100
CE046	Water Resources Engineering	3	0	0	100
CE047	Management of Irrigation Systems	3	0	0	100
CE048	Coastal Zone Management	3	0	0	100
	URBAN SYSTEM ENGINEERING				
CE049	Transportation Planning and Systems	3	0	0	100
CE050	Traffic Engineering and Management	3	0	0	100
CE051	Housing Planning and Management	3	0	0	100
CE052	Railways and Airport Engineering	3	0	0	100
CE053	Urban and Regional Development	3	0	0	100
	ENVIRONMENTAL ENGINEERING				
CE054	Environmental Impact Assessment	3	0	0	100
CE055	Industrial Waste Management	3	0	0	100
CE056	Air Pollution Management	3	0	0	100
CE057	Municipal Solid Waste and Management	3	0	0	100
CE058	Ecological Engineering	3	0	0	100
	SOIL MECHANICS AND FOUNDATION ENGINEERING				
CE059	Pavement Engineering	3	0	0	100
CE060	Ground Improvement Techniques	3	0	0	100
CE061	Introduction to Soil Dynamics and Machine Foundations	3	0	0	100
CE062	Rock Engineering	3	0	0	100

Elective II

SURVEY, REMOTE SENSING

CE063	Geographical Information System	3	0	0	100
CE064	Cartography	3	0	0	100
CE065	Electronic Surveying	3	0	0	100
CE066	Information Technology	3	0	0	100

Elective I

OTHERS

CE044	Hydrology	3	0	0	100
GE034	Creativity, Innovation and New Product Development	2	0	2	100
MA039	Probability and Statistics	3	0	0	100
IF144	Object Oriented Programming	3	0	0	100
HS053	Communication Skills for Engineers	2	0	2	100
	Data Base Systems	3	0	0	100
	Fundamentals of Electronics and Microprocessors	3	0	0	100
GE 037	Intellectual Property Right (IPR)	3	0	0	100
GE 038	Indian Constitution and Society	3	0	0	100

TECHNICAL ELECTIVE

HS041	English I	3	1	0	100
HS042	English II	3	1	0	100

CM125 Chemistry I	**3**	**0**	**0**	**100**

1. CHEMICAL THERMODYNAMICS **9**

Definition of free energy and spontaneity - Maxwell relations - Gibbs-Helmholtz equation - Van't hoff equations - Stoichiometry and energy balances in Chemical reactions.

2. DYNAMICS OF CHEMICAL PROCESSES **10**

Basic concepts - composite reactions (opposing, parallel and consecutive reactions) - Collision theory - Thermodynamic formulation of reaction rates - unimolecular reactions - Chain reactions (Stationary and non-stationary) - Enzyme Kinetics - Michaelis - Menten Equation.

3. ELECTRODICS **8**

Types of electrodes and cells - Nernst Equation - emf measurement and its applications - Principles of chemical and electrochemical corrosion - corrosion control (Sacrificial anode and impressed current methods).

4. WATER **8**

Water quality parameters - Definition and expression - Estimation of hardness (EDTA method) - Alkalinity (Titrimetry) - Water softening (zeolite) - Demineralisation (Ion- exchangers) and desalination (RO) - Domestic water treatment.

5. POLYMERS **10**

Monomer - Functionality - Degree of polymerisation - Classification based on source and applications - Addition, Condensation and copolymerisation - Mechanism of free -radical polymerisation - Thermoplastics and thermosetting plastics - Processing of plastics - Injection moulding, blow moulding and extrusion processes.

Total No of periods: 45

CM125 Chemistry I **3 0 0 100**

Text Books:

1. *Alkins P.W., " Physical Chemistry ", ELBS, IV Edition, 1998, London.*

References:

1. *Balasubramanian M.R., Krishnamoorthy S. and Murugesan V., " Engineering Chemistry ", Allied Publisher Limited., Chennai, 1993.*
2. *Karunanidhi M., Ayyaswamy N., Ramachandran T and Venkatraman H., " Applied Chemistry ", Anuradha Agencies, Kumbakonam , 1994.*
3. *Sadasivam V., " Modern Engineering Chemistry - A Simplified Approach ", Kamakya Publications, Chennai , 1999.*
4. *Kuriakose, J.C. and Rajaram J., " Chemistry in Engineering and Technology ", Vol. I and II, Tata McGraw-Hill Publications Co.Ltd, New Delhi ,1996.*
5. *Jain P.C. and Monica J., " Engineering Chemistry ", Dhanpat Rai Publications Co.,(P) Ltd., New Delhi, 1998.*

GE131 Engineering Mechanics **3 1 0 100**

1. BASICS **5**

Introduction - Units and Dimensions - Laws of Mechanics - Vectors - Vectorial representation of forces and moments - Vector operations.

2. STATICS OF PARTICLES **8**

Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility - single equivalent force.

3. EQUILIBRIUM OF RIGID BODIES **7**

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Equilibrium of
Rigid bodies in two dimensions - Equilibrium of rigid bodies in three dimensions.

4. PROPERTIES OF SURFACES AND SOLIDS **12**

Determination of Areas and Volumes - First moment of area and the centroid - second and product moments of plane area - Parallel axis theorems and perpendicular axis theorems - Polar moment of inertia - Principal moments of inertia of plane areas - Principal axes of inertia - Mass moment of inertia - relation to area moments of inertia.

5. FRICTION **4**

Frictional Force - Laws of Coloumb friction - Simple Contact friction - Rolling Resistance - Belt Friction.

6. DYNAMICS OF PARTICLES **16**

Displacement, Velocity and acceleration their relationship - Relative motion - Curvilinear motion - Newton's
Law - Work Energy Equation of particles - Impulse and Momentum - Impact of elastic bodies.

7. ELEMENTS OF RIGID BODY DYNAMICS **8**

Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion - Moment of
Momentum Equations - Rotation of rigid Body - Work energy equation.

Total No of periods: 60

PH125	**Physics I**	**3**	**0**	**0**	**100**

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1. PROPERTIES OF MATTER **9**

Elasticity - stress-strain diagram-factors affecting elasticity - Twisting couple on a wire-Shafts-Torsion pendulum-Depression of a cantilever- Young's modulus by cantilever-Uniform and Non Uniform bending-I shape girders-Production and measurement of high vacuum-Rotary pump-Diffusion pump-Pirani Gauge-Penning gauge-Viscosity-Oswald Viscometer-Comparision of viscosities.

2. ACOUSTICS **9**

Acoustics of buildings-Absorption coefficient-Intensity-Loudness-Reverberation time-Sabine's formula-Noise pollution-Noise control in a machine-Ultrasonics-production-Magnetostriction and Piezoelectric methods-Applications of ultrasonics in Engineering and Medicine.

3. HEAT AND THERMODYNAMICS **9**

Thermal conductivity-Forbe's and Lee's Disc methods-Radial flow of heat-Thermal conductivity of rubber and glass-Thermal insulation in buildings-Laws of thermodynamics-Carnot's cycle as heat engine and refrigerator-Carnot's theorem-Ideal Otto and Diesel engines-Concept of entropy-Entropy Temperature diagram of carnot's cycle.

4. OPTICS **9**

Photometry-Lummer Brodhum photometer-Flicker Photometer-Antireflection coating-Air wedge-Testing of flat surfaces-Michelson's Interferometer and its applications-Photoelasticity and its applications-Sextant-Metallurgical microscope-Scanning electron microscope.

5. LASER AND FIBRE OPTICS **9**

Principle and lasers-laser characteristics-Ruby-NdYAG, He-Ne, CO2 and semiconductor lasers-propagation of light through optical fibers-types of optical fibre-Applications of optical fibres as optical waveguides and sensors.

Total No of periods: 45

PH125 Physics I **3 0 0 100**

Text Books:

1. Arumugam.M., " Engineering Physics ", Anuradha Publications, 1998.

References:

1. Resnik R. and Halliday D., " Physics ", Wiley Eastern, 1986.
2. Nelkon M. and Parker.P., " Advanced Level Physics ", Arnald-Heinemann, 1986.
3. Vasudeva A.S., " Modern Engineering Physics ", S. Chand and Co., 1998..
4. Gaur, R.K., and Gupta, S.L., " Engineering Physics ", Dhanpat Rai and Sons, 1988.
5. Mathur, D.S, " Elements of properties of Matter ", S.Chand & Co., 1989.

CM126 Chemistry Lab	**0**	**0**	**2**	**100**

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1. Preparation of Standard solutions.
2. Estimation of hardness of water by EDTA method
3. Estimation of different types and amounts of alkalinity in water - Indicator method
4. Determination of 'Dissolved oxygen' - Winkler's method.
5. Estimation of iron in water - Spectrophotometer method.
6. Estimation of sodium water - Flame Photometer method
7. Determination of molecular weight of polymers-Viscometric method.
8. Determination of total dissolved solids in water.
9. Corrosion experiments:
   * Corrosion rate measurements
   * Inhibition effciency.
10. Electrochemistry experiments:
   * Determination of emf.
   * Single electrode potential
   * Potentiometric and conductometric titration

Total No of periods: 30

. MA131 Mathematics I

(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)

1. MATRICES 9

Characteristic equation - Eigen values and eigen vectors of a real matrix. Some properties of eigen values,
Cayley-Hamilton theorem, Orthogonal reduction of a symmetric matrix to diagonal form - Orthogonal matrices - Reduction of quadratic form to canonical form by orthogonal transformation.

2. THREE DIMENSIONAL ANALYTICAL GEOMETRY 9

Direction cosines and ratios - Angle between two lines - Equation of a plane - Equation of a straight line - Co- planer lines - Shortest distance between skew lines - Sphere - Tangent plane - Plane section of a sphere - orthogonal spheres.

3. GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9

Curvature - cartesian and polar coordinates - Circle of curvature - Involutes and Evolutes - Envelopes - properties of envelopes - Evolute as envelope of normals.

4. FUNCTIONS OF SEVERAL VARIABLES 9

Functions of two variables - Partial derivatives - Total differential - Differentiation of implicit functions - Taylor's expansion - Maxima and Minima - Constrained Maxima and Minima by Lagrangean Multiplier method - Jacobians - differentian under integral sign.

5. ORDINARY DIFFERENTIAL EQUATIONS 9

Simultaneous first order linear equations with constant coefficients - Linear equations of second order with constant and variable coefficients - Homogeneous equation of Euler type - equations reducible to homogeneous form - Method of reduction of order - Method of variation of parameters.

6. TUTORIAL 15

Total No of periods: 60

Text Books:

1. Kreyszig, E., " Advanced Engineering Mathematics " (8th Edition), John Wiley and Sons (Asia) Pte Ltd., Singapore, 2001
2. Veerarajan, T., " Engineering Mathematics ", Tata McGraw Hill Publishing Co., NewDelhi, 1999.

References:

1. Grewal, B.S., " Higher Engineering Mathematics " (35th Edition), Khanna Publishers, Delhi , 2000.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " Engineering Mathematics ", Volume I (4th Revised Edition), S. Chand & Co., New Delhi, 2000.
3. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " Advanced Mathematics for Engineering Students ", VolumeI (2nd Edition), S. Viswanathan (Printers & Publishers), 1992.
4. Venkataraman, M.K. " Engineering Mathematics - First year " National Publishing Company, Chennai (2nd Edition), 2000.

HS 041 ENGLISH - I **3 1 0 100**

1 **LISTENING** **7**

Listening comprehension – listening for specific information – note – taking -use of charts and diagrams.

2 SPEAKING **7**

Defining – describing objects – describing uses/functions – comparing- offering suggestions – analyzing problems and providing solutions – expressing opinions (agreement/disagreement) predicting – expressing possibility/certainty – framing questions – providing answers – pronunciation practice (word stress).

3 READING **12**

Skimming – scanning – detailed reading – predicting content – interpreting charts and tables – identifying stylistic features in texts – evaluating texts -understanding discourse coherence – guessing meaning from the context -note – making/transferring information.

4 WRITING **12**

Sentence definition - static description – comparison and contrast – classification of information – recommendations – highlighting problems and providing solutions – formal and informal letter writing – using flow – charts/diagrams - Paragraph writing – editing.

5 FOCUS ON LANGUAGE **7**

Word formation with prefixes and suffixes – discourse markers and their functions– degrees of comparison – expressions relating to recommendations and comparisons – active and passive voice – antonyms – tense forms – gerunds – condition sentences – modal verbs of probability and improbability – acronyms and abbreviations – compound nouns and adjectives – spelling – punctuation.

L = 45 T = 15 Total = 60

TEXT BOOK

1. **"**English for Engineers and Technologists", Volume I. *Authors*: Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd., 1990.

REFERENCES

1. Narayanaswami.V.R. Strengthen, 'Your Writing', Orient Longman Ltd., Chennai 1996 (Revised Edition).
2. Pickett and Laster, 'Technical English, Writing, Reading and Speaking' New York Harper and Row Publications.
3. Swan, Michael, 'Basic English Usage', Oxford University Press, 1984.

GE132 Computer Practice I **1 0 3 3**

1 FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS **4**

Evolution of Computers-Organization of Modern Digital Computers-Single user Operating System- Multitasking OS-GUI

2 OFFICE AUTOMATION **11**

a) Word Processing
b) Data Base Management System c) Spread Sheet Package
d) Presentation Software

3	**PRACTICALS**	**45**

Total No of periods: 60

Text Book :

1. *"Computers and Computation - A Beginner's Guide", Ghosh Dastidar, Chattopadhyay and Sarkar, Prentice Hall of India, 1999.*

Reference :

1. *Microsoft Office 97, Nelson, Tata McGraw Hill, 1999.*
2. *"PC Software for Windows Made Simple", Taxali, Tata McGraw Hill, 1999.*

	GE133 Workshop Practice	**0**	**0**	**4**	**2**

1	**SHEET METAL**	**10**

Tools and Equipments - Fabrication of tray, cone, etc., with sheet metal

2	**WELDING**	**10**

Tools and Equipemts - Arc Welding of butt joint, Tap Joint, Tee fillet etc., Demonstration of gas welding.

3	**FITTING**	**10**

Tools and Equipments- Practice in Chipping, Filling, Drilling - making Vee joints, square and dove tail joints.

4	**CARPENTRY**	**10**

Tools and Equipments-Planning Practice-making halving joint and dove tail joint models.

5	**FOUNDRY**	**10**

Tools and Equipments Preparation of moulds of simple objects like flange, gear V- grooved pulley etc.,

6	**SMITHY**	**10**

Tools and Equipments - Demonstration for making simple parts like keys, bolts etc.

Total No of periods: 60

REFERENCE BOOKS :

1. V.S.Venkatachalapathy, First Year Engineering Workshop Practice, Raamalinga Publications, Madurai, 1999.

2. P. Kanaiah and K.C. Narayana, Manual on Workshop Practice Scitech Publications,Chennal, 1999.

AG151 Engineering Geology **3 0 0 3**

1 GENERAL GEOLOGY **9**

Geology in Civil Engineering - Branches of geology - Earth Structure and composition - Elementary knowledge on contental drift and plate techtonics. Earth processes - Weathering - Work of rivers,wind and sea and their engineering importance - Earthquake belts in India. Groundwater - Mode of occurance - prospecting
- importance in Civil Engineering.

2 MINERALOGY **9**

Elementary knowledge on symmetry elements of important crystallograpghic 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 occurence in India.

3 PETROLOGY **9**

Classification of Rocks - distinction between Igneous,Sedimentatary and Metamorphic rocks. Decription occurence, 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. Quartzite,Marble,Slate Thyllite, Gniess and Schist.

4 STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD **9**

Attitude of beds - Outcrops - Geological maps - study of structures - Folds,Faults and points - Their bearing on engineering Construction, Seismic and Electrical methods for Civil Engineering investigations.

5 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 cuttings, Lad slides - causes and preventions. Sea erosion and coastal Protection.

Total No of periods: 45

TEXT:
1. Parbin Singh,"Engineering and General Geology " , Katson Publication House 1987.
2. Krynine and Judd,"Engineering Geology and Geotechniques", McGraw Hill Book Company,1990. Reference:
1. Legeet, "Geology and Engineering", McGraw Hill Book Company, 1998.
2. Blyth,"Geology for Engineers" , ELBS,1995.

CE131 Building Science I 3 0 0 3

1 STONES 5

Classification - Selection - Application of stone in buildings - Requirement and testing of stones - Deterioration and preservation of stone work - Articicial stones.

2 BRICKS AND BUILDING BLOCKS 10

Manufacture of bricks - classification - Qualities - Test on Bricks - Fire bricks - building blocks types and uses
- joist and filter blocks - Curved shell units - Light weight concrete blocks.

3 MORTAR - CEMENT - CONCRETE 10

Classfiction of mortar - Preparation - Selection of mortar - Tests for mortars - Manufacture of cement - Types of cement - Aggregate - Admixtures - Properties of fresh concrete - Properties of hardened concrete - Slump Test - Vebe test - Flow test - Compacting factor test - Types of Concrete.

4 MATERIALS FOR BUILDINGS SERVICES 10

Timber - Market forms - Industrial timber - Plywood Veneer - Thermocole - Panels of laminates - Steel - Composition - uses - Market forms - Mechanical treatment - Paints - Vanishes - Distempers.

5 SPECIAL MATERIALS 10

Glass - Ceramics - Sealants for joints - Sheets for pitched roof coverings - Fibre glass reinforced plastic - Clay products - Refractories - Composite materials - Types - Applications of laminar composites - Fibre textiles - mats and pads for earth reinforcement - Recycling of Industrial waste as building material - Polymers in Civil Engineering.

Total No of periods: 45

TEXT :
1. Rangwala, S.C. Engineering Materials, Charotar Publishing House, Anand, 1997.
2. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi,1996.

REFERENCE:
1. Neil Jackson and Ravindrakumar Dhir, Civil Engineering Materials.
2. National Building Code of India, part V Building Materials,1983.

EC151 Electronics Engineering 2 0 0 2

1 SEMICONDUCTORS 6

Classification of solids as conductors and semiconductors - Intrinsic,Extrinsic semiconductors - P type and Ntype semiconductors - junction diode - Zener effect - Zener diode - VI characteristics of junction and Zener diodes.

2 TRANSISTORS 6

Bipolar Junction Transistor -CB,CE,CC-Configurations - Simple treatment of characteristics and biasing. Elementary treatment of FET,MOSFET,UJT,DIAC and TRIAC.

3 BASIC ELECTRONIC CIRCUITS 6

Rectifiers - Votage Regulators - CB,CE,CC amplifer circuits - SCR circuit and one application - Principle of feedback and sinusoidal oscillators.

4 LINEAR INTEGRATED CIRCUITS 5

Multivibrators - Operational Amplifier - Adder, Multiplier, Integrator, Differentiatior and Filters.

5 DIGITAL ELECTRONICS 7

Binary number system - AND,OR, NOT, NAND, NOR circuits - half and Full Address - Principal of register and counter - Qualiative treatment of A/D and D/A conversion - Principle of Digital Computer.

Total No of periods: 30

TEXT :

1. V.K. Mehta, Principle of Electronic, S.Chand and Company Limited,1994.

REFERENCE:

1. Malvino & Leach, Digital Principal and Applications, McGraw Hill 1986.
2. Milman & Halkias, Integrated Electronics, McGraw Hill,1979.

EE151 Electrical Engineering 2 0 0 2

1 ELECTRICAL CIRCUITS 9

Ohms Law-Kirchoff's Laws - steady stage solution of D.c. circuits-Introduction to AC circuits-Waveforms and
RMS value-power and power factor, single phase and 3 phase balanced circuts.

2 ELECTRICAL MACHINES 15

Principles of operation and characteristics of D.C. machines. Transformers (single phase and three phase)- Sychronous Machines-3 Phase and single phase Induction motors-(op.principles).

3 ELECTRICAL MEASUREMENTS 6

Moving coil and moving iron instruments (Ammeter and Voltmeter) Dynamometer type watt meters and energy meters (op.principles).

4 PRACTICAL 30

Total No of periods: 60

Text Books :

1. V.N.Mittle, 'Basic Electrical Engineering', TMH Edition New Delhi, 1990.
2. Del Toro, 'Electrical Engineering Fundamentals', Prentice Hall of India Pvt.Ltd., New Delhi, Second
Edition.

Reference Books:

1. Jimmie J.cathey and S.A.Nasar, 'Basic Electrical Engineering'. Schaurn outline series in Engineering. McGraw Hill Book Co.1987.
2. N.V.Deshpandi, 'Electrical Machines' A.A.Wheeler and Co. Ltd., New Delhi 1994.

MA132 Mathematics II **3 1 0 4**

1 VECTOR CALCULUS **9**

Gradiant, Divergence, Curl-Line and surface integrals-Green's Gauss divergence and Stokes theorems- Verification and applications.

2 ANALYTIC FUNCTIONS **9**

C-R equations-Properties and analytic functions-Determination of harmonic conjugates and analytic function- conformal mappings-Mapping properties of w = z + a, l/z, az, z2 and bilinear transformation.

3 COMPLEX INTEGRATION **9**

Cauchy's theorem - Cauchy's integral formula - Taylor and Laurent's series - Singularities and classification - Residues, Cauchy's residue theorem - Contour integration around circular and semi - circular contours (excluding poles on the real axis).

4 EMPIRICAL STATISTICS **9**

Introduction - Measures of central tendency - Measure of dispersion - Moments - skewness and Kurtosis - Coefficient of correlations - Lines of regression - standard Error and estimate.

5 STATISTICAL INFERENCE **9**

Sampling distribution - Testing of hypothesis - Level of significance - Confidence limits - Tests based on normal distribution, t-distribution, F-distribution and Chi-square distribution.

6 TUTORIAL **15**

otal No of periods: 60

Text Book :

1. Kandasamy, P., Thilakavathy,K. and Gunavathy,K.Engineering Mathematics, Volume ii, S.Chand & Co., New Delhi,1997.

References :

1. Grewal, B.S.Higher Engineering Mathematics (34th Edition), Khanna Publishers, NEw Delhi, 1998.
2. Manivachakan, K., Vittal, P.R. Engineering Mathematics, Margham Publication, Madras, 1998.
3. Kreyszig, E.Advanced Engineering Mathematics (7th Edition), John Wiley and Sons, Singapore, 1998.
4. Veerarajan, T.Engineering Mathematics, Tata McGraw Hill Publishing Co., New Delhi, 1999.

ME151 Mechanical Engineering 2 0 0 2

1 SIMPLE MACHINES 5

Lifting machines-Cranes-Principle of operation- different types-law of a machine-automatic forklifts. Drilling machines-rock drilling-submerged drilling - oil drilling. Trouble shooting and maintenance procedures.

2 ENERGY SYSTEMS 10

Principle of Internal and external combustion engines-auto engine-diesel engine. Electricity generation - hydro
- thermal - nuclear- solar power plants layout and principle of operation. Environment friendly systems - energy efficency.

3 ENERGY RESOURCES 5

Conventional and non-conventional energy resources-availability-principle of taping. Envirnomental concerns-global warming-ozone depletion-envirnoment labeling-criteria for sustainable development.

4 FOUNDRY TECHNOLOGY 5

Moulding process - properties of moulding sand - methods of moulding - tools and equipments used. Study of typical sand mould.Casting - different methods - melting furnaces - Cupola-defects in casting - inspection of casting.

5 METAL FORMING 5

Hot and cold forming,Welding processes-arc & gas Welding - AC & DC welding equipments-TIG-MIG- Submerged arc - Thermal welding,Brazing and soldering.

Total No of periods: 30

Text:
1. Rao,P.N., Manufacturing Technology, 2nd Edition, Tata McGraw Hill, Inc.,New Delhi.
2. Khurmi, R.S.& Gupta,J.K., A Text Book of Thermal Engineering (Mechanical Technology),S.Chand &Co., New Delhi,1999.
Reference:
1. Campbell, J.S., Principles of Manufacturing Materials and Processes,14th Edition,Tata McGraw
Hill.Inc.,New Delhi,1995.
2. Rai,T.D., Energy Sources, Khanna Publishers, New Delhi,1996

PH233 Applied Materials Science **3 0 0 100**

1. CRYSTALLOGRAPHY AND STRENGTHENING MECHANISMS 9

Crystalline and amorphous solids - Unit cell and primitive cell - Miller indices BCC, FCC and HCP crystal structures and their packing factors - Crystal defects - point defects and line defects (edge dislocation and screw dislocation). Effect of crystal imperfections in mechanical properties - strengthening mechanisms for the improvement of mechanical properties.

2. FRACTURE AND ITS PREVENTION 9

Fracture - Mechanism of brittle fracture (Griffith's theory) and Ductile fracture - Difference between brittle and ductile fractures - Fatigue failure and its prevention - Creep - different stages in creep curve - Factors affecting creep resistant materials - Mechanism of creep fracture.

3. FERROUS ALLOYS 9

Significance of phase diagram - Allotropy and phase change of pure iron - Classification of steels and cast iron - Iron - carbon equilibrium diagram - Microstructure of iron and steel - Ferrous alloys and their applications - Factors affecting mechanical properties - Grain size and heat treatment.

4. NONFERROUS METALS AND ALLOYS 9

Factors affecting conductivity of a metal - Electrical resistivity in alloys - Thermal conductivity of metals and alloys - Silver, Copper and Aluminium - High resistivity alloys - nichrome, manganin, constantan and kanthal and their composition and applications - Super hard materials - Tungsten carbide and Boron nitride.

5. SURFACE ENGINEERING 9

Surface heat treatment - Diffusion methods - Carburising, Nitriding, Cyaniding and Carbonitriding and their applications - Thermal methods - Flame hardening - induction hardening and their applications - Laser surface hardening - Diamond-like film coating - Surface hardness test - Vicker's hardness tester.

Total No of periods: 45

PH233 Applied Materials Science **3 0 0 100**

Text Books:

1. *Arumugam, M., " Materials Science ", Anuradha Publishers, 1997.*
2. *Raghavan, V., " Materials Science and Engineering ", Prentice Hall of India Pvt.Ltd., 1999.*

References:

1. *Muralidhara,M.K., " Materials Science and Processes ", Danpat Rai Publishing Co., 1998.*
2. *Nayak, S.P., " Engineering Metallurgy and Materials Science ", Character Publishing House, Anand, India, 1985.*
3. *Van Vlack, " Materials Science for Engineers ", Addison Wesley, 1985.*
4. *Anver, " Introduction to Physical Metallurgy ", McGraw Hill International Book Company, 1994.*
5. *Rajan, Sharma T.V. and Ashok Sharma, " Heat Treatment - Principles and Techniques ", Prentice Hall of India Pvt.Ltd., 1995.*
6. *Flinn R.A. & Trojan P.K., " Engineering Materials and their Applications ", M/s Jaico Publishing, 1998-1999.*

HS 042 ENGLISH - II **3 1 0 100**

1. LISTENING **7**

Listening comprehension – listening for specific information – note –taking – using non-verbal devices

2. SPEAKING **7**

Describing processes – stating purpose – offering opinions, suggestions and recommendations – summarizing – reporting – free discussion of chosen topics – pronunciation practice (word stress, consonant clusters – homonymns**)**

3. READING **12**

Skimming – scanning – note –making – understanding the organization of texts – discourse cohesion – predicting and evaluating content – evaluating style – inferring meaning – study – reading – interpreting tables, flow-charts

4. WRITING **12**

Extended definition – process description – cause and effect analysis – stating choice and justifying it – safety instructions – check list – letter of application – data sheet/resume

5. FOCUS ON LANGUAGE AND FUNCTIONS **7**

Word formation – synonyms – prepositions – adverbs – passive voice – sequence words/discourse markers – connective adverbs – numerical expressions – expansion of abbreviations – rules for writing SI units – language of instructions, checklists, cause and effect, purpose and means – indefinite adjectives of number and quantity – spelling and punctuation

L = 45 T = 15 Total = 60

TEXT BOOK

1. **"**English for Engineers and Technologists", Orient Longman, 1990 Volume II. *Authors:* Humanities and Social Sciences Department, Anna University, Published by Orient Longman Ltd., 1990

REFERENCES

1. Swales, John.M., and Christine B Feak, Academic Writing for Graduate Students, The University of Michigan Press, USA, 1994.
2. Goddard, Ken, ' Informative Writing – Your Practical Guide to Effective Communication', Cassell Publication, U.K., 1998

1. Cutts, Martin, 'The Plain English Guide – How to Write Clearly and Communicate Better' , Oxford University Press, New Delhi, 1995.

GE134 Engineering Graphics **1 0 3 3**

1 PRINCIPLES OF GRAPHICS **16**

Two-dimensional geometrical construction-Conic sections, Involutes and Cycloids-Representation of three dimensional objects-Principles of Projections-Standard codes of principles.

2 ORTHOGRAPHIC PROJECTIONS **28**

Projections of points, straight lines and planes - Auxiliary projections - Projection and sectioning of solids - Intersection of surfaces - Development of surfaces.

3 PICTORIAL PROJECTIONS **8**

Isometric projections - Perspectives , Free hand Sketching.

4 COMPUTER GRAPHICS **8**

Hardware - Display technology - Software - Introduction to drafting software.

Total No of periods: 60

Text Book:

1. Narayanan K.L. and Kannaiah P. 'Engineering Graphics', 1992.

Reference:

1. William M.Neumann and Robert F.Sproul, 'Principles of Computer Graphics', McGraw Hill, 1989.

2. Warren J.Luzadder and John M.Duff, 'Fundamentals of Engineering Drawing', Prentice Hall of India
Private Ltd., Eastern Economy Edition, 1995.
3. Natarajan K.V., 'Text Book of Engineering Drawing', Private Publication, Madras, 1990.
4. Mathur M.L.and Vaishwanar R.S., 'Engineering Drawing and Graphics', Jain Brothers, New Delhi, 1993.

GE135 Computer Practice II **1 0 3 3**

1 MULTISUERS OPERATING SYSTEM **4**

Unit: Introduction-Basic Commands-Vieditor-filters-Input/output redirection-piping-transfer of data between devices-shell scripts.

2 FUNDAMETALS OF NETWORKING **3**

Working on a networked environment-Accessing different machines from one node-concept of E-mail-Uses of
Interent.

3 HIGH LEVEL LANGUAGE PROGRAMMING **8**

C Language: Introduction - Operator - Expressions - Variables - Input output statements - control statements - function - arrays - pointer - structures - unions - file handling - case studies.

4 PRACTICALS **45**

Total No of periods: 60

Text and Reference Books:

1. Exploring the UNIX System, Stephan J.Kochen & Patrick H.Wood Techmedia, 1999.
2. The desin of UNIX Operating Systems, Maurice J.Bach Prentice Hall of India, 1999.
3. Computer Networking Concepts, Ramos Prentice Hall International, 1999.
4. Programming in ANSI C, Balagurusamy Tata McGraw Hill, 1999.
5. The C Programming Language, Kernighan and Ritchie Prentice Hall of India, 1999.
6. Programming with C, Gottfried Tata McGraw Hill, 1999. C and UNIX Programming, A Conceptual Perspective, Kutti Tata
McGraw Hill,
1999.
7. C and UNIX Programming: A Conceptual Perspective, Kutti, Tata McGraw Hill, 1999.
8. Eric Nagler Learning C++ M/s. Jaico Publishing Co. 1998-99.

CE231 Mechanics of Solids **3 1 0 4**

1 STRESS, STRAIN AND DEFORMATION OF SOLIDS **6**

Rigid bodies and deformable solids - Stability, strength and stiffness - tension, compression and shear stresses
- Deformation of simple and compund bars - Thermal Stresses - Elastic Constants.

2 ANALYSIS OF PLANE TRUSSES **6**

Stability and equilibrium of plane frames -perfect frames- types of trusses - analysis of forces in truss members - Method of joints -Method of tension coefficients - Method of

sections.

3 TRANSVERSE LOADING ON BEAMS 6

Beams - Types and transverse loading on beams - Shear force and bending moment in beams - Cantilevers - Simply supported beams and over-hanging beams.

4 STRESSES IN BEAMS 7

Theory of simple bending - analysis of stresses - Load carrying capacity - Proportioning sections - Leaf springs - Flitched bearms - Shear stress distribution - shear flow.

5 TORSION 7

Stresses and deformation in circular and hollow shafts - Stepped shafts - shafts fixed at the both ends - Stresses in helical springs - Deflection of springs - Design of buffer springs.

6 ANALYSIS OF STATES OF STRESS (TWO DIMENSIONAL) 7

Biaxial state of stress - Thin cylinders and shells - Deformation of thin Cylinders and schells - Stresses at apoint - Stresses at a point - Stress as tensor - Stresses on inclined planes - Principal stresses and principal planes - Mohr's circle of stress.

7 DEFLECTION OF BEAMS 7

Double integration method - Macaulay's method - Area moment theorems for computation of slopes and deflections in beams - Conjugate beam method.

8 TUTORIAL 15

Total No of periods: 61

Text:

1. EGOR P.POPOV "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi 1997.

2. SRINATH L.N."Advanced Mechanics of Solids", Tata McGraw Hill Publishing Company Ltd.,New Delhi.

Reference:

1. Junarkar S.b.,Mechanics of Structures, Vol.1,21st Edition, Charotar Publishing House, Anand, India,1995.

2. Kazimi S.M.A. Solid Mechanics, Tat McGrawHill Publishing Company, New Delhi 1991.

3. Laudner T.J. and Archer R.R. Mechanical of Solids in Introduction, McGrawHill International Editions,1994.

4. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Services,McGraw Hill
International Editions, Third Edition, 1994.

5. Elangovan A.Thinmavisaiyiyal (Mechanics of solids in Tamil) Anna University,Chennai ,1995.

CE232 Building Science II 3 0 0 3

1 PRELIMINARY INVESTIGATION 9

Principles of Planning - Planning regulations and bye-laws-Site works and setting out - Excavations and Timbering - Sub soil drainage - Electrictiy Lighting on Building sites - Winter building - Preparation of layout - Site Plan - Orientation of buildings.

2 FOUNDATION 6

Bearing capacity of soils - soil investigations - Plate load Test -Methods of Improving bearing capacity - Shallow Foundations - Deep Foundations - Machine Foundations.

3 SUPER STRUCTURE 5

Stone and Brick masnory - Composite masonry Load bearing walls - Cavity Walls - Partition walls - Reinforced Brick masonry.

4 FLOORING 5

Ground floors - Components - Types - suspended flooring - Upper fllors - Types - Methods of laying.

5 ROOFS 5

Types of roofs-Types of Pitched roof - Schell roofs-Folded Plate roofs - Constructional Practices - Roof covering details.

6 STAIRCASE 5

Requirement of a good staircase - Types of staircase calculation for geometry - Ramps, Escalators, Lifts,Types - Handling Capacity.

7 BUILDING SERVICES 5

Water Supply - Drainage - Ventilation - Damp proofing - Acoustiv Treatment - Thermal Insulation Termite Proofing - Fire Protection.

8 PREFABRICATION 5

Principles - Advantages and disadvantages - Types of prefabricates - Standardization - Basic, nominal and actual dimensions - Tolerances - Joints Production - Transporation - Erection - Cranes merits and demerits.

Total No of periods:45

Text:
1. Arora S.P. and Bindra S.P., 'Building Construction Planning Techniques and method of Construction ' , Dhanpat Rai and Sons,New Delhi,1997.
1. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publications Pvt.Ltd.,New Delhi,1997.

Reference:
1. Chudley.R.,"Construction Technology", Vol.1,2,3,4ELBS Publisher, 1997.
2. National Building Code of India, Parts III,IV,VII and IX 1983.

CE233 Fluid Mechanics 3 1 0 4

1 DEFINITIONS AND FLUID PROPERTIES 5

Definitions - Fluid and Fluid Mechanics - Dimensions and units - Fluid properties - Continum - Concept of system and control volume.

2 FLUID STATISTICS 8

Pascal's law and Hydrostatic equation - Forces on plane and curved surfaces - Buoyancy - Pressure measurement.

3 FLUID KINEMATICS 6

Stream,steak and path lines-Classification of flows - Continuity equation - Stream and potential functions - Flow nets - Velocity measurement.

4 FLUID DYNAMICS 10

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 - Impact of jets on plane and curved plates.

5 BOUNDARY LAYER AND FLOW THROUGH PIPES 10

Definition of boundary layer - Thickness and classification - Displacement and momentum thicknesses - Development of Laminar and Turbulent flows in circular pipes - Major and minor losses of flow in pipes - Pipes in series and in parellel - Pipe network.

6 SIMILITUDE AND MODEL STUDY
6

Dimensional analysis - Rayleigh's method - Buckingham P-Theorem - similitude and models - Scale effect and distorted models.

7 TUTORIAL 15

0

Text:
1. Kumar. K.L., Engineering Fluid Mechanics, Eurasia Publishing House (P) Ltd.,New Delhi,1995.
2. Fox, Robert W. and McDonald, Alan T., Introduction to Fluid Mechanics, John Willey & Sons, 1995.

Reference:
1. Streeter. Victor L., and Wylie, E.Benjamin, Fluid Mechanics, McGraw-Hill Ltd.,1998.
2. Natarajan, M.K. Principled of Fluids Mechanics, Anuradha Agencies, Vidayal Karuppur, Kumbakonam,1995.

CE234 Surveying I 3 0 0 3

1 INTRODUCTION AND CHAIN SURVEYING 8

Definition - Principles - Classification - Fields and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chanining - Reciprocal ranging - Setting perpendiculars
- well - conditioned trainagles - Traversing - Plotting - Enlarging and Reducing figures.

2 COMPASS SURVEYING AND PLANE TABLE SURVEYING 7

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

3 LEVELLING AND APPLICATIONS 12

Level line - Horizontal line - Levels and Staves - Sprit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and Check levelling - Booking - reduction - Curvature and Refraction - reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and users of contours - Plotting - Earth work volume - Capacity of reserviors.

4 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 - Gales's tables - Omitted measurements.

5 ENGINEERING SURVEYS 10

Reconnaissance, Preliminary and location surveys for engineering projects - Layout- 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 - Transistion curves - Functions and requirements - Sight distances - Mine Surveying - Instruments - Tunnels - Correlation of underground and surface surveys - Shafts - Adits.

Total No of periods: 45

Text:
1. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992.
2. Heribert Kahmen and Wolfgang Faig, Surveying, Walter de Gruyter, 1995.
3. Kanetkar T.P.,Surveying and Levelling, Vols.I and II, United Book Corporation, Pune,1994.
4. Punmia B.C.,Surveying, Vols.I , II and III, Laxmi Publications, 1999.

Reference:
1. Clark D., Plane and Geodetic Surveying, Vols.I and II, C.B.S. Publishers and Distributors, Delhi, Sixth
Edition,1991.
2. James M.Anderson and Edward M.Mikhail, Introduction to Surveying, McGraw Hill Company,1995.

CE235 Architecture 3 0 0 3

1 ARCHITECTURAL DESIGN 6

Architectural design - an analysis - Integration of function and aesthetics - Introduction to basic elements and principles of design.

2 CLIMATE RESPONSIVE DESIGN 7

Factors that determine climate - Characterestics of climate types - Design for various climate types - Passive and active energy controls.

3 BUILDING TYPES 12

Residential, institutional, commercial and Industrial - Planning concepts - Application of anthropometry and space standards- Interelationships of functions - Safety standards - Building rules and regulations - Integration of building services.

4 SITE PLANNING 10

Surveys - Site analysis - Development control - Zoning regulations - Layout regulations - Urban planning standards - Layout design concepts.

5 ENVIRONMENTAL DESIGN 10

Urban reneual - Conservation - Principles of Landscape design - Case studies.

Total No of periods: 45

Reference:
1. Francis D.K. Ching; Architecture: Form, Space and Order: VNR, N.Y.1999.
2. Givoni B; Man Climate and Architecture, Applied Science, Barking ESSEX, 1982.
3. Edward DMills; Planning the Architects Handbook - Butterworth London,1995.
4. Gallian B.Arthur and Simon Eisner, The Urban Pattern - City Planning and Design, Affiliated Press Pvt.Ltd.,New Delhi,1995.
5. Margaret Roberts, An Introduction to Town Planning Planning Techniques, Hutchinson, London,1990.

MA231 Mathematics III **3 1 0 4**

1 FOURIER SERIES **8**

Dirichlet's conditions, General Fourier series, Half-range sine and cosine series, Parseval's identity, Harmonic analysis.

2 FOURIER TRANSFORMS **10**

Fourier integral representation Fourier transform pairs, Properties, Fourier Sine and Cosine Transforms, Transforms of simple functions, Transforms of derivatives, The convolution integrals of Fourier. Applications to one dimensional wave and diffusion equations.

3 LAPLACE TRANSFORMS **9**

Transforms of simple functions, Basic operational properties, Transforms of derivatives and integrals, Periodic functions, Convolution theorem, Inverse transforms, Initial and Final value of theorems, Applications of Laplace transforms to linear ordinary differential equations.

4 PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation, Solution of standard types of first order equation and Lagrange's Linear Equation, Linear partial differential equations of second and higher order with constant coefficients.

5 BOUNDARY VALUE PROBLEMS **9**

Classification of second order partial differential equations, Transverse vibrations of a string, One dimensional heat equation and Two dimensional steady heat flow, Fourier series solutions in cartesian coordinates.

6 TUTORIAL **15**

Total No of periods: 60

Text Book :
1. Narayanan, S. Manikavachagam Pillay, T.K. and Ramanaiah, G. Asdvanced Mathematics for Engineering
Students, Vols.II and III S. Viswanathan Publishers,Chennai, Second Eidition, 1993.

References:
1. Spiegel, M.R.Laplace Transforms, Schaum's outline Series, McGraw Hill Book Co., 1993.
2. Grewal, B.S.Higher Engineering Mathematics, Khanna Publishers, 1993.
3. Manivachagam,K. Vittal P.R. Engineering Mathematics, Margham Publications, Chennai 1998.
4. Shanmugham, T.N., http://annauniv.edu//staff/shan/trans.html.

CE241	**Survey Practical I**	**0**	**0**	**4**	**2**

1 CHAIN SURVEYING **8**

Ranging - Changing - Traverse.

2 COMPASS SURVEYING **4**

Traverse

3 PLANE TABLE SURVEYING **16**

Triang ulation to find the distance between inaccessible points with and without known scale - Three-point problem - Two-point problem.

4 LEVELLING **16**

Study of levels and levelling staff - Fly levelling using Dumpy level - Fly levelling using Tilting level – Check Levelling.

5 THEODOLITE SURVEYING **16**

Study of Theodolites Measurement of angles by reiteration and repetition Measurement of vertical angles.

Total No of periods: 60

CE242	**Strength of Materials Laboratory**	**0**	**0**	**2**	**1**

30

1. Tension test on mild steel and for steel rods
2. Compression test on wooden specimen
3. Double Shear test on mild steel and aluminium rods.
4. Torsion test on mild steel rod.
5. Impact test on metal specimen.
6. Hardness tests on metals like mild steel, brass,copper and aluminium.
7. Deflection test on metal beam.
8. Compression test on helical spring.
9. Deflection test on carriage spring

Total No of periods: 30

CE236	**Strength of Materials**	**3**	**0**	**0**	**3**

1 ENERGY PRINCIPLES **10**

Strain energy and strain energy density - Stain energy in traction, shear, flexure and torsion - Castigliano's and Engessor's energy theorem - Principle of virtual work - application of energy

theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorem - Williot mohr diagrams.

2 INDETERMINATE BEAMS 9

Propped Cantilever and Fixed Beams - Fixed end moments and Reactions for standard cases of loading - slopes and deflections in fixed beams - Continuous beams - Theorem of three moments - Analysis of continous beams - S.F. and B.M. diagrams for continous beams.

3 COLUMNS 6

Eccentrically loaded short columns middle third rule - core of section - Columns of unsymmetrical sections - euler's theory of long columns - Critical loads for prismatic columns with different end conditions Rankine - Gordon Formula eccentrically loaded long columns.

4 STATE OF STRESS IN THREE DIMENSIONS 8

Spherical and deviatric components of stress tensor - Determination of Principal stresses and principle planes
- Volumetric strains - Dilatation and distrotion - theories of failure - Principle stress principal, shear stress, strain energy and distortion energy theories - application in analysis of stress, load carrying capacity and design of members - Interaction problems and interaction curves.

5 ADVANCED TOPICS IN BENDING OF BEAMS 6

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - curved beams - Winkler Bach Formula -Shear centre.

6 SPECIAL TOPICS 6

Residual Stresses - Stress Concentration - Fatigue and Fracture - Thick Cylinders - Compound Cylinders.

Total No of periods: 45

Text:

1. EGOR P.Popov "Engineering Mechancis of Solids", Vol.1,21st Edition, Charotar Publishing House, Anand, India,1995.

2. Kazim S.M.A., Solid Mechanics, Tat McGraw Hill Publishing Company,New Delhi ,1991.

3. B.S.Prakash Rao,"Strength of Materials, a Practical Approach" University Press (India) Ltd.,1999.

Reference:

1. Junarkar S.b.,Mechanics of Structures, Vol.1,21st Edition, Charotar Publishing House, Anand, India,1995.

2. Kazimi S.M.A. Solid Mechanics, Tat McGrawHill Publishing Company, New Delhi 1991.

3. Laudner T.J. and Archer R.R. Mechanical of Solids in Introduction, McGrawHill International Editions,1994.

4. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Services,McGraw Hill
International Editions, Third Edition, 1994.

5. Elangovan A.Thinmavisaiyiyal (Mechanics of solids in Tamil) Anna University,Madras,1995.

CE237 Concrete and Construction Technology **2 0 2 3**

1 CONCRETE AND CONSTRUCTION TECHNOLOGY **6**

High grade cements - High strength Concrete - Advances in manufacture of cements - testing of fresh and Hardened Concrete - Non-destructive testing - Concrete chemicals and application.

2 CONCRETE MIX DESIGN **4**

Concepts of mix design - Statistical quality control of concerte-Mix design as per IS and other methods of mix design.

3 SITE PREPARATION AND TEMPORARY STRUCTURES **6**

Specification, details and sequence of construction co-ordination - site clearance -marking - Earthwork - shoring - Dewatering - pipe lines-building foundations - basements - temporary shed - centerilng and shuttering sheet piles - slip and moving forms - scaffoldings - Deshuttering forms - Launching girders bridge decks,offshore platforms etc, - special forms for shells.

4 SUPER STRUCTURE **6**

Fabrication and errection of steel trusses - Frames - Braced domes - Laying brick - Masonry - stone masonry - Concrete - Concrete hollow block masonry - flooring- Damp proof courses construction joints - Movement and expansion joints - Precast Pavements - weather and water proof finishing. Air conditioning,Accosting and fire protection.

5 REPAIR AND REHABILITATION WORKS **4**

Study on causes for building damage and deterioration - assessment of materials and methods of repair and restoration.

6 CONSTRUCTION EQUIPMENT **4**

Selection of equipment for earth work,concreting,Material handling and erection of structures - Dewatering and Pumping equipment.

7 PRACTICAL **30**

Total No of periods: 60

Text:
1. Shetty M.S., Concrete Technology, S.Chand and Company, 1992.
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Methods of construction, Dhanpat Rai and sons,1997.
3. Pewifoy R.L.,Formwork for Concrete Structures, McGraw Hill Book Co.,1999.
4. Jha J and Sinha S.K. Construction and Foundation Engineering Khanna Publishers 1993.

CE238 Applied Hydraulic Engineering **3 1 0 4**

1 OPEN CHANNEL FLOW **8**

Open channel flow - types and regime of flow - Velocity distribution in open channel - wide open channel - specific energy - critical flow and its computation.

2 UNIFORM FLOW 8

Uniform flow - Velocity measurement - Manning's and Chezy's formula - determination of roughness coefficients - determination of normal depth and velocity - most economical sections - minimum permissible velocity determination - non-erodible channels.

3 VARIED FLOW 8

Dynamic equation of gradually varied flow - assumptions - characteristics of flow profiles - drawdown and backwater curves - profile determination - graphical integration, direct step, standard step method.

4 HYDRAULIC JUMPS 6

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

5 TURBO MACHINES 8

Turbomachines - turbines - classification - radial flow turbines - draft tube and cavitation - axial flow turbines- performance of turbines - similarity laws - centrifugal pump - minimum speed to start the pump - multistage pumps.

Positive displacement pumps - reciprocating pump - negative slip - flow seperation conditions - air vessels - indicator diagram and its variation - savings in work done - rotary pumps.

6 POSTIVE DISPLACEMENT PUMPS 7

Positive displacement pumps - reciprocating pump - negative slip - flow seperation conditions - air vessels - indicator diagram and its variation - savings in work done - rotary pumps.

7 TUTORIAL 15

Total No of periods: 60

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

Reference:
1. Ven Te Chow, Open-Channel Hydraulics, McGraw - H:Q Book company, 1996.
2. Ramamirtham S.,Fluid Mechanics, Hydraulics and Fluid Mechines, Dhanpat Rai & Sons,Delhi,1998.
3. John A.Roberson, Hydraulic Engineering, Jaico Publishing House, 1998.

CE239 Surveying II 3 0 0 3

1 TACHEOMETRIC SURVEYING 6

Tacheometric systems - Tangential,stadia and substense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.

2 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 levelling - Single and reciprocal observations - Modern trends.

3 SURVEY ADJUSTMENTS 8

Errors-Sources, precautions and corrections - Classification of errors- True and most probable values - weighted observations - Method of Equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple traingulation networks.

4 ASTRONOMICAL SURVEYING 11

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

5 MISCELLANY 12

Photogrammetry - Introduction - Terrestial and aerial Photographs - Stereoscopy -Parallex - Electromagnetic distrance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying - Tides - MSL - Sounding and methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer - River surveys - Measurement of current and discharge - Cartography - Cartographic concepts and techniques - Cadastral surveying - Definition - Uses - Legal values -Scales and accuracies.

Total No of periods: 45

Text:
1. Bannister A. and Raymond S., Surveying , ELBS, Sixth Edition, 1992.
2. Heribert Kahmen and Wolfgang Faig, Surverying, Walter de Gruyter,1995.
3. Kanetkar T.P., Surverying and Levelling, Vols.I and II,United Book Corporation,Pune,1994.
4. Punmia B.C.,Surveying Vols.I,II and III,Laxmi Publicatins.1999.

Reference:
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.
4. Robinson A.H.,Sale R.D. Morrison J.L.and Muehrche P.C.,Elements of Cartography, John Wiley and
Sons,New York,Fifth Edition, 1984.

CE240 Soil Mechanics 3 0 0 3

1 INTRODUCTION 10

Nature of soil - Soil description and classification for engineering purposes - IS Classification system - Phase relationships - Soil compaction - Theory,comparison of laboratory and field compaction methods - Ground improvement by compaction.

2 SOIL WATER AND WATER LOW 7

Soil water - static pressure in water - Permeability measurement in the laboratory and field - Seepage - Introduction to flow nets - Simple problems.

3 STRESS DISTRIBUTION AND SETTLEMENT 10

Effective stress concepts in solids - Stress distribution in soil media - Use of influence charts - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory.

4 SHEAR STRENGTH
9

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory - saturated soil mass - Measurement of shear strength, direct shear - Triaxial compression,UCC and Vane shear tests - Pore pressure parameters.

5 SLOPE STABILITY
9

Stlope failure mechanisms - Types - Infinte slopes - Finite slopes - Total stress analysis for satured clay - Method of slicese - friction circle method - Use of stablity number - Slope protection measures.

Total No of periods: 45

Text:
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, wiley Eastern Ltd., New Delhi (india),1997.
3. Khan,I.H.,A text book of Geotechnical engineering, Prentice Hall of India, New Delhi,1999.
4. Arora K.R.Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, New
Delhi,1997.

Reference:
1. Holtz R.D. and Kovacs W.D.,Introduction to Geotechnical Engineering Prentice - Hall,1995.
2. McCarthy D.F., Essentials of Soil Mechanics and Foundations, Prentice-Hall,1997.
3. Sutten ,B.H.C.,Solving Problems in Soil Mechanics,Longman Group Scientific and Technical, U.K. England,1994.

MA038 Numerical Methods 3 1 0 4

1 SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9

Iterative method, Newton-Raphson method for single variable and for simultaneous Equations with two variables. Solutions of linear system by Gaussian, Gauss-Jordan, Jacobi and Gauss-Seidel methods. Inverse of a matrix by Gauss-Jordan method. Eigen value of a matrix by Power and Jacobi Methods.

2 INTERPOLATION
9

Newton's divided difference formula, Lagrange's and Hermite's polynomials, Newton forward and backward
difference formulae. Stirling's and Bessel's Central difference formulae.
‘’

3 NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation with interpolation polynomials, Numerical integration by Trapezoidal and Simpson's (both 1/3 rd and 3/8 th) rules. Two and Three point Gaussian quadrature formula. Double

integrals using Trapezoidal and Simpson's rules.

4 INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single Step Methods-Taylor Series, Euler and Modified Euler, Runge-Kutta method of order four for first and second order differential equations. Multistep Methods-Milne and Adam's-Bashforth predictor and corrector method.

5 BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution for the second order ordinary differential equations. Finite difference solution for one dimensional heat equation (both implicit and explicit), one dimensional wave equation and two dimensional Laplace and Poisson equations.

6 TUTORIAL 15

Total No of periods: 60

Text Books:

1. Sastry, S.S., " Introductory Methods of Numerical Analysis (Third Edition) ", Printice Hall of India, New Delhi, 1998.

References:

1. Kandasamy, P., Thilakavathy, K. and Gunavathy, K., " Numerical Methods ", S. Chand & Co., New Delhi, 1998.
2. Grewal, B.S. and Grewal, J.S., " Numerical Methods in Engineering and Science ", Khanna Publishers, New Delhi, 1999.
3. Jain M.K., Iyengar, S.R.K. and Jain, R.K., " Numerical Methods for Engineering Scientific and computations (Third Edition) ", Wiley Eastern Ltd, New Delhi, 1987.
4. Gerald, C.F., and Wheatley, P.O., " Applied Numerical Analysis (Fifth Edition) ", Addison Wesley, Singapore, 1998.
5. Narayanan, S., Manicavachagam Pillai,T.K. and Ramanaiah, G., " Advanced Mathematics for Engineering Students - Volume-III ", S.Viswanathan Pvt., Ltd., 1987.

CE243 Soil Engineering Laboratory 0 0 2 1

30

1. Grainsize distribution - Sieve analysis
2. Grainsize distribution - Hydrometer analysis
3. Atterberg limits test
4. Determination of moisture - Density relationship using standard proctor.
5. Permeability determination (constant head and falling head methods)
6. Determination of shear strength parameters. a) Direct shear test on cohesionless soil
   b) Unconfined compression test in cohesive soil
   c) Triaxial compression test on cohesionless soil
7. One dimensional consolidation test (Determination of co-efficient of consolidation only)

Total No of periods: 30

Reference:
1. Soil Engineering Laboratory Instruction Manual, Published by the Engineering College Co-operatiave
Society, Chennai,1996.
2. Lambe T.W.,Soil Testing for Engineers,John Wiley and Sons, New York,1990.
3. I.S.Code of Practice (2720) Relevant Parts, as amended from time to time.

CE244 Hydraulics Engineering Laboratory 0 0 2 1

1 FLOW MEASUREMENT 8

Calibration of Flow Measuring Instruments.

2 LOSSES IN PIPES 4

Estimation of major and minor losses in pipes

3 PUMPS 8

Performance Characteristics of Pumps

4 TURBINES 4

Performance Characteristics of turbines

5 WATER MANAGEMENT PARAMETERS 6

Meterological data collection and recording - Estimation of Water Management parameters such as soil water, field capacity, infiltration capacity.

Total No of periods: 30

CE331 STRUCTURAL ANALYSIS I

1. DEFLECTION OF DETERMINATE STRUCTURES 9 + 3

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

2. FLEXIBLITY METHOD FOR INDETERMINATE FRAMES 9 + 3

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).

3. SLOPE DEFLECTION METHOD 9 + 3 Continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry – Simplification for hinged end - Support displacements.

4. MOMENT DISTRIBUTION METHOD 9 + 3
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.

5. MATRIX STIFFNESS METHOD 9 + 3

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

CE 332 STRUCTURAL DESIGN I 3 0 0 100

1. INTRODUCTION 9

Type of steel structures- properties of rolled steel sections- allowable stresses in steel. Requirements of structural design –steps involved in design-load analysis-types of load- Applicable codes for load estimation- load combination-general design requirements of a steel structure-increase in allowable stresses- light gauge steel as a structural material- uses-and application-applicable IS codes for light gauge steel

2. JOINTS 9

Riveted and bolted connections-failure of joints-simple and multiple riveted lap and butt joints under axial loading –strength of fillet weld and butt welded joints- design of brackets, design of riveted and welded joints for systems subjected to moment in the plane of joints and moment acting at right angles to the plane of joints- -design of joints between beam connected to flange of column-secondary beam connected to web of main beam-beam column connection using seat connections-moment resisting connections

3. TENSION AND COMPRESSION 9

Design of simple and built up members subjected to tension-tension splices-effective area of angles connected to gusset- 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-design of tension splice –web splice, shear splice, moment splice

4. BEAMS 9

Design of simple beams based on strength and stiffness as per IS code- design if built up beams and curtailment of flange plates-connection of flange plate and beams-design of plate girder-design of beam column as per IS code

5. TIMBER 9

Study of property of natural timber-allowable stresses in compression tension and flexure-types of joints with nails and bolts-design of simple compression members-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. L S Negi, Design of Steel structures, Tata McGraw Hill, 1995
2. Arya & Ajmani, Design of Steel Structures, Nem Chand & Brors, 1997
3. P Dayaratnam, Design of Steel Structures, A H Wheeler & Co., 1999

CE333 BASICS OF REMOTE SENSING AND GIS 3 0 0 100

1. REMOTE SENSING 9

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body - Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR , Thermal IR and Microwave – Black Body Radiation - Planck's law – Stefan-Boltzman law.

2. EMR INTERACTION WITH ATMOSPHERE AND EARTHMATERIALS 9

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface

3. OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites - Classification – Based on Orbits – Sun Synchronous and Geo Synchronous – Based on Purpose – Earth Resources Satellites, Communication Satellites, Weather Satellites, Spy Satellites – Satellite Sensors - Resolution – Spectral, Spatial, Radiometric and Temporal Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics

4. GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

5. MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications

- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems

Total = 45

Text Books:

1. Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications 2001
2. M.G. Srinivas(Edited by), Remote Sensing Applications, Narosa Publishing House, 2001.

References:

1. Lillesand T.M. and Kiefer R.W. Remote Sensing and Image Interpretation, John Wiley and Sons, Inc, New York, 1987.
2. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol.I., American Society of Photogrammetry, Virginia, U.S.A, 1975.
3. Burrough P A, Principle of GIS for land resource assessment, Oxford, 1990

CE 334 ENVIRONMENTAL ENGINEERING I 3 0 0 100

1. INTRODUCTION 9

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

2. PLANNING FOR WATER SUPPLY AND SEWERAGE SYSTEMS 9

Public water supply and sewerage systems – Objectives – Design period – Population forecasting – Water demand – Sources of water – Source Selection – Water quality – Characterisation – Water quality standards – Sources of wastewater – Quantity of sanitary sewage – Estimation of storm runoff – Characteristics and composition of sewage and their significance – Effluent standards.

3. CONVEYANCE SYSTEM 9

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.

4. WATER DISTRIBUTION 9

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

5. WATER SUPPLY AND DRAINAGE IN BUILDINGS 9

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.

L : 45 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.

CE 335: TRANSPORTATION ENGINEERING – I 3 0 0 100

1. HIGHWAY PLANNING AND ALIGNMENT 9

Highway Development in India, Macadam's Method of Road Construction, Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level,

Institutions for Highway Development at National level - Indian Roads Congress, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute.

Requirements of Ideal Alignment, Factors Controlling Highway Alignment

Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques)

Classification and Cross Section of Urban and Rural Roads (IRC),

Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards]

2. GEOMETRIC DESIGN OF HIGHWAYS 9

Design of Horizontal Alignments – Superelevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems]

Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves

Sight Distances - Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD]

Geometric Design of Hill Roads [IRC Standards Only]

3. DESIGN OF RIGID AND FLEXIBLE PAVEMENTS 9

Rigid and Flexible Pavements- Components and their Functions

Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic

Design Practice for Flexible Pavements [CBR method, IRC Recommendations- Problems]

Design Practice for Rigid Pavements – [IRC Recommendations-Problems]

4. HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory)

Soil – California Bearing Ratio Test, Field Density Test

Aggregate - Crushing, Abrasion and Impact Tests

Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests.

Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]

Highway Drainage [IRC Recommendations]

5. HIGHWAY MAINTENANCE **9**

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments.

Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special Repairs

Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation

Overlay Design by Benkleman Beam Method [Procedure only]

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. IRC Standards
2. Bureau of Indian Standards (BIS) Publications on Highway Materials
3. MORTH Guidelines for Highway Engineering

CE 341 COMPUTER AIDED BUILDING DRAWING 0 0 4 100

Building drawing in accordance with development and control rules satisfying orientation and functional requirements for the following :

1. Residential buildings with load bearing walls (RCC roof) **12**

2. RCC framed structures **12**

3, Office buildings (RCC roof) **12**

4. Industrial buildings – North light roof structures – Trusses – Gantry arrangements **12**

5. Perspective view for small buildings **12**

P : 60 **Total: 60**

Text Books:

1. Civil Engg. Drawing & House planning – B.P.Verma, Khanna publishers, Delhi
2. Building drawing & detailing – Dr. Balagopal & T.S.Prabhu, Spades publishers, Calicut.

References:

1. Building drawing – Shah, Tata McGraw-Hill
2. Building planning & drawing – Dr. N.Kumaraswamy, A.Kameswara Rao, Charotar publishing house.
3. Shah, Kale and Patki, Building drawing, Tata McGraw-Hill

CE 342 SURVEY PRACTICAL II 0 0 4 100

1. Tacheometry

Tangential system (using theodolite, leveling staff)

Stadia system (using theodolite, leveling staff)

Subtense system (using theodolite, tape, cross staff, leveling staff)

2. Setting out works

Foundation marking (using theodolite, tape, ranging rods)

Simple curve - right / left handed (using theodolite, tape, ranging rods)

Transition curve (using theodolite, tape, ranging rods)

3. Field astronomy

Field observation for the calculation of azimuth (using theodolite, tape)

4. Electronic surveying (Using Photogrammetry accessories / instruments)

Practicing fusion of stereo pairs of charts and photographs to get 3D

Use of pocket stereoscope and parallax bars

Determination of personal stereoscopic acuity in laboratory

Work on stereo test charts to access stereoscopic ability

Total : 60

CE336 STRUCTURAL ANALYSIS II 3 1 0 100

1. MOVING LOADS AND INFLUENCE LINES 9 + 3

(DETERMINATE & INDETERMINATE STRUCTURES)

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.

Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames – Indirect model analysis for influence lines of indeterminate structures.

2. ARCHES 9 + 3

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

3. SUSPENSION BRIDGES AND SPACE TRUSSES 9 + 3

Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders.

4. SPACE STRUCTURES 9 + 3

Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

5. PLASTIC ANALYSIS OF STRUCTURES 9 + 3

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems.

L: 45 T:15 TOTAL : 60

Text Books

1. Thadani B. N. and Desai J.P., Structural Mechanics, Weinall Book Corporation, Bombay, 1998

2. Jain A.K. and Arya A.S., Structural Analysis, Vol.II, Nemchand Publishers, Roorkee, 1996

References:

1. Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers, Delhi, 1994

2. Coates R.C., Coutie M.G. and Kong F.K., Structural Analysis, ELBS and Nelson, 1990

CE 337 STRUCTURAL DESIGN II 3 0 0 100

1. METHODS OF DESIGN OF CONCRETE STRUCTURES 9

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 current IS code- design of flexural members and slabs by working stress method and ultimate load method- design of water retaining structures-un cracked section (resistance to cracking)- moment of resistance (limited stress approach)

2. LIMIT STATE DESIGN FOR FLEXURE 9

Analysis and design of one way and two way slabs – rectangular slab subjected to uniformly distributed and concentrated loads – boundary conditions and corner effects – singly and doubly reinforced rectangular and flanged beams - design aids

for flexure-deflection and crack width control

3. LIMIT STATE DESIGN FOR SHEAR TORSION BOND AND ANCHORAGE 9

Behaviour of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of R C members for combined bending shear and torsion- use of design aids

4. LIMIT STATE DESIGN OF COLUMNS 9

Types of columns-analysis and design of short columns for axial un axial and bi axial bending-design of long columns- use of design aids

5. LIMIT STATE DESIGN OF FOOTINGS AND MASONRY STRUCTURES **9**

Design of wall footing-design of axially and eccentrically loaded rectangular footing-design of combined rectangular footing for two columns only- design of masonry walls, pillars and footings as per NBC and IS codes

Total = 45

Text Books

1. Varghese P C, Limit State Design of Reinforced Concrete, Prentice Hall of India, Private, Limited New Delhi, 1997
2. Dayaratnam P, Brick and Reinforced Brick Structures, Oxford & IBH Publishing Company Private Limited 1997

References:

1. Mallick and Gupta, Reinforced Concrete Design, Oxford and IBH, Delhi, 1997
2. Design Aides to IS 456-1978 (SP-16)
3. Code of Practice for Plain and Reinforced Concrete – IS456-2000

CE 338: TRANSPORTATION ENGINEERING II 3 0 0 100

1. RAILWAY PLANNING AND DESIGN **9**

Role of Indian Railways in National Development. Engineering Survey for Track Alignment. Permanent Way, its Components and Functions of Each Component, Gauges in Railway Tracks. Coning of Wheels. Geometric Design of Railway Tracks – Gradient, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Vertical Curves and Grade Compensation (Derivations of formulae and Problems)

2. RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION **9**

Points and Crossings, Signaling, Interlocking and Track Circuiting, Construction and Maintenance – Conventional and Modern methods (Remote Sensing, GIS & GPS) for Railway Alignment, Track Construction, Maintenance and Materials - Track Drainage.

Lay outs of Railway Stations and Yards

3. AIRPORT PLANNING AND DESIGN **9**

Airport Planning, Components of Airports, Airport Site Selection

Runway Design- Orientation, Geometric Design and Correction for Gradients

Terminal area, Airport Layout, Airport Buildings, Passenger Facilities, Parking Area and Airport Zoning

4. HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT 9

Definition of Terms - Harbours, Ports, Docks, Tides and Waves. Harbours – Requirements, Classification – Site Investigation for Locations, Planning and Layouts Concept of Satellite Ports. Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders Coastal Shipping, Inland Water Transport and Container Transportation. Pipe Ways, Rope Ways

5. ECONOMIC EVALUATION OF TRANSPORT PROJECTS 9

Evaluation of Highway and Railway Projects- Cost Benefit Analysis (Benefit Cost Ratio, Net Present Value, International Rate of Returns (Problems) Environmental Impact Assessment, Financial Appraisal

Build, Operate and Transfer for Highway and Railway Projects (Basic Concepts only)

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.

References:

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.
2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.
3. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publication, Delhi, 1992

CE 339 ENVIRONMENTAL ENGINEERING II 3 0 2 100

(INCLUDING DRAWING)

1. WATER TREATMENT 9

Objectives – Unit operations and processes – Principles, functions and design of flash mixers, flocclators, sedimentation tanks and sand filters – Disinfection – Aeration – iron and manganese removal, Defluoridation and demineralization – Water softening.

2. SEWAGE TREATMENT – PRIMARY TREATMENT 9

Objectives – Unit Operations & Processes – Principles, functions and design of screen, grit chambers and primary sedimentation tanks.

3. SEWAGE TREATMENT – SECONDARY TREATMENT 9

Secondary Treatment – Activated Sludge Process and Trickling filter; Other treatment methods – Stabilisation Ponds and Septic tanks – Advances in Sewage Treatment.

4. SEWAGE DISPOSAL 9

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

5. SLUDGE MANAGEMENT 9

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

6. ENVIRONMENTAL ENGINEERING DESIGN AND DRAWING

Water treatment – Typical layouts – Flash mixer – Clariflocculator – Slow sand and rapid sand filters **P : 15**

Sewage treatment – Typical layouts – Screens – Grit chamber – Sedimentation tanks – Trickling filter – Activated sludge plant – Septic tank – Soil dispersion system – Waste stabilization pond and sludge drying bed. **P : 15**

L : 45 P : 30 Total : 75

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.

Reference:

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 Company, New Delhi, 1995.

CE 340 FOUNDATION ENGINEERING 3 0 0 100

1. SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Introduction – Scope and objectives – Method of exploration boring – Sampling – disturbed and undisturbed sampling – sampling techniques – Bore log and report – Penetration tests (SPT and SCPT) – Data interpretation – Selection of foundation based on soil condition.

2. SHALLOW FOUNDATION 9

Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – bearing capacity from insitu tests – Factors influencing bearing capacity – codal provisions – Settlement – Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and maximum differential settlements of buildings – Codal provision – Methods of minimising settlement.

3. FOOTINGS AND RAFTS 9

Types of foundation – structural design of spread footing – Design aspects of combined and mat foundation – Codal provisions.

4. PILES 9

Types of piles – Factors influencing the selection of pile – Carrying capacity in granular and cohesive soils – Static and dynamic formulae – Capacity from insitu tests (SPT and SCPT) – Piles subjected to uplift – Negative skin friction – Group capacity – Settlement of pile groups – Interpretation of pile load test – Pile caps – Codal provisions.

5. RETAINING WALLS **9**

Earth pressure theory – Plastic equilibrium in soils – active and passive states – Rankine's theory – Coloumb's wedge theory – Classical and limit equilibrium solution – Earth pressure on retaining walls of simple configurations – pressure on the wall due to single line load alone – Graphical method (Culmann's method alone) – Stability of retaining wall.

Total : 45

Text Books:

1. Punmia, B.C., Soil mechanics and foundations, Laxmi publications pvt. Ltd., New Delhi, 1995.
2. Gopal Ranjan and Rao, A.S.R. Basic and applied soil mechanics, Wiley Eastern Ltd., New Delhi (India), 1997.

References:

1. Khan, I.H., A text book of Geotechnical Engineering, Prentice Hall of India, New Delhi, 1999.
2. Arora, K.R. Soil mechanics and foundation engineering, Standard publishers and distributors, New Delhi, 1997.
3. Bowles J.E. Foundation analysis and design, McGraw Hill, 1994.

CE 343 COMPUTER AIDED DESIGN AND DRAWING 0 0 4 2

1. Design and drawing of R.C.C. cantilever and counterfort type retaining walls with reinforcement details. **12**

2. Design of solid slab and R.C. Tee beam bridges for IRC loading and reinforcement details **12**

3. Deign of rectangular, pressed and hemispherical bottomed steel tank –staging –riveted joints – detailed drawing **12**

4. Design of circular, rectangular and intze type water tank reinforcement details **12**

5. Design of plate girder – twin girder deck type railway bridge – through type and deck type highway bridges – Truss girder bridges – detailed drawing – riveted connections. **12**

Total : 60

Text Books:

1. Structural design & drawing (concrete & steel) – Krishnaraju, CBS Publishers.
2. Design of steel structures – B.C.Punmia, Ashok kumar jain, Arun kumar jain, Laxmi publications Pvt. Ltd.

References:

1. Krishnamurthy, D, Structural Design and Drawing Vol.II, CBS, Publishers & Distributors, Delhi, 1990
2. Krishnamurthy, D, Structural Design and Drawing Vol.III (Steel Structures), CBS, Publishers & Distributors, Delhi, 1990
3. Vazirani V N and Ratwani N M, Design of Steel Structures, Khanna Publishers, Delhi, 1984

CE 344 SURVEY CAMP* 100

1. Three weeks survey camp using Theodolite, cross staff, leveling staff, tapes and Plane table

   (i) Triangulation
   (ii) Trilateration
   (iii) Star observation to determine azimuth
   (iv) Rectangulation

* Will be accommodated during winter vacation

CE 431 ESTIMATING AND COST ENGINEERING 3 1 0 100

1. ESTIMATION 9 + 3

Philosophy – purpose - Methods of estimation – advantages – types of estimates – approximate estimates – definite estimate – estimation of quantities for buildings, roads, canals and hydraulic structures – Sluices – Head and wing wall type, tower head, surplus weir, earthen dam.

2. SPECIFICATIONS AND TENDERS 9 + 3

Specifications-Detailed and general specifications-construction specifications – sources –types of specifications – Tender notices – types – corrigendum notice – tender procedures – Drafting model tenders

3. CONTRACTS 9 + 3

Contract – types of contracts – formation of contract - contract conditions - contract problems-contract for labour, material, design and construction – drafting of contract documents – construction contracts – arbitration and legal requirements.

4. VALUE ENGINEERING **9 + 3**

Basics - principles of valuation – Value and cost –value engineering – value analysis – phases in value engineering – information – function – escalation – evaluation - recommendation implementation – Audit.

5. CASH FLOW AND COST CONTROL **9 + 3**

Cash flow –cash inflow – outflow – cost control-tools and techniques – cost control in construction projects – Exercise on cash flow in Civil engineering projects.

L : 45 T : 15 TOTAL : 60

Text Books:

1. Estimating and costing in civil Engineering – B.N.Dutta, S.Dutta & Company, Lucknow.
2. Practical valuation – Vol I Mr. B.Kanagasabapathy, M/s. Ehilalarasi Kanagasabapathy, Thiruchirappalli.

References:

1. A text book on estimating and costing – G.S.Birdie – Dhanpat Rai and Sons, New Delhi.
2. Fixation of fair rent - Mr. B.Kanagasabapathy, M/s. Ehilalarasi Kanagasabapathy, Thiruchirappalli.
3. Jagannathan G, Getting more at less less cost – The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992.

CE432 IRRIGATION ENGINEERING (Including Drawing) 3 0 2 100

1. INTRODUCTION **4**

Definition – Need – Benefits. Developments – Historical - Scope in the country and state.

2. SOIL – PLANT WATER RELATIONSHIP **5**

Soil – Water relationship - Wilting point – Soil fertility. Principal crops – Crop rotation – Crops and cropping season.

3. CROP WATER REQUIREMENTS **9**

Duty and Delta – Definitions – Factors affecting Duty – Methods of Improving Duty, Consumptive use of water (Evapo – Transpiration) – Estimation of Evapo – Transpiration – Blaney and Criddle Method – Penman Methods – Lysimeter.

4. SOURCES, CONVEYANCE AND DISTRIBUTION OF WATER **12**

Sources of Water – Rivers – Streams – Reservoirs and Tanks. Lift irrigation – Devices and equipment for Lift irrigation. Components of irrigation networks – Main and Branch canal – Distributors – Minors – Water courses and field chak. Water application methods – Surface irrigation – Border – Check and Furrow – Subsurface irrigation – Sprinkler and Drip irrigation.

5. CONTROL AND REGULAR WORKS 8

Canal regulation works – Necessity and location of falls – Head and cross regulator – Canal escapes. Cross drainage works – Types of cross drainage work. River training works – Classification of River training works – Groynes or Spurs – Bank protection.

6. IRRIGATION WATER MANAGEMENT 7

Irrigation Efficiencies – Water conveyance efficiency – Water application efficiency – Water storage efficiency – Water distribution efficiency. Need for optimization – Need for interdisciplinary and participation approach. Roles and responsibilities of farmer's and government agencies in Turn Over.

7. DESIGN AND DRAWING OF IRRIGATION STRUCTURES (PRACTICAL COMPONENT) 30

Design of tanks surplus weir – Tank sluice with a tower head – Direct sluice taking off from a main canal – Canal drop with notch type – Canal regulators across the canal – Design of channels by Kennedy's Lacey's Regime formula through Computers – Design of gravity dam using Computer and Auto CAD – Design of cross drainage work – Siphon Aqueduct type III.

L : 45 + P : 30 = TOTAL : 75

TEXT BOOKS

1. Michael A.M., Irrigation – Theory and Practices, Vikas Publishing House, New Delhi, 1990.
2. Sharma R.K., Irrigation Engineering and Hydraulic Structures, Oxford and IBH Publishing Company, New Delhi, 1994.
3. Sathyanarayana Murthy, Irrigation Design and Drawing, Published by Mrs.L.Banumathi, Tuni, East Godavari District, A.P. 1998.

CE433 ECONOMICS AND BUSINESS FINANCE FOR CIVIL ENGINEERS 3 0 0 100

1. ECONOMICS 9

Role of civil engineering in industrial development - Advances in civil engineering and engineering economics - Support matters of economy as related to engineering Market demand and supply choice of technology and quality control and quality production - Audit in economic, Law of returns governing production.

2. LAND AND CONSTRUCTION ECONOMICS 9

Urban land use and values - Construction development in housing, transport and other infrastructures –Economics of ecology, environment, energy resources, local material selection, form and functional designs –Construction workers - Urban problems - Poverty - Migration - Unemployment - Pollution.

3. FINANCING **9**

The need for financial management - Types of financing - Short term borrowing - Long term borrowing –Leasing - Equity financing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations - analysis of financial statement – Balance Sheet - Profit and Loss account - Funds flow statement - Ratio analysis - Investment and financing decision –Financial control Job control and centralized management.

4. ACCOUNTING METHOD **9**

General overview - Cash basis of accounting - Accrual basis of accounting - Percentage - Completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purposes.

5. LENDING TO CONTRACTORS **9**

Loans to contractors - Interim construction financing - Security and risk aspects.

Total : 45

Text Books:

1. Warneer Z, Hirsch, Urban Economics, Macmillan, New York, 1993.
2. Prasanna Chandra, " Project Management ", TMH 1997.

References:

1. Kwaku A, Tenah and jose M.Guevara, "Fundamental of Construction Management and organisation", Prentice - Hall of India, 1995.
2. Engineering Economic Analysis.
3. K K Chitkara, Construction Project Management, Tata McGraw Hill.

GE035 PROFESSIONAL ETHICS 3 0 0 100

1. 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 – Professions and Professionalism – Professional ideals and virtues – Theories about right action – Self-interest – Customs and religion – Use of Ethical Theories

2. ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation – Engineers as responsible experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study.

3. ENGINEER'S RESPONSIBILITY FOR SAFETY 9

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

4. RESPONSIBILITIES AND RIGHTS 9

Collegiality and loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Discrimination.

5. GLOBAL ISSUES 9

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

Text Books:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York, 1996
2. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 1999

References:

1. Laura Schlesinger, How Could You Do That: The Abdication of Character, Courage, and Conscience, Harper Collins, New York, 1996.
2. Stephen Carter, Integrity, Basic Books, New York 1996.

3. Tom Rusk, The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life, Viking, New York, 1993

CE441 MINI PROJECT WORK AND PRACTICAL 0 0 6 100

TRAINING (4 weeks during summer)

CE 435 MANAGEMENT CONCEPTS FOR CIVIL ENGINEERS 3 0 0 100

1. BASIC CONCEPTS IN MANAGEMENT 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.

2. 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.

3. 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

4. HUMAN RESOURCE MANAGEMENT 9

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

5. 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., Management Eight 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 publications, 1995.

CE444 PROJECT WORK 0 0 12 200

The Objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering. Every Project Work shall have a Guide who is a member of the faculty of the University. Twelve periods per week shall be allotted in the Time Table for this important activity and this time shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work as assigned by the Guide and also to present in periodical seminars the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

CE 044: HYDROLOGY **3 0 0 100**

1. HYDROMETEOROLOGY 9

Hydrological cycle – Hydrometeorological factors – Cloud formation – Winds and their movement – Types of precipitation – Forms for precipitation – Density and Adequacy of rain gauges – Recording and non-recording gauges

2. PRECIPITATION AND ABSTRACTIONS 9

Spatial distribution – Consistency analysis – Frequency analysis – Intensity, duration, frequency relationships – Evaporation – Infiltration – Horton's equation – Infiltration indices – Types of streams – Stage discharge relationships – Flow measurements – Current meter method for velocity measurements.

3. HYDROGRAPH ANALISYS 9

Factors affecting shape of hydrograph – Components of DRH – Baseflow – Unit hydrograph – S curve hydrograph – Synthetic unit hydrograph

4. GROUND WATER HYDROLOGY 9

Occurrence of ground water – Types of aquifer – Dupuit's assumptions – Darcy's law – Estimation of aquifer parameters – Pump tests

5. FLOOD ANALYSIS 9

Flood estimation – Gumbel's method – Log Pearson type III method – Reservoir flood routing – Channel routing – Other methods of routing

Total : 45

Text Books:

1. Subramanya K, Engineering Hydrology, Tata McGraw-Hill, 1999
2. Jayaram Reddy P, Hydrology, Tata McGraw-Hill, 1998

References:

1. Raghunath H M, Hydrology, Wiley Eastern Limited, 1998
2. Vijay P Singh, Elementary Hydrology, Prentice Hall of India, 1998
3. Mutreja K N, Applied Hydrology, Tata McGraw Hill, 1998

DATABASE SYSTEM CONCEPTS 3 0 0 100

1. INTRODUCTION & ENTITY RELATIONSHIP MODEL 9

Purpose of Database Systems – View of data – Data models – Database Languages – Transaction Management – Storage Management – Database Administrator – Database users – Overall System Structure.

Basic Concepts – Design issues – Mapping Cardinalities – Keys E-R Diagrams – Weak Entity Sets – Extended E-R features – Design of an E-R Database Scheme – Reduction of an E-R scheme to Table

2. RELATIONAL MODELS, LANGUAGES AND INTEGRITY CONSTRAINTS 9

Structure of Relational Databases – Relational Algebra – The Tuple Relational Calculus – The Domain Relational Calculus – Extended Relational – Algebra Operations – Modification of the database – Views.

Query by example – Quel – Datalog – Domain Constaraints – Referential Integrity – Assertions – Triggers – Functional Dependencies

3. OBJECT ORIENTED AND OBJECT RELATIONAL DATABASES 9

New database applications – The objected oriented data model – Object oriented languages – Persistent programming languages – Persistent C++ systems.

Nested Relations – Complex types and object orientation – Querying with complex types – creation of complex values and objects – Comparison of object oriented and object relational database

4. STORAGE, FILE STRUCTURES, INDEXING AND HASHING 9

Overview of physical storage media – Magnetic disks – Tertiary storage – Storage Access – File organization – Organization of records in file – Data dictionary storage structures for objected oriented databases

Basic concepts of indexing and hashing – Ordered indices – B+ Tree index files – B-Tree index files – Static Hashing – Dynamic Hashing – Comparison of ordered indexing and hashing.

5. RECOVERY SYSTEM AND DATABASE SYSTEM ARCHITECTURES 9

Failure classification – Storage structure – Recovery and atomicity – Log – based recovery – Shadow paging – Recovery with concurrent transactions – Buffer Management – Failure with loss of non volatile storage – Advance recovery techniques
Centralised systems – Client server system – Parellel system – Distributed systems – Network types.

Total : 45

Text Books:

1. Abraham Silberschtz, Henry F. Korth and S. Sudershan, Database System Concepts, Third Edition, McGraw Hill International Edition, 1997, Chapters 1, 2, 3, 4,5, 6, 8, 9, 10, 11, 15 and 16.

FUNDAMENTALS OF ELECTRONICS AND MICROPROCESSORS 3 0 0 100

1. SEMICONDUCTOR DEVICES 9

Semiconductor physics – Structure of an atom – Electron energy – Energy band-energy band diagram – Intrinsic & Extrinsic Semiconductors – PN junction – Characteristics of PN junction – Ideal diode – Static & Dynamic characteristics of diode – Junction capacitance – equivalent circuit of a PN diode – Zener diode – tunnel diode – thermistor – bipolar junction transistor (BJT) – field effect transistor (FET)

2. ELECTRONIC CIRCUITS 9

Introduction to rectifiers – Half wave rectifier – Full wave rectifier – filter circuits – regulators – transistor amplifiers – BJT biasing circuits – FET biasing circuits – multistage amplifiers – FET amplifiers.

3. LINEAR AND DIGITAL ICs 9

Operational amplifier – comparison between analog and digital system – logic families – logic gates – fillip flops – multivibrators using Ics – Half adder & full adder – Registers – counters – multiplexer – decoders.

4. MICROPROCESSOR FUNDAMENTALS 9

Introduction – organization of micro computer – architecture of Intel 8085 – instruction format – addressing modes – instruction classification – instruction set of 8085 – programming languages – architecture of Intel 8086.

5. MICROPROCESSORS APPLICATIONS 9

Memory devices – Floppy disks – Hard disks – Input & Output Devices – Memory interfacing – CRT terminal interfacing – printers – keyboard interface with Microprocessor kit – parallel and serial communication – data transfer scheme – applications of Microprocessors.

Total : 45

Texts Books:

1. Thiripurasundari D and Elizabeth Rufus, Electronics and Microprocessor
2. N. N. Bhargava, D. C. Kulshrestha and S.C.Gupta, Basic Electronics and Linear Circuits, Tata McGraw Hill

References:

1. Malvino, Electronics Principles, Tata McGraw Hill
2. Roger Tokhem, Digital Electronics, Schaum Series
3. Roy Choudry, Linear Integrated Circuits, New Age International (P) Ltd.

CE045 GROUND WATER ENGINEERING 3 0 0 100

1. FUNDAMENTALS OF GROUND WATER 9

Introduction – Characteristic of Ground water – Global distribution of water - ground water column –Permeability - Darcy's Law - Laboratory permeability test - Types of aquifers - Hydrogeological Cycle – water level fluctations.

2. HYDRAULICS OF FLOW 9

Storage coefficient - Specific yield - Heterogeneity and Anisotrophy -Transmissivity - governing equations of ground water flow - Steady state flow - Dupuit Forchheimer assumption - Velocity potential - Flow nets

3. ESTIMATION OF PARAMETERS 9

Transmissivity and Storativity – Pumping test - Unsteady state flow - Thiess method - Jacob method - Image well theory – Effect of partial penetrations of wells - Collectors wells

4. GROUND WATER DEVELOPMENT 9

Collector wells - Infiltration gallery - Conjunctive use - Artificial recharge -Safe yield - Yield test – Geophysical methods – Selection of pumps.

5. WATER QULAITY 9

Ground water chemistry -Origin, movement and quality - Water quality standards - Saltwater intrusion –Environmental concern.

Total : 45

Text books:

1. Raghunath H.M., Ground Water Hydrology, Wiley Eastern Ltd., Second reprint, 2000.
2. Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000.

References:

1. Ramakrishnan S, Ground Water, 1998
2. C Walton, Ground Water Resource Evaluation, McGraw Hill

CE046 WATER RESOURCES ENGINEERING 3 0 0 100

1. GENERAL 9

Water Resources Survey - Water ResourceS of India and Tamilnadu - Description of Water Resources Planning - Economics of W.R.Planning - Physical and Socio - economic data - National water Policy - Tamil nadu State Water Policy - Collection of meteorological and hydrological data for water resources development

2. NETWORK DESIGN 9

Hydrologic measurement – Analysis of hydrologic data - Hydrologic station network - Station network design - Statistical techniques in network design.

3. WATER RESOURCE NEEDS 9

Consumptive and non-consuptive water use - Estimation of water requirements for irrigation, for drinking and navigation - Water characteristics and quality – Scope and aims of master plan - Concept of basin as a unit for development - Water budget and development plan.

4. RESERVOIR PLANNING AND MANAGEMENT 9

Reservoir - Single and multipurpose - Multiobjective - Fixation of Storage capacity - Strategies for reservoir operation - Sedimentation of reservoirs - Design flood - Levees and flood walls - Channel improvement.

5. ECONOMIC ANALYSIS 9

Estimation of cost and Evaluation of Benefits - Discount rate - Discounting factors - Discounting techniques – Computer Application.

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.

CE 051: HOUSING – PLANNING AND DESIGN 3 0 0 100

1. INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments - Objectives of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Local bodies' Bye-laws at Urban and Rural Level and Development Control Regulations, Institutions for Housing at National, State and Local levels

2. HOUSING PROGRAMMES 9

Basic Concepts – Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programme, Role of Public, Private and Non-Government Organisations.

3. PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

4. CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

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

5. Housing Finance and Project Appraisal 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems)

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.

CE 053: URBAN AND REGIONAL DEVELOPMENT 3 0 0 100

1. INTRODUCTION 9

Definition of Terms – Human Settlement, Town/City, Region, City Region, Urbanisation, Suburbanisation, Urban Sprawl, Urban Fringe, Central Business District (CBD), Definition and Classification of urban settlements by Census of India
Trend of Urbanisation at International, National, State and District levels
Impact of Urbanisation on Economic, Social, Spatial, Environmental, and Technological sectors
National and Regional Development Policies and Strategies – Urbanisation, Housing and Transportation
Sustainable Urban Development- Definition and Principles.

2. PLANNING PROCESS 9

Types of Urban and Regional Plans, Stages in the Planning Process – Delineation of Planning Areas, Goals and Objectives of Plans, Surveys and Analysis, Formulation of Plans, Evaluation of Alternative Pans, Plan Implementation, Legal, Financial and Institutional Constraints in the Planning Process
Social Orientation in the Planning Process.

3. PROJECT FORMULATION AND EVALUATION 9

Project Formulation Methodology – Housing, Water Supply, Transportation and Traffic Improvement Projects
Project Evaluation- Economic Evaluation [Benefit Cost Ratio method, Net Present Value and Internal Rate of Return – Problems], Environmental Impact Assessment and Cash Flow Analysis (Simple Problems)

4. DEVELOPMENT MANAGEMENT SYSTEMS 9

Development Control Rules – Zoning Regulations, Sub Divisional Regulations, Building Bye-laws, Co-ordination between Urban Local Bodies and Other Functional Agencies such as Water supply & Sewerage Boards, Housing Boards including Slum Boards and Planning Authorities

5. MANAGEMENT INFORMATION AND DECISION SUPPORT SYSTEM 9

Database, Management information system, Decision Support system for Land Suitability, Urban Renewal and Network Analysis.

Total : 45

Text Books:

1. Gallian B Arthur and Simon Eisner, The Urban Pattern, City Planning and Design, Affiliated Press Pvt. Ltd, New Delhi, 1995.
2. Margaret Roberts, An Introduction to Town Planning and Planning Techniques, Hutchinson, London, 1990.

References:

1. Master Plans for Cities and Towns prepared by Planning Authorities, 2011, Chennai Metropolitan Development Authority, 1995.
2. Development Control Rules for Chennai Metropolitan Area, CMDA, Chennai, 2002.
3. Rangwala S C, Town Planning, Charotar Publishing House, 1987.

CE066 INFORMATION TECHNOLOGY 3 0 0 100

1. INTRODUCTION 9

Data - information - Knowledge - Concepts of Database Design and Architecture - Commerical and Engineering Database.

2. COMPUTER HARDWARE AND SOFTWARE 9

Mother Board - Memory Devices -Bus -Ports and peripherals - I/O Devices -PC and work stations-Foundations of Operating System and its level of abstraction -Compilers - Interrupt Services Application, Software -Elements of visual Programming - Concepts, Components and formats of Multimedia - Principles of Virtual Reality.

3. SOFTWARE ENGINEERING AND QUALITY CONTROL 9

Introduction - Principles and Requirements - Planning -Cost Estimation -Design Concepts - Modularisation –Nation - Implementation - Verfication -Maintenance - Software quality management, ISO and CMM.

4. NETWORKS AND COMMUNICATION 9

Introduction to Computer Networks - Layered Architecture - Data Communication Concepts – Transmission Media and Topologies - Internetworking issues - Internet - TCP/IP Protocols and WWW.

5. APPLICAITION OF INFORMATION TECHNOLOGY IN CIVIL ENGINEERING 9

IT applications in Design, Construction management, Environmental monitoring water resources Management and urban planning and Design

Total : 45

Text Books:

1. Wing Toy Benjamin Zee, Computer hardware/software architecture, Printice-Hall of India, 1992.
2. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, Prentice -Hall of India, 1998.

References:

1. Andrew S. Tanenbaum, Computer Networks, Printice - Hall of India, 1996.

CEO63 GEOGRAPHICAL INFORMATION SYSTEM 3 0 0 100

1.INTRODUCTION 9

Maps – Definition – Types of Maps – Characteristics of Maps – Map Projections – GIS – Definition – Components of GIS – Hardware, Software and Organisational Context – GIS software

2. DATA AND DATA INPUT 9

Data Types – Spatial and Non-Spatial – Spatial Data – Points, Lines and Polygons – Non-spatial data – Nominal, Ordinal, Interval and Ratio – Digitizer – Scanner – Editing and Cleaning - Georeferencing

3. DATA STRUCTURE AND ANALYSIS 9

Raster and Vector Data Structure – Raster data storage – Run length, Chain and Block Coding – Vector Data Storage – Topology – Topological Models – ArcNode Structure – Surface Data – DEM – Gridded DEM and TIN structure- Applications of DEM

4. DATA ANALYSIS AND DATA QUALITY 9

Reclassification – Measurement – Buffering – Overlaying – SQL for Queries – Neighbourhood and zonal operations – Data Quality – Components of data quality - Sources of errors in GIS – Meta data

5. DATA OUTPUT AND GIS APPLICATIONS 9

Output – Maps, Graphs, Charts, Plots, Reports – Printers – Plotters – Fields of application – Natural Resource Management, Parcel based, AM/FM applications examples – Case study: Urban growth studies using GIS

Total : 45

Text Books:

1. Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications 2001
2. M.G. Srinivas (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001.

References:

1. Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publication.
2. Star J. and Estes. J., GIS – An Introduction, Prentice Hall, USA.
3. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996.

CE064 CARTOGRAPHY 3 0 0 100

1. INTRODUCTION 9

Cartography today - Nature of Cartography - History of Cartography - Graticules - Cartometry.

2. EARTH 9

Earth - Map Relations - Basic Geodesy - Map Projections, Scale, Reference and Coordinate system –Transformation - Basic Transformation -Affin Transformation.

3. SOURCES OF DATA 9

Sources of data - Ground Survey and Positioning - Remote Sensing data collection - Census and sampling –data - Models for digital cartographic information, Map digitizing.

4. PERCEPTION AND DESIGN 9

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

5. CARTOGRAPHY ABSTRACTION 9

Selection and Generalisation Principles - Symbolisation - Topographic and thematic maps-Maps production and Reproduction - 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, Elsevirr Applied Science Puplishers 2nd Edition, 1994.
2. Arthur, H.Robinson Et al Elements of Cartography, Sixth John Cambell, Introductory Cartography, Second Edition, John Wiley and Sons, 1995.

Refernces:

1. John Cambell, Introductory Cartography Second Edition, 1994, Wm.C Brown Publishers.
2. R.P Misra and A. Ramesh, Fundamentals of Cartography, Concept Publishing Company, New Delhi -2.

CE 039 PREFABRICATED STRUCTURES 3 0 0 100

1. INTRODUCTION 9

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

2. PREFABRICATED COMPONENTS 9

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

3. DESIGN PRINCIPLES 9

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

4. JOINT IN STRUCTURAL MEMBERS 9

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

5. DESIGN FOR ABNORMAL LOADS 9

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

L : 45 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.

CE041 COMPUTER AIDED DESIGN OF STRUCTURE 3 0 0 100

1. INTRODUCTION 9

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

2. COMPUTER GRAPHICS 9

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

3. STRUCTURAL ANALYSIS 9

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

4. DESIGN AND OPTIMISATION 9

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming.

5. EXPERT SYSTEMS 9

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

Total No of periods: 45

Text Books:

1. Groover M.P. and Zimmers E.W. Jr.," CAD/CAM, Computer Aided Design and Manufacturing ", Prentice Hall of India Ltd, New Delhi, 1993.
2. Krishnamoorthy C.S.Rajeev S., "Computer Aided Design", Narosa Publishing House, New

References :

1. Harrison H.B., " Structural Analysis and Design ", Part I and II Pergamon Press, Oxford, 1990.
2. Rao S.S., " Optimisation Theory and Applications ", Wiley Eastern Limited, New Delhi, 1977.
3. Richard Forsyth (Ed), " Expert System Principles and Case Studies ", Chapman and Hall, London, 1989.

CE 042 PRESTRESSED CONCRETE STRUCTURES 3 0 0 100

1. INTRODUCTION – THEORY AND BEHAVIOUR 9

Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect on tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width

2. DESIGN 9

Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

3. CIRCULAR PRESTRESSING 9

Design of prestressed concrete tanks – Poles and sleepers

4. COMPOSITE CONSTRUCTION 9

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

5. PRE-STRESSED CONCRETE BRIDGES 9

General aspects – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks – Advantages over R.C. bridges – Principles of design only

L : 45 Total : 45

Text Books:

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi 1998
2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co.Pvt. Ltd. 1997.

References:

1. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
2. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.
3. David A.Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete – A design guide, McGraw Hill, New Delhi 1992.

CE049 TRANSPORTATION PLANNING AND SYSTEMS 3 0 0 100

1. STUDY AREA AND SURVEYS 9

Importance of planning for Integrated transport facilites in urban areas- Delineation of study area and zoning –Conducting various surveys - Travel patterns , Transport facilites and planning parameters.

2. MODES 9

Basic of trip generation -Trip distribution - Trip assignment and modal split models - Validation of the model.

3. PLAN PREPARATION AND EVALUTION 9

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

4. BUS TRANSPORTATION 9

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

5. RAIL TRANSPROTATION 9

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

Total : 45

Text Books:

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.

CE050 TRAFFIC ENGINEERING AND MANAGEMENT **3 0 0 100**

1. INTRODUCTION **9**

Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

2. TRAFFIC SURVEYS AND ANALYSIS **9**

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Problems

3. TRAFFIC CONTROL **9**

Traffic Signs, Road Markings, Design of Traffic Signals and Signal Co-ordination (Problems), Traffic control Aids and Street Furniture, Computer Applications in Signal Design

4. DESIGN OF GEOMETRIC INTERSECTIONS **9**

Conflicts at Intersections, Classification of Intersections at Grade, Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Channelisation and Rotary Design (Problem)

5. TRAFFIC MANAGEMENT **9**

Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Restrictions on Turning Movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal Flow Operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

Total : 45

Text Books:

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.

References:

1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Guidelines of Ministry of Road Transport and Highways, Government of India.
3. Subhasg C.Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications, New Delhi, 1989.

CE 052: RAILWAYS AND AIRPORT ENGINEERING 3 0 0 100

1. CONSTRUCTION AND MAINTENANCE OF RAILWAY TRACKS 9

Railway Track Design - Construction, Formation, Earthwork Consolidation, Plate Laying, Sleepers, Materials, Sleeper Density – Ballast, Materials, Size and Quantity, Laying of Ballast – Maintenance of Railway Tracks, Methods, Important Considerations – Modern Methods and Materials for Construction and Maintenance

2. DESIGN AND CONSTRUCTION OF RAILWAY BRIDGES 9

General Requirements – Component of Bridges, Design of Bridges – Waterway, Afflux and Depth of Foundation, Scour, Economic Span – Problems

3. RAPID TRANSIT SYSTEM (RTS) 9

Alignment of Rapid Transit System (RTS) - Different types of RTS – Station Elements of RTS – Design aspects of LRT and RTS – Application of Remote Sensing, GIS Techniques in alignment

4. AIRPORT DESIGN ASPECTS 9

Planning and Design of Various Components of Airport – Runway (Wind Rose Diagram-Problem), Taxiway, Structural Design of Airport Pavements, Strengthening of Airfield Pavements, Terminal Buildings, Hanger.

5. MAINTENANCE AND REHABILITATION OF AIRFIELD PAVEMENTS 9

Need for Maintenance – Airfield Pavement – Failures, Maintenance and Rehabilitation of Airfield Pavements – Evaluation of Airfield Pavements – Strengthening of Airfield Pavements – Problems

Total : 45

Text Books:

1. Saxena C Subhash and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 1999.
2. Khanna S K, Arora M and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994

References:

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.
2. Rangwala. Airport Engineering, Charotar Publishing House, 1996.
3. Agarwal M M, Indian Railway Track, Prabha and Co., New Delhi, 1993.

CE 054 ENVIRONMENTAL IMPACT ASSESSMENT 3 0 0 100

1. INTRODUCTION 9

Impact of development on environment and Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) – Objectives – Historical development – EIA capability and limitations – Legal provisions on EIA.

2. METHODOLOGIES 9

Methods of EIA – Strengths, weaknesses and applicability – Appropriate methodology – Case studies.

3. PREDICTION AND ASSESSMENT 9

Socio Economic Impact – Assessment of Impact on land, water and air, energy impact; Impact on flora and fauna; Mathematical models; public participation – Reports – Exchange of Information – Post Audit – Rapid EIA.

4. MATHEMATICAL MODELS FOR ASSESSMENT 9

Use the mathematical models in EIA – Water quality, air quality and noise; assumptions and limitations.

5. ENVIRONMENTAL MANAGEMENT PLAN 9

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People.

L : 45 Total : 45

Text Books:

1. Canter, R.L.Environmental Impact Assessment, McGraw Hill Inc., New Delhi, 1996.
2. S.K.Shukla and P.R.Srivastava, Concepts in Environmental Impact Analysis, Common Wealth Publishers, New Delhi, 1992.

References:

1. John G.Rau and David C Hooten (Ed)., Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1990.
2. Environmental Assessment Source book, vol.I, II & III. The World Bank, Washington, D.C., 1991.
3. Judith Petts, Hand book of Environmental Impact Assessment Vol.I & II, Blackwell Science, 1999.

CE 055 INDUSTRIAL WASTE MANAGEMENT 3 0 0 100

1. INTRODUCTION 9

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Hazardous Wastes – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes – Pollution Control Boards.

2. CLEANER PRODUCTION 9

Waste management Approach – Waste Audit – Volume and strength reduction – material and process modifications – Recycle, reuse and byproduct recovery – Applications.

3. TREATMENT OF INDUSTRIAL WASTEWATER 9

Equalisation – Neutralisation – removal of suspended and dissolved organic solids - Chemical oxidation – Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management.

4. TREATMENT AND DISPOSAL OF HAZARDOUS WASTES 9

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

5. CASE STUDIES 9

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

L : 45 Total : 45

Text Books:

1. M.N.Rao & A.K.Dutta, Wastewater Treatment, Oxford IBH Publication, 1995.
2. W .W. Eckenfelder Jr., Industrial Water Pollution Control, McGraw-Hill Book Company, New Delhi, 1994.

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.

CE 056 AIR POLLUTION MANAGEMENT 3 0 0 100

1. SOURCES AND EFFECTS 9

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

2. DISPERSION OF POLLUTANTS 9

Elements of atmosphere and dispersion of pollutants – Meterological factors – Wind roses – Lapse rate - Atmospheric stability and turbulance – Plume rise – Dispersion of pollutions – Gaussian dispersion models – Applications.

3. AIR POLLUTION CONTROL 9

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic prescipitation – Selection criteria for equipment, gaseous pollutant control by adsorption absorption, condensation, combustion – Pollution control for specific major industries.

4. AIR QUALITY MANAGEMENT 9

Air quality standards – Air quality monitoring – Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment – Methods.

L : 45 Total : 45

Text Books:

1. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
2. Rao M.N., and Rao H V N., Air Pollution Control, Tata-McGraw Hill, New Delhi, 1996

References:

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw Hill, New Yark, 1997
2. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. Environmental Engineering, McGraw Hill, New Delhi, 1985.

CE 057 MUNICIPAL SOLID WASTE MANAGEMENT 3 0 0 100

1. SOURCES AND TYPES 9

Sources and types of solid wastes in a Municipality; Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

2. ON-SITE STORAGE & 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.

3. COLLECTION AND TRANSFER 9

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

4. OFF-SITE PROCESSING 9

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

5. DISPOSAL 9

Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills.

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.

CE059 PAVEMENT ENGINEERING 3 0 0 100

1. 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

2. DESIGN OF FLEXIBLE PAVEMENTS 9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per lates IRC guidelines

3. DESIGN OF RIGID PAVEMENTS 9

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

4. 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]

5. STABILISATION 8

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geo-fabric in roads.

Total : 45

Text Book :

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.

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.

CE060 GROUND IMPROVEMENT TECHNIQUES 3 0 0 100

1. INTRODUCTION 9

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

2. DRAINAGE AND DEWATERING 9

Drainage techniques - Well points - Vaccum and electroosmotic methods - Seepage analysis for two dimensional flow fully and partially penetrating slots in homogenous deposits(Simple cases only).

3. INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 9

Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

4. EARTH REINFORCEMENT 9

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth - Geotextiles in filtration drainage - Separation and road works.

5. GROUND TECHNIQUES 9

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemical - Stabilisation expansive soils.

Total : 45

Text Books :

1. Koerner R.M., Construction and Geotechical Methods in Foundation Engineering, McGraw Hill, 1994.
3. Purushothama Raj, P.Ground Improvement Techniques, Laxmi Publications (p) Ltd., New Delhi.

References :

1. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 1993.
2. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
3. Craig, R.F., Soil Mechanics, Van Nostrant Reinhold Co.,New York, 1993.

CE034 BRIDGE STRUCTURES 3 0 0 100

1. INTRODUCTION 9

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders

2. STEEL BRIDGES 9

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

3. REINFORCED CONCRETE SLAB BRIDGES 9

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

4. REINFORCED CONCRETE GIRDER BRIDGES 9

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

5. PRESTRESSED CONCRETE BRIDGES 9

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters -Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

Total : 45

Text Books:

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990.
2. Ponnuswamy S., " Bridge Engineering ", Tata McGraw Hill, New Delhi, 1996.

References:

1. Phatak D.R., " Bridge Engineering ", Satya Prakashan, New Delhi, 1990.

CE037 TALL BUILDINGS 3 0 0 100

1. INTRODUCTION 9

The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations.
Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

2. THE VERTICAL STRUCTURE PLANE 9

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing-Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

3. COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD 9

The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

4. APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS 9

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

5. OTHER HIGH-RISE BUILDING STRUCTURE 9

Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

Total : 45

Text Books:

1. WOLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons.
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991.

References:

1. COULL, A. and SMITH, STAFFORD, 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.

CE 043 INDUSTRIAL STRUCTURES 3 0 0 100

1. PLANNING 9

Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

2. FUNCTIONAL REQUIREMENTS 9

Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

3. DESIGN OF STEEL STRUCTURES 9

Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

4. DESIGN OF R.C. STRUCTURES 9

Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

5. PREFABRICATION 9

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Total : 45

Text Books:

1. Reinforced Concrete Structural elements – P. Purushothaman
2. Pasala Dayaratnam – Design of Steel Structure - 1990

References:

1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995
2. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990
3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982

CE048 COASTAL ZONE MANAGEMENT 3 0 0 100

1. COASTAL OCEANS 9

introduction and Basic concepts – Coastal Waters, Estuaries, Wetlands and lagoons – Pollution Stresses on Coastal water – Marine sediments – Sediment transport – Texture, composition and distribution – Living resources in the coastal zone and their conservation and utilization – Non-living resources and their exploration and exploitation.

2. WAVE DYNAMICS 9

Wave characteristics – Airy's Linear Wave Theory – Deep water waves – Shallow water waves – Transitional waves – Wind generated waves – Sea swell – Surface-wave refraction – Wave reflection – Wave breaking – Storm surge – Tsunami – Internal waves.

3. COASTAL PROCESSES 9

erosion and depositional shore features – change levels of the shoreline – plate tectonics and coasts – Tides and currents – Littoral currents – Renewable ocean energy – Shifting river mouths and delta formation shoreline shifting and need for continuous survey – ocean thermal energy conversion – Wave-tidal engineering structures and other infrastructure in coastal zone – Dykes and Levees

4. ENVIRONMENTAL IMPACTS IN COASTAL ZONE 9

Hydraulic aspects – Ecological aspects – Land use in coastal zone – Coastal aquifers – Sea water intrusion – Desalination – Brackishwater aquaculture and its impact on coastal zone – Coastal zone management – Concepts and development – Data base for coastal zone management – Design and operation of closure works – Sand closure.

5. GIS AND REMOTE SENSING APPLICATION IN COASTAL MANAGEMENT 9

Introduction and basic concepts of GIS – Data entry storage and analysis and modeling – Application in coastal zone – Aquaculture remote sensing – Basic concepts – Application of remote sensing in coastal zone management.

Total : 45

Text Books:

1. Ippen, Arthur and T. Estuary, Coastline Hydrodynamics, McGraw Hill, New , New York, 1993
2. Dwivedi S. N., Natarajan R and Ramachandran S, Coastal Zone Management in Tamilnadu, 1991

CE 061 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS 3 0 0 100

1. INTRODUCTION 9

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

2. WAVES AND WAVE PROPAGATION 9

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

3. DYNAMIC PROPERTIES OF SOILS 9

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

4. DESIGN PROCEDURES 9

Design criteria-dynamic loads-simple design procedures for foundations under reciprocating machines-machines producing impact loads-rotary type machines

5. VIBRATION ISOLATION 9

Vibration isolation technique-mechanical isolation-foundation isolation-isolation by location-isolation by barriers- active passive isolation tests

Total : 45

Text Books

1. S.Prakesh & V.K Puri, Foundation for machines, McGraw Hill 1993
2. Srinivasulu, P & Vaidyanathan, Hand book of Machine Foundations, McGraw Hill 1996

CE036 DESIGN OF PLATE AND SHELL STRUCTURES

3 0 0 100

1. THIN PLATES WITH SMALL DEFLECTION 9

Laterally loaded thin plates – governing differential equations – Simply supported and fixed boundary conditions

2. RECTANGULAR PLATES 9

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

3. THIN SHELLS 9

Classification of shells-structural actions – membrane theory

4. ANALYSIS OF SHELLS 9

Analysis of spherical dome – cylindrical shells – folded plates

5. DESIGN OF SHELLS 9

Design of spherical dome – cylindrical shells – folded plates

Total : 45

Text Books

1. Bairagi N K, A text book of Plate Analysis, Khanna Publishers, New Delhi,, 1996
2. G. S. Ramaswamy, Design and Construction of Shell Structures, CBS Plublishers, New Delhi, 1996

References:

1. Szilard R, Theory and analysis of plates, Prentice Hall Inc, 1995
2. Chatterjee B. K., Theory and Design of Concrete Shells, Oxford & IBH, New Delhi, 1998
3. Billington D. P., Thin Shell Concrete Structures, McGraw Hill, 1995

CE072 SMART STRUCTURES AND SMART MATERIALS 3 0 0 100

1. INTRODUCTION 9

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

2. MEASURING TECHNIQUES 9

Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

3. SENSORS 9

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

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

4. ACTUATORS 9

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

5. SIGNAL PROCESSING AND CONTROL SYSTEMS 9

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

Total : 45

Text Books:

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.

References:

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw Hill, 1998.
2. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw Hill, 1998.

CE 038 STRUCTURAL DYNAMICS 3 0 0 100

1. Difference between static loading and dynamic loading – Nature of dynamic loads – Wind, Earthquake and Impact Loads – Damping – Viscous and structural damping – single degree of freedom (SDOF) Systems – Formulation of equation of motion – Newton's Law and D'Alembert's principles – Examples of SDOF modeling. **9**

2. Free vibration response of SDOF system – Response of undamped and damped SDOF system to harmonic excitation – characteristic of resonance – Response to impulse and an arbitrary forcing function – Duhamel Integral formulation. **9**

3. MDOF systems – examples – Lumped parameter model – Formulation of equation of motion – Free vibration of MDOF systems as Eigen value problem – concept of mode shapes and natural frequencies – 2 DOF example – orthogonal properties of normal modes. **9**

4. Harmonic excitation of 2 DOF system – Principle of mode superposition (principle only) for dynamic analysis – vibration isolation – vibration measuring instruments. **9**

5. Effect of wind and earthquake on structures – Principles of aseismic design – Methods of vibration control – codal provisions for design for wind and earthquake (explanation of provisions only – no design) **9**

TOTAL : 45 Hrs

Text Books:

1. Mario Paz, Structural Dynamics Theory and Computation, Van Nostrand Reinhold, 1992
2. Anil K.Chopra, "Dynamics of Structures Theory and Applications to Earthquake Engineering" Prentice Hall of India (P) Ltd., New Delhi 1996.

References:

1. Thomson W.T., Theory of Vibration and Applications, Prentice Hall of India, 1992
2. Clough R.W. and Penzien, J., Dynamics of Structures, McGraw-Hill, 1990
3. Craig R.R. Jr., Structural Dynamics – An Introduction to Computer Methods, John Wiley and Sons, 1981

CE035 STORAGE STRUCTURES

1. STEEL WATER TANKS 15

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

2. CONCRETE WATER TANKS 15

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

3. STEEL BUNKERS AND SILOS 5

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

4. CONCRETE BUNKERS AND SILOS 5

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

5. PRESTRESSED CONCRETE WATER TANKS 5

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

L : 45 Total : 45

Text Books

1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.

CE040 WIND ENGINEERING

1. INTRODUCTION 9

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

2. EFFECT OF WIND ON STRUCTURES 9

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

3. Effect on typical Structures 9

Tail buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

4. APPLICATION TO DESIGN 9

Design forces on multistorey building, towers and roof trusses.

5. INTRODUCTION TO WIND TUNNEL 9

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

L : 45 Total : 45

Text Books

1. Peter Sachs, "Wind Forces in Engineering, Pergamon Press, New York, 1992.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 1993.

References

1. Devenport A.G., "Wind Loads on Structures", Division of Building Research, Ottowa, 1990.
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 1995.

CE047 MANAGEMENT OF IRRIGATION SYSTEMS

1. DEMAND ASSESSMENT 8

Introduction – Consumptive and non-consumptive demands – Crop water requirement – Allowable deficit – Effective rainfall – Irrigation requirement – Irrigation frequencies – Other demands – Control and regulating structures – Flow measurements – Calibration of structures.

2. OPERATION PLAN 14

Existing operation practices in India – Objectives of preparing operation plan – Precipitation and runoff – Dependable yield – Seasonal and Intraseason planning – Matching supply and demand – Preparation of operation plan for main canal, distributory - Case studies.

3. MONITORING AND EVALUATION 6

Implementation of operation plan – Monitoring parameters – Feed back from field – Review and revision – Performance indicators – Evaluation of system performance.

4. MAINTENANCE 7

Physical and social phenomenon causing maintenance problems and their solutions – Diagnostic survey – Development of maintenance plans – Deferred maintenance and rehabilitation.

5. MANAGEMENT 10

Physical and administration control of the system – Water laws – Water user's association (WUA) and their role in-distribution of water below the outlet and maintenance of the system. Role of WUA in system management – Irrigation management transfer – Water cess – Sustainability of irrigation systems.

L : 45 Total : 45

References

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project Technical Report No.33, CWC, New Delhi, 1990.
2. Hand Book for improving Irrigation System Maintenance Practices, Water Resources Management and Training Project, Technical Report No.19A, CWC, New Delhi, 1989.
3. Maloney C and Raju K.V., Managing Irrigation Together, Practice and Policy in India, Stage Publication, New Delhi, India, 1994.
1. Sagardoy J.A., Bottrall A., and Utten Bogaard G.O., Organisation, Operation and Maintenance of Irrigation Schemes, Irrigation and Drainage, Paper No.40, FAQ, Rome, 1986.
2. Preparation of the Operation Plan and Example, Indo-Dutch Training Project Management Unit, Group Report, 1993.
3. Irrigation Management in India Policy, Processes and Performance Oxford – IBH Photography Co. (P) Ltd., New Delhi, 1999.

CE058 ECOLOGICAL ENGINEERING

1. PRINCIPLES AND CONCEPTS 12

Scope and applications of Ecological Engineering – Development and evolution of ecosystems – principles and concepts pertaining to species, populations and community – Eco Successions.

2. ECOSYSTEM FUNCTIONS 10

Energy flow and nutrient cycling – Food chain and food webs – biological magnification, diversity and stability, immature and mature systems. Primary productivity – Biochemical cycling of nitrogen, phosphorous, sulfur and carbon dioxide; Habitat ecology Terrestial, fresh water, estuarine and marine habitats.

3. METHODS IN ECOLOGICAL ENGINEERING 15

Biomonitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles – range rehabilitation; step cropping, bio-wind screens, Wetlands, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological systems.

4. ECOLOGICAL EFFECTS 8

Ecological effects of exploration, production, extraction, processing, manufacture & transport.

Total : 45

Text Book

1. Odum, E.P., “Fundamental of Ecology”, W.B.Sauders, 1990.

References

1. Mitch, J.W. and Jorgensen, S.E., Ecological Engineering – An Introduction to Ecotechnology, John Wiley and Sons, 1996.
2. Colinvaux, P., Ecology, John Wiley and Sons, 1996.

CE062 ROCK ENGINEERING

1. CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 6

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

2. ROCK STRENGTH AND FAILURE CRITERIA 12

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

3. INITIAL STRESSES AND THEIR MEASUREMENTS 10

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

4. APPLICATION OF ROCK MECHANICS IN ENGINEERING 10

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

5. ROCK BOLTING 7

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

L : 45 Total : 45

Text Books

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.

References

1. Brow 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. Hock E. and Bray J., “Rock Slope Engineering, Institute of Mining and Metallurgy”, 1991.

HS053 COMMUNICATION SKILLS FOR ENGINEERS 2 0 2 100

UNIT 1: **L P**
8 14

ORAL COMMUNICATION – Practical use of language in simulated real – life situations through role playing – social skills – interaction with employers, peers and subordinates – Group dynamics – Listening techniques – Phonological aspects of language use – pronunciation, stress and intonation.

Introducing oneself and others, narrating events – Making telephonic conversation – Making requests, Asking questions, Making recommendations using modal verbs, Expressing causal relations with suitable discourse markers, Giving instructions using imperatives, Expressing purposes and functions, obligation and preferences, Accepting offers and Counselling, Interpreting advertisements, Describing processes using sequential expressions.

UNIT 2: L P
6 6

Presenting one's ideas at meetings and conferences, Making extempore talks, Public speaking, Body language, Strategic competence, Use of audio – visual aids and multimedia presentations.

UNIT 3: L P
8 0

Technical Writing – the structure of organised writing – paragraph writing, coherence, cohesion (use of Discourse Markers) and punctuation, Use of titles, nonverbal devices – Layout – Revision strategies – Reading techniques.
Letter Writing: - Personal/Informal letters**:** Letters to family members and friends Business / Formal letters**:** Letters thanking the recipients, announcing functions, extending invitations, congratulating associates on important occasions, letters of application (Resumes), apology and complaint, letters to the editor.

UNIT 4: *L P*
8 0

Report Writing: - persuasive, explanatory, argumentative and informative, Writing agenda, minutes, memos, project proposals and checklists.

UNIT 5 *L P*
10 0

Grammar - study of grammatical items in contexts. Nouns, pronouns, adjectives, comparative adjectives, adverbs, gerund, prepositions, voice, tenses, 'if clauses, direct and indirect speech (reporting verbs), concord Vocabulary – Synonyms, antonyms, homonyms, homophones, hyponyms, affixes, reference words, phrasal verbs and prepositional phrases.

Total 60 hrs. **L: 40 P: 20**

Text Books:

1. Doff, Adrian and Jones, Christopher, Language in Use: Classroom Book (Intermediate level). Cambridge: CUP. 1994 (2 audio cassettes).
2. Dr.V.Chellammal, Learning to Communicate – a resource book for Engineers and Technologists. Coimbatore**:** Kamakhya Publications 2002 (1 audio cassette)

References:

1. Sung, Abraham. 330 more Model Letters for all occasions Malaysia-Minerva Publications. 2002.
2. Bentley, T.J. Report Writing in Business: The Effective Communication of Information. New Delhi**:** Viva Books Pvt.Ltd., 2001.
3. Vivanilam, J.V. More Effective Communication: A Manual for Professionals. New Delhi: Response Books. 2000
4. Michael, V.P.Communication and Research for Management. Mumbai: Himalaya Publishing House 2001.
5. Nauheim, Ferd. How to Write Business Letters. New Delhi; Crest Publishing House 2000.
6. Mohan, Krishna, Meera Banerji. Developing Communication Skills. New Delhi: Macmillan 1991.
7. Denny, Richard. Communicate to Win. New Delhi: Kogan Page 2002.

MA039 PROBABILITY AND STATISTICS

1. PROBABILITY AND RANDOM VARIABLES 9

Probability concepts, Random variables, Moments, Moment Generating function, Binomial, Poisson, Geometric, Negative binomial, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebyshev inequality.

2. TWO-DIMENSIONAL RANDOM VARIABLES 9

Marginal and Conditional distributions, Covariance, Correlation and regression, Transformation of random variables, Central limit theorem.

3. RANDOM PROCESSES 9

Classification, Stationary and Markov processes, Poisson process, Pure birth process, Birth and death process, Markov chains, Markovian queuing models.

4. RELIABILITY ENGINEERING 9

Concepts of reliability, Hazard function, Series and parallel systems, Reliability and Availability of Markovian systems, Maintainability, Preventive maintenance.

5. Design of Experiments and Quality Control 9

Completely randomized design, Randomised block design, Latin square design, Process control, Control charts of measurements and attributes, Tolerance limits.

L : 45 T :45 Total : 60

References

1. Miller, I.R and Freund, J.E, “Probability and Statistics for engineers”, Prentice-Hall, 1995.
2. Kapur, J.N and Saxena, H.C, “Mathematical Statistics”, S. Chand & Company Ltd., New Delhi, 1997.
3. Balagurusamy E, “Reliability Engineering”, Tata-McGraw-Hill Publishers, New Delhi, 1994.
4. Bhat, U.N, “Elements of applied stochastic processes, Wiley Series in Probability and Mechanical statistics, New York, 1993.

GE034 CREATIVITY, INNOVATION AND NEW PRODUCT DEVELOPMENT

1. INTRODUCTION 8

The process of technological innovation – factors contributing to successful technological innovation – the need for creativity and innovation – creativity and problem solving – brain storming different techniques.

2. PROJECT SELECTION AND EVALUATION 8

Collection of ideas and purpose of project – Selection criteria – screening ideals for new products (evaluation techniques).

3. NEW PROJECT DEVELOPMENT 7

Research and new product development – Patents – patent search – Patent laws – International code for patents – Intellectual property rights (IPR).

4. NEW PRODUCT PLANNING 7

Design of proto type – testing – quality standards – marketing research – introducing new products.

L : 30 P : 30

1. LABORATORY

Creative design – Model Preparation – Testing – cost evaluation – Patent application

References

1. HARRY NYSTROM, "Creativity and Innovation", John Wiley & Sons, 1979.
2. BRAIN TWISS, "Managing Technological Innovation", Pitman Publishing Ltd., 1992.
3. HARRY B.WATTON, "New Product Planning", Prentice-Hall Inc., 1992.
4. P.N.KHANDWALLA, "Fourth Eye (Excellence through Creativity), Wheeler Publishing, Allahabad, 1992.
5. I.P.R. Bulletins, TIFAC, New Delhi, 1997.

IF144 OBJECT ORIENTED PROGRAMMING

1. OOP PARADIGM 9

Data abstraction – encapsulation – class – inheritance – polymorphism – reusability.

2. C++ INTRODUCTION 9

Classes – objects – dynamic memory allocation – constructor – destructor – friend functions – operator overloading.

3. INHERITANCE AND POLYMORPHISM 9

Derived class and base class – derived class constructor – modes of inheritance – multiple inheritance – virtual function – polymorphism – dynamic binding – abstract class.

4. JAVA INTRODUCTION 9

Class – objects – extending class – Java features – interfaces – packages – multithreading.

5. PROGRAMMING 9

Tokens – operators – expressions – control flow – programming with types – documentation comments – I/O package – applets – creating applets – some sample programs.

Total = 45

Text Books

1. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley, 2000.
2. Ken Arnold, James Gosling, The JAVA language, II edition, Addison Wesley, 1998.
3. E.Balaguruswamy, Object Oriented Programming with C++, II edition, TMH, 2001.

References

1. Herbert Schildt, C++ The complete reference, TMH, 1997.
2. Stanley B. Lippman. Jore Lajoie, C++ Primer, III edition, Addison Wesley, 2000.
3. Barkakati N, Object Oriented Programming in C++, PHI, 1995.
4. Kris Jamsa, Java programming – A Complete reference, Galgotia Publication, 1994.
5. Patrick Naughton, Herbert Schildt, Java The complete reference, TMH, 1997.

GE037 INTELLECTUAL PROPERTY RIGHTS (IPR)

UNIT I

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property). 5

UNIT II

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures. 10

UNIT III

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT). 10

UNIT IV

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition. 10

UNIT V

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition. 10

TEXT BOOK

1. Subbaram N.R. " Handbook of Indian Patent Law and Practice ", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.

REFERENCES

1. Eli Whitney, United States Patent Number : 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today : Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.

GE038 INDIAN CONSTITUTION AND SOCIETY

UNIT I

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. 9

UNIT II

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review. 9

UNIT III

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts. 9

UNIT IV

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India. 9

UNIT V

Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections. 9

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.

ME046 FINITE ELEMENT TECHNIQUES

1. INTRODUCTION – VARIATIONAL FORMULATION 8

General filed problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

2. FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS 8

One dimensional second order equations – discretisation of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

3. FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS 8

Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

4. ISOPARAMETRIC ELEMENTS AND FORMULATION 7

Natural coordinates inn 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

5. APPLICATIONS TO FILED PROBLEMS IN TWO DIMENSIONALS 7

Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow.

6. INTRODUCTION TO ADVANCED TOPICS (NOT FOR EXAMINATION PURPOSE) 7

Three dimensional problems – Mixed formulation – use of software packages.

Total : 45

Text Book

1. J.N.Reddy, “An Introduction to Finite Element Method”, McGraw-Hill, Intl. Student Edition, 1985.

References:

1. Rienkiewics, “The finite element method, Basic formulation and linear problems”, Vol.1, 4/e, McGraw-Hill, Book Co.
2. S.S.Rao, “The Finite Element Method in Engineering”, Pergaman Press, 1989.
3. C.S.Desai and J.F.Abel, “Introduction to the Finite Element Method”, Affiliated East West Press, 1972.

CE065 ELECTRONIC SURVEYING

1. BASICS 15

Methods of measuring distance, historical development, basic principles, classifications, applications and comparision with conventional surveying. Fundamental of electronics, resonant circuits, semiconductors, Lasers, Cathode ray tube, photo multiplier tube, transducers, oscillators, frequency mixing, modulation and demodulation, Kerrcell modulator, measurement of phases difference, reflectors and power sources.

2. PROPAGATION OF ELECTROMAGNETIC WAVES 15

Definition, classification, applications, Propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting, computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions, reference refractive index for microwaves, measurements of atmospheric parameters, mean refractive index, real time application of first velocity correction, second velocity correction and total atmospheric correction.

3. ELECTROMAGNETIC DISTANCE MEASURING SYSTEM 15

Electro-optical system, measuring principle, working principle, sources of error, infrared EDM instruments, Laser EDM instruments and total station. Microwave system measuring principle, working principle, sources of error, microwave EDM instruments, comparision with Electro-optical system, care and maintenance of EDM instruments, Modern Positioning Systems.

L : 45 Total : 45

REFERENCES

1. Burnside, C.D. Electromagnetic distance measurements Crosby Lock wood staples, U.K. 1991.
2. Rueger, J.M. Electronic Distance Measurements, Springer-Verlag Berlin, 1990.
3. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc., 1993.
4. Soastamoinen, J.J. Surveyor’s guide to electro-magnetic Distance Measurement, Adam Hilger Ltd., 1997.

HS 041 ENGLISH - I **3 1 0 100**

1 **LISTENING** **7**

Listening comprehension – listening for specific information – note – taking -use of charts and diagrams.

2 SPEAKING **7**

Defining – describing objects – describing uses/functions – comparing- offering suggestions – analyzing problems and providing solutions – expressing opinions (agreement/disagreement) predicting – expressing possibility/certainty – framing questions – providing answers – pronunciation practice (word stress).

3 READING **12**

Skimming – scanning – detailed reading – predicting content – interpreting charts and tables – identifying stylistic features in texts – evaluating texts -understanding discourse coherence – guessing meaning from the context -note – making/transferring information.

4 WRITING **12**

Sentence definition - static description – comparison and contrast – classification of information – recommendations – highlighting problems and providing solutions – formal and informal letter writing – using flow – charts/diagrams - Paragraph writing – editing.

5 FOCUS ON LANGUAGE **7**

Word formation with prefixes and suffixes – discourse markers and their functions– degrees of comparison – expressions relating to recommendations and comparisons – active and passive voice – antonyms – tense forms – gerunds – condition sentences – modal verbs of probability and improbability – acronyms and abbreviations – compound nouns and adjectives – spelling – punctuation.

L = 45 T = 15 Total = 60

TEXT BOOK

1. **"**English for Engineers and Technologists", Volume I. *Authors*: Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd., 1990.

REFERENCES

1. Narayanaswami.V.R. Strengthen, 'Your Writing', Orient Longman Ltd., Chennai 1996 (Revised Edition).
2. Pickett and Laster, 'Technical English, Writing, Reading and Speaking' New York Harper and Row Publications.
3. Swan, Michael, 'Basic English Usage', Oxford University Press, 1984.

HS 042 ENGLISH - II **3 1 0 100**

1. LISTENING **7**

Listening comprehension – listening for specific information – note –taking – using non-verbal devices

2. SPEAKING **7**

Describing processes – stating purpose – offering opinions, suggestions and recommendations – summarizing – reporting – free discussion of chosen topics – pronunciation practice (word stress, consonant clusters – homonymns**)**

3. READING **12**

Skimming – scanning – note –making – understanding the organization of texts – discourse cohesion – predicting and evaluating content – evaluating style – inferring meaning – study – reading – interpreting tables, flow-charts

4. WRITING **12**

Extended definition – process description – cause and effect analysis – stating choice and justifying it – safety instructions – check list – letter of application – data sheet/resume

5. FOCUS ON LANGUAGE AND FUNCTIONS **7**

Word formation – synonyms – prepositions – adverbs – passive voice – sequence words/discourse markers – connective adverbs – numerical expressions – expansion of abbreviations – rules for writing SI units – language of instructions, checklists, cause and effect, purpose and means – indefinite adjectives of number and quantity – spelling and punctuation

L = 45 T = 15 Total = 60

TEXT BOOK

1. **"**English for Engineers and Technologists", Orient Longman, 1990 Volume II. *Authors:* Humanities and Social Sciences Department, Anna University, Published by Orient Longman Ltd., 1990

REFERENCES

1. Swales, John.M., and Christine B Feak, Academic Writing for Graduate Students, The University of Michigan Press, USA, 1994.
2. Goddard, Ken, ' Informative Writing – Your Practical Guide to Effective Communication', Cassell Publication, U.K., 1998
1. Cutts, Martin, 'The Plain English Guide – How to Write Clearly and Communicate Better' , Oxford University Press, New Delhi, 1995.

PH 126 PHYSICS LABORATORY **0 0 2 100**

1. Young's modulus by non-uniform bending.
2. Rigidity modulus and moment of inertia using Torsion Pendulum.
3. Viscosity of a liquid by Poiseuille's method.
4. Wavelength determination using grating by spectrometer.
5. Particle size determination by Laser.
6. Thermal conductivity by Lee's disc.
7. Thickness of wire by Air wedge.
8. Thermo emf measurement by potentiometer.

P = 30, TOTAL = 30

CM132 CHEMISTRY II **3 0 0 100**

1. ORGANIC REACTIONS AND THERMO CHEMISTRY **12**

Organic reactions and mechanisms – Law of mass action – Enthalpy, entropy and free energy – Industrial enthalpy balances – Free energies of metallic compounds – Ellingham diagram – Metallurgical and multicomponent equilibria – Phase rule of metallurgical reactions – Refractory materials.

2. POLYMER AND CERAMIC MATERIALS **8**

Commodity and Engineering plastics – Polymer blends and alloys - Moulding compounds – powder, DMC, SMC, liquid resin – Composites – Fibres Ceramics – Glass.

3. ELECTRO CHEMISTRY **10**

Principles – Reversible and irreversible cells – Electromotive series – Electro winning – metallurgy – Applications – Sensors – Electrochemical machining – Metal processing – Corrosion and its prevention.

4. EXTRACTIVE METALLURGY AND ALLOYS **10**

Ores – Ore dressing – Extraction processes – Alloys – Phase diagrams – Iron–Carbon systems – Heat treatment – Non ferrous and special alloys.

5. POWER METALLURGY **5**

Principles – Compacting and sintering methods – Applications.

TOTAL : 45

TEXT BOOKS

1. Dara S.S., " A text book of Engineering Chemistry ", S.Chand and Company Ltd., New Delhi, 1996.

REFERENCES

1. Christopher, Brett M.A. "Electrochemistry, Principles, methods and applications, Oxford University Press, 1993.
2. Raymond A. Higgins, "Engineering Metallurgy", Part I, "Applied Physical Metallurgy", ELBS, 1983.
3. Everett R.K., Arsenault R.J., "Metal matrix composites mechanisms and properties", Academic Press, 1991.
4. Utracki L.A., "Polymer alloys and blends", Hanser Publishers, 1990.

CE071 PRINCIPLES OF ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 100

1. COMPONENTS OF ENVIRONMENT 9

Components – Water, air and land – Inter-relationship between components – Subcomponents; Ecosystem – Structure and functional components of ecosystem – Development and evolution of ecosystem – Energy flow and material cycling in ecosystem – Natural and man made impacts on water, air and land; Environment and development – Concept of sustainable development.

2. SCIENCE OF ENVIRONMENT 9

Chemistry, Physics and biology of water, air and land; Stress on the Chemistry, Physics and Biology of water, air and land owing to the impacts; Environmental quality objective and goals – Policies on development projects and their impacts, with emphasis on the branch of engineering of the student.

3. CURRENT ENVIRONMENTAL ISSUES 9

Current Environmental issues at Country level – management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste – Air pollution due to industries and vehicles; Global issues – Biodiversity, Climatic change, Ozone layer depletion.

4. ENGINEERING INTERVENTIONS TO REDUCE THE ENVIRONMENTAL STRESSES 9

Minimisation of Stress – Principles of Physics, chemistry and biology in engineering interventions such as waste treatment – Flow sheets of engineering interventions relevant to the Engineering discipline of the student – Waste minimisation techniques – Clean technology options – Standards of performance of the interventions.

5. (A) TOOLS FOR ENVIRONMENTAL MANAGEMENT 9

Environmental impact assessment; Precautionary Principle and Polluter Pays Principle; Constitutional provisions, Legal and economic instruments in Environmental Management; Role of Non-government organisations – Community participation

environmental management works; International conventions and protocols; Pollution Control Boards and Pollution Control Acts.

(b) Field Study

In-depth study of environmental issues at least one environmentally sensitive site relevant to the discipline of the student and preparation of a report thereupon.

Total : 45

Text Books:

1. G.M.Masters, Introduction to Environmental Engineering & Science, Prentice Hall, New Delhi, 1997
2. J.G. Henry and G. W. Heike, Environmental Science & Engineering", Prentice Hall International Inc., New Jersy, 1996.

References:

1. S. K. Dhameja, Environmental Engineering and Management, S. K. Kataria and Sons, New Delhi, 1999.
2. State of India's Environment – A Citizen's Report, Centre for Science and Environment and Others, 1999
3. Shyam Divan and Armin Rosancranz, Environmental Law and Policy in India, Cases, Materials and Statutes, Oxford University Press, 2001.

CE 434 ENGINEERING SOCIOLOGY 3 0 0 100

1. Individual – Society – Civilisation – Historical perspective – Relation between Individual and Society – Theories – Personal needs and Societal needs as related to development of Technology 9

2. Evolution of Society – Ancient Society – Development of Science and Technology based on Societal needs – Examples from Ancient Civilisations. **9**

3. Agriculture and Industrial Development – Technological changes and their influence on social, economic and political systems – Industrial Revolution – Fall out – Recession and Impact on Society **9**

4. Knowledge and Information revolution – Basic influence on rural and urban development strategies – Feature of society to individual relationship. **9**

5. Civil Engineering from ancient civilizations to modern times – Impact of development in the area of civil engineering on individual and society – Importance of considering societal needs – Interaction with society at different stages of planning and implementation – participating management – professional ethics. **9**

TOTAL : 45 hrs

Text Books:

1. Ramakrishna Mukherjee, Society Culture Development, Sage Publications, India Pvt. Ltd. Madras 1991.

2. Oommen T.K. State and Society in India, Sage Publications, India Pvt. Ltd. Madras 1990

References:

1. William Fogburn and Meyar F.Nimkoff; A Hand Book of Sociology, Routledge and Kegan Paul Ltd., 1994.

2. Harry Gld, The Sociology of Urban Life, Prentice Hall Inc., New York 1992.

GE406 TOTAL QUALITY MANAGEMENT 3 0 0 100

1. INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES 9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS 9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

4. QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TEXT BOOK:

1. Dale H.Besterfiled, et at., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).

REFERENCES:

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. “Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. “Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. “Total Quality Management for Engineers Wood Head Publishers, 1991.