B. TECH
CURRICULUM
AND
SYLLABUS

Semester I

Code	Subject	L	T	P	C
HSS 101	English for Technical Communication I	2	0	0	2
MAT101	Mathematics I	3	0	0	3
PHY 101	Physics I	3	0	0	3
CHY 103	Chemistry	3	0	0	3
CIV 101	Basic Civil and Mechanical Engineering	4	0	0	4
MEC 101	Engineering Drawing	1	0	3	2
MEC 181	Work Shop	0	0	3	1
CHY 181	Chemistry Laboratory	0	0	3	1
	Total	16	0	9	19

Semester II

Code	Subject	L	T	P	C
HSS 102	English for Technical Communication II	2	0	0	2
MAT 102	Mathematics II	3	0	0	3
PHY 103	Physics II	3	0	0	3
EEE 101	Basic Electrical and Electronics Engineering	4	0	0	4
CHY 101	Environmental Sciences	2	0	0	2

CSE 102	Programming Lanugages	2	0	0	2
MEC 103	Engineering Mechanics	3	0	0	3
PHY 181	Physics Laboratory	0	0	3	1
CSE 181	Programming Language Laboratory	0	0	3	1
	Total	19	0	6	21

Semester III

Code	Subject	L	T	P	C
MAT 201	Mathematics III	3	0	0	3
HSSXXX	Humanities Elective I	3	0	0	3
CIV 201	Mechanics of Solids	3	1	0	4
CIV 202	Fluid Mechanics	3	1	0	4
CIV 203	Surveying	3	0	0	3
CIV 204	Geology & Building Materials	3	0	0	3
CIV 285	Computer Aided Building Drawing	0	0	3	2
CIV 282	Fluid Mechanics Laboratory	0	0	3	2
CIV283	Surveying Laboratory I	0	0	3	2
	Total	18	2	9	26

Semester IV

Code	Subject	L	T	P	C
MAT 211	Numerical Methods	3	0	0	3
CIV 205	Strength of Materials	3	1	0	4
CIV 206	Hydraulics & Hydraulic Machinery	3	1	0	4
CIV 207	Concrete Technology	3	0	0	3
CIV 208	Mechanics of Soils	3	1	0	4
CIV 209	Water Supply Engineering	3	0	0	3
CIV 284	Advanced Surveying Laboratory	0	0	3	2
CIV 281	Strength of Materials Laboratory	0	0	3	2
CIV 286	Soil Mechanics Laboratory	0	0	3	2
	Total	18	3	9	27

Semester V

Code	Subject	L	T	P	C
CIV 3XX	Department Elective I	3	0	0	3
	Minor Elective I	3	0	0	3
CIV 301	Structural analysis	3	1	0	4
CIV 302	Transportation Engineering I	3	0	0	3

CIV 303	Design of Concrete Structures	3	1	0	4
CIV 304	Geotechnical Engineering	3	0	0	3
CIV 305	Sanitary Engineering	3	0	0	3
CIV 381	Environmental Engg Laboratory	0	0	3	2
CIV 382	Construction Laboratory	0	0	3	2
	Total	21	2	6	27

Semester VI

Code	Subject	L	T	P	C
HSSXXX	Humanities Elective II	3	0	0	3
CIV 3XX	Department - Elective II	3	0	0	3
	Free Elective I	3	0	0	3
	Minor Elective II	3	0	0	3
CIV 306	Irrigation Engineering	3	0	0	3
CIV 307	Design of Steel Structures	3	1	0	4
CIV 308	Transportation Engineering II	3	0	0	3
CIV 383	Irrigation & Environmental Engineering Design and Drawing Laboratory	0	0	3	2
	Total	21	1	3	24

Semester VII

Code	Subject	L	T	P	C
HSS 4XX	Humanities Elective III	3	0	0	3
	Free Elective II	3	0	0	3
CIV 4XX	Department Elective III	3	0	0	3
CIV 4XX	Department Elective IV	3	0	0	3
CIV 401	Estimating and Costing	3	0	0	3
CIV 402	Earthquake Resistant Design of Structures	3	0	0	3
CIV 481	Computer Aided Design & Drawing	0	0	3	2
	Total	18	0	3	20

Semester VIII

Code	Subject	L	T	P	C
	Self study Elective	3	0	0	3
CE499	Project Work	0	0	26	10
	Total	3	0	26	13

TOTAL – 177 Credits

MAJOR ELECTIVES

Code	Subject	L	T	P	C
CIV351	Principles of Architecture	3	0	0	3
CIV352	Construction Techniques And Practices	3	0	0	3
CIV353	Hydrology	3	0	0	3
CIV354	Ground Water Engineering	3	0	0	3
CIV355	Introduction to Remote Sensing	3	0	0	3
CIV356	Higher Surveying Techniques	3	0	0	3
CIV362	Advanced Structural Analysis	3	0	0	3
CIV363	Design of Masonry and Timber Structures	3	0	0	3
CIV364	Computational Methods in Civil Engineering	3	0	0	3
CIV365	Ground Improvement Techniques	3	0	0	3
CIV366	Geographic Information systems	3	0	0	3
CIV367	Air Pollution & Control	3	0	0	3
CIV368	Ecological Engineering	3	0	0	3
CIV369	Environmental Impact Assessment	3	0	0	3
CIV370	Planning and Design of Building Services	3	0	0	3
CIV451	Rehabilitation of structures	3	0	0	3
CIV452	Advanced Concrete Design	3	0	0	3
CIV453	Smart Structures And Smart Materials	3	0	0	3
CIV454	Pre-stressed Concrete Structures	3	0	0	3
CIV455	Finite Element Techniques	3	0	0	3
CIV456	Soil Dynamics And Machine Foundations	3	0	0	3

CIV457	Rock Mechanics	3	0	0	3
CIV458	Reinforced Soil Structures	3	0	0	3
CIV459	Irrigation water Management	3	0	0	3
CIV460	Highway And Airport Pavement Systems	3	0	0	3
CIV461	Traffic Engineering	3	0	0	3
CIV462	Computer Applications in Traffic Engineering	3	0	0	3
CIV463	Solid Waste Management	3	0	0	3
CIV464	Industrial Waste Water Management	3	0	0	3
CIV465	Solid And Hazardous Waste Management	3	0	0	3
CIV466	Professional Practices in Civil Engineering	3	0	0	3
CIV467	Housing Planning And Management	3	0	0	3
CIV468	Construction Planning & Management	3	0	0	3

MINOR ELECTIVES

Code	**Subject**	**L**	**T**	**P**	**C**
CHE311	Corrosion Science and Engineering	3	0	0	3
MEC308	Mechatronics	3	0	0	3
MEC323	Materials Management	3	0	0	3
MEC326	Composite Material Science	3	0	0	3
EEE365	Electrical Machines	3	0	0	3
ECE201	Electron Devices	3	0	0	3
CSE206	Object Oriented Programming	3	0	0	3
INT355	Internet and Web Technology	3	0	0	3

HUMANITIES ELECTIVES

Code	Subject	L	T	P	C
HSS001	Total Quality Management	3	0	0	3
HSS002	Engineering Management	3	0	0	3
HSS003	Indian Economic Development	3	0	0	3
HSS004	Industrial Psychology	3	0	0	3
HSS006	Professional Ethics	3	0	0	3
HSS008	Basics of Economics	3	0	0	3
HSS010	International Trade and Finance	3	0	0	3
HSS011	Information Systems for Managerial Decision Making	3	0	0	3
HSS013	Cost Analysis and Control	3	0	0	3
HSS014	Marketing Management	3	0	0	3
HSS015	Management Concepts and Techniques	3	0	0	3
HSS016	Organizational Psychology	3	0	0	3
HSS017	International Economics	3	0	0	3
HSS018	Communication Skills	3	0	0	3
HSS019	Operations Research	3	0	0	3
HSS020	Human Resource Management	3	0	0	3
HSS022	Banking Theory	3	0	0	3
HSS023	Entrepreneurship Development	3	0	0	3
HSS024	Industrial Psychology	3	0	0	3
HSS031	English Advance Level	3	0	0	3

SEMESTER I

		L	T	P	C
HSS101	ENGLISH FOR TECHNICAL COMMUNICATION I (Common to all branches)	2	0	0	2

FOCUS ON LANGUAGE

Parts of speech - Nominal compounds, noun phrases - Relative pronoun - Adjective - numerical, comparison and contrast, collocation and word combinations - Verb - Preposition and relative - Conjunction- connectives, expressions of purpose and function, cause and effect - Articles - adjectives - Sentence pattern - Tenses - Voice - Rewriting the sentences in impersonal/abbreviated passive grammatical structures - Concord - sentence level verb noun agreement - Gerund - rewriting infinitive into gerund - Imperative - rewriting imperative into recommendation using should - Word formation - varied grammatical function of the same word - Affixes - prefix and suffix, number prefix, negative prefix - Reported speech - Editing strategies - Conditional structures - real, unreal, no possibility, zero condition - Writing formal definition - Abbreviation and acronym - Idioms and phrases - Varieties of English - British versus American.

LISTENING SKILLS

Comprehension practice - Vocabulary development - Familiarity to varied types of spoken English and accents - Developing ability to understand audio and video media - Aiming at overcoming barriers to listening - Listening to documentaries, radio news broadcasts, TV news telecasts - Active listening in discussions and to lectures - Taking notes while listening - Extracting information from listening.

SPEAKING SKILLS

Oral practice - Role play - Interplay - Seminar - Transcoding visual into oral - Participating in short and longer conversation - Voice record, replay, correction of intonation, pronunciation and flow of speech - Phonemes - vowels, consonants, stress, rhythm, intonation - Group discussion - Participative learning - Acquiring proficiency, fluency, accuracy in oral communication - Speaking practice - Developing confidence - Extempore speech - Learning professional/conversational etiquette.

READING SKILLS

Vocabulary Extension - Improving vocabulary - Intensive reading - Reading Strategies - identifying topic sentence - guessing meaning from content - picking out specific information - professional reading - Reading practice - Predicting the content, critical and analytical reading - Reading articles in English newspapers, sports magazines, encyclopedias - Reading aloud, use of stress and intonation - Reading and comprehending technical materials - Cloze reading.

WRITING SKILLS

Discourse cohesion - Improving writing skills, avoiding common grammatical errors in academic writing - Extending the hints - Writing shorter sentences - Punctuation - Dialogue writing - Paragraph writing, problems and solutions, achieving coherence, transition words, sequence words - Essays of descriptive and argumentative - Writing instructions, use of imperatives - Jumbled sentences into sequential paragraph using linguistic clues - Report writing - technical reports, industry visit reports, events reports - Writing recommendations - Letter writing - formal and informal letters - job application and resume, permission for in-plant training, business correspondence letters, calling for quotation, placing order, lodging complaint, persuasive letters - Assignment writing - Mini-

project - Transcoding - transferring of information from text to pictorial/graphical representation and vice versa.

TEXT BOOK

1. Rizvi M Ashraf, Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.

REFERENCES

1. Daniel Jones, English Pronouncing Dictionary, Universal Book Stall, New Delhi, 17th Edition, 2000.
2. Geoffrey Leech, Fan Svartvik, A Communicative Grammar of English, Pearson Education Asia, 1994.
3. Hornby, AS, Oxford Advanced Learner's Dictionary of Current English, OUP, 7th Edition, 2005.
4. Manivannan G, English for Engineers - A Book on Scientific and Technical Writing, Govi Publications, 2005.
5. Martin Cutts, Plain English Guide - How to Write Clearly and Communicate Better, Oxford University Press, 1999.

MAT101	MATHEMATICS I (Common to all Branches)	L	T	P	C
		3	0	0	3

MATRICES

Review of Linear algebra-Matrix operations - Addition, Scalar Multiplication, Multiplication, Transpose, Adjoint and their properties- Special types of matrices - Null, Identity, Diagonal, Triangular, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary, Normal- Rank- consistency of a system of linear equations- Solution of the matrix Equation Ax = b - Row-reduced Echelon form.

EIGEN VALUE PROBLEMS

Eigen value and Eigen vector of real matrix – properties of Eigen values and Eigen vectors – Cayley- Hamilton theorem – Orthogonal

transformation of a real symmetric matrix to diagonal form – reduction of quadratic form to canonical form by orthogonal transformation – index, signature and nature of quadratic form.

DIFFERENTIAL CALCULUS

Review of limits - continuity and differentiability - Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature-evolutes - involutes - envelopes - partial differentiation –Euler's theorem for homogeneous functions-total differential – Taylor's expansion (two variables) - Maxima / Minima for functions of two variables – Method of Lagrangian multiplier – Jacobians.

THREE DIMENSIONAL ANALYTICAL GEOMETRY

Direction cosines and ratios – Angle between two lines – Equations of a plane – Equations of straight line – coplanar lines – shortest distance between two skew lines – sphere – tangent plane – plane section of a sphere – orthogonal spheres.

ORDINARY DIFFERENTIAL EQUATIONS

Solutions of second and higher order linear Ordinary Differential Equations with constant coefficients – Cauchy's and Legendre's linear equations - Simultaneous first order linear equations with constant coefficients - Method of variation of parameters.

TEXT BOOKS

1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 8th Edition, 2001.
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Engineering Mathematics Volume I, Scitech Publications (India) Pvt. Ltd., Chennai, 2nd Edn., Reprint 2000.

REFERENCES

1. Grewal, B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 37th Edition, 5th Reprint 2004.
2. Venkataraman, M. K., Engineering Mathematics First Year, The National Publishing Company, Chennai, 2nd Edition, Reprint 2001.

PHY 101	PHYSICS I (Common to all branches)	L	T	P	C
		3	0	0	3

ACOUSTICS AND STRUCTURE OF SOLIDS

Classification of sound- Reverberation, Sabine's formula, Common acoustical defects and remedies. Classification of solids- Crystal structures, X-ray diffraction, crystal growth, Crystal defects.

LASER AND FIBRE OPTICS

Interaction of radiation with matter –quantum mechanical view, three and four Level laser system, Engineering and medical applications -Introduction of fibre optics- classification of fibre, Engineering and medical applications

QUANTUM PHYSICS

Inadequacy of classical mechanics –Black body radiation, Plancks law, Photoelectric effect, Compton Effect, Einstein's photoelectric equation, Schrödinger wave equation, Particle in one, three dimensional box.

NON-DESTRUCTIVE TESTING, NEW ENGINEERING MATERIALS

Ultrasonic, Ultrasonic flaw detectors - X-ray photography – Fluoroscopy – Thermography - Gamma ray spectroscopy - Characterization technique Nanophase materials – Biomaterials - Non linear materials - Polymer materials.

DIGITAL ELECTRONICS

Introduction, Analog to Digital circuits, Conversion of numbers one's complement, 2's complement, Logic gates, Boolean algebra, DeMorgan's theorem, Karnaugh's maps.

TEXT BOOK

1. Gaur, R. K., and Gupta, S. L., Engineering Physics, Dhanpat Rai Publishers, New Delhi, 2001.

REFERENCES

1. Murthy, V.S.R.., Jena, A.K., Gupta, K.P., and Murthy, G.S., Structures and Properties of Engineering Materials, Tata McGraw Hill Publishing company Limited, New Delhi, 2003.
2. Ali Omar, M., Elementary Solid State Physics, Pearson Education (Singapore), Indian Branch, New Delhi, First Edition, 2006.
3 William F. Smith., Foundations of materials science and Engineering, McGraw-Hill, New York, 3rd Edition, 2003.
4. Mathews, P.M., Venkatesan. K., Text Book of Quantum Mechanics, Tata McGraw Hill Company, Delhi, 2003.
5. Gupta S.L., Kumar.V, Hand book of Electronics, Pragati Prakashan, Meerut, 28th Edition, 2001.

CHY103	CHEMISTRY	L	T	P	C
		3	0	0	3

WATER

Water quality parameter (industry and drinking water) definition – classifications – expressions – units of hardness of water with respect to $CaCO_3$ – problems - Estimation of hardness by EDTA method (theory only) - definition of alkalinity (theory only) – water softening – Zeolite process – demineralization – (Ion – exchange process) – Desalination - reverse osmosis – domestic water treatment.

CORROSION SCIENCE AND CONTROL ENGINEERING

Corrosion – causes of Corrosion - Principles of dry and wet Corrosion - Factors Influencing Rate of corrosion – Types of corrosion – Corrosion control – Impressed current cathodic protection and sacrificial anodic protection method - Corrosion inhibitors – Protective coating (Organic coatings only).

HI-TECH POLYMERS AND COMPOSITES

Introduction – Classification – Difference between thermoplastic and thermosetting plastic – Properties of plastic - Degree of polymerization – Types of polymerization (Mechanism)- Phenol formaldehyde resin – epoxy resin – Polyurethanes – TEFLON- Amino resins – (Urea Formaldehyde, Nylon.11, Nylon.6:6 & Nylon 6) PET, PVC) – Composites – Definition –Characteristics- Constituent – Types- Fibre reinforced plastics (FRP) – Metal Matrix Composites (MMC) – Ceramic Matrix Composites (CMMC) – Properties and applications.

INSTRUMENTAL METHODS OF ANALYSIS

Electro magnetic radiation – Absorption of radiation - Beer - Lambert's Law - UV-VIS. Spectroscopy – IR Spectroscopy principle and instrumentation (Black diagram only) Estimation of iron by colorimetry – Flame photometry- principle and instrumentation (Black Diagram Only) - Estimation of Na by flame photometry - Atomic absorption spectroscopy – Principle and instrumentation (Block diagram only) - Quantitative estimation of Ni by atomic absorption spectroscopy.

CHEMISTRY OF BUILDING MATERIALS

Cement – Chemical Composition – Setting And Hardening – Concrete – Weathering of Cement and Concrete and its Prevention – Refractory – Requisites – Classification – Common Refractory Bricks – Preparation, Properties of Silica Bricks – High Alumina Bricks – Magnetic Bricks Carbon Bricks – Zirconia Bricks and

Corborundum - Abrasives – Definition – Properties, Classification and Application Of Abrasives.

TEXT BOOK

1. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai Pub. Co. (P) Ltd., New Delhi, 2002.

REFERENCES

1. Puri, B.R., Sharma, L.R. and Madan, S., Pathania, Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co., Jalandhar, 2000.
2. Sharma, B.K., Industrial Chemistry, Goel Publishing House, Meerut.
3. Vogel A.I., A text book of Quantitative Inorganic Analysis, ELBS, London, 2000.

CIV 101	**BASIC CIVIL AND MECHANICAL ENGINEERING** (Common to all branches)	**L**	**T**	**P**	**C**
		4	**0**	**0**	**4**

CIVIL ENGINEERING

BUILDINGS

Characteristics of good building materials such as stones, bricks, plywood and ceramic tiles, timber, cement, aggregates and concrete - Basic functions of buildings – Major components of buildings – Foundations - Purpose of a foundation – Bearing capacity of soils – types of foundations. Proper methods of construction of Brick masonry – Stone masonry – Hollow Block masonry. Beams – Lintels – Columns – Flooring – Damp proof course – surface finishes – Doors and windows – Roofing.

TRANSPORTATION ENGINEERING

Principles and Classification of surveying, Chain surveying, Compass surveying and leveling - Importance of roads –

Classification of Highways –water bound macadam, bituminous and cement concrete roads –. Railways - Importance of railways – Gauges – Components of a permanent way. Bridges - Components of Culverts – Causeways, Slab Bridge, T-beam and slab bridge, Suspension bridge

MECHANICAL ENGINEERING

BOILERS AND TURBINES

Boilers - boiler mountings and accessories – Cochran boiler, Locomotive boiler, Babcock and Wilcox boiler, fire and water tube boilers - Steam turbine - single stage impulse turbine, Parson's reaction turbine, difference between impulse and reaction turbines.

POWER PLANTS AND INTERNAL COMBUSTION (IC) ENGINE

Classification of power plants – steam, nuclear, diesel and hydro power plants - Alternate sources of energy - solar, wind, tidal, geothermal, ocean thermal energy conversion. – IC engine - components, working of four and two stroke petrol and diesel engines.

PRODUCTION TECHNOLOGY

Metal casting and forming process –patterns, moulding, melting of cast iron, casting – forging – rolling – extrusion – drawing - Metal joining process - welding – arc welding, gas welding, brazing and soldering - Metal machining – lathe, drilling machine, milling machine, shaping machine, planing machine, introduction to Computer Numerical Control machining.

TEXT BOOK

1. Shanmugam, G,, and Palanichamy, M.S., Basic Civil and Mechanical Engineering, Tata McGraw Hill Publishing Co., New Delhi, 1996.

REFERENCES

1. Khanna, K., Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, New Delhi, 1997.
3. Venugopal K., Basic Mechanical Engineering, Anuradha Publications, Kumbakonam, 2000.
4. Shanmugam G., Basic Mechanical Engineering, Tata McGraw Hill Publishing Co.,New Delhi, 2001.

		L	T	P	C
MEC 101	**ENGINEERING DRAWING** (Common to all branches)	**1**	**0**	**3**	**2**

INTRODUCTION

Importance of graphics – use of drafting instruments – BIS conventions and specifications – size, layout and folding of drawing sheets – lettering dimensioning and scales - Orthographic principles - free hand sketching in first angle projection from pictorial views.

PROJECTION OF POINTS, STRAIGHT LINES AND PLANES

Projection of points, located in all quadrants - projection of straight lines located in the first quadrant, determination of true lengths and true inclinations, location of traces - projection of polygonal surface and circular lamina located in first quadrant inclined to one or both reference planes.

PROJECTION AND SECTION OF SOLIDS

Projection of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method. Section of above solids in simple vertical position by cutting planes inclined to any one of the reference planes, obtaining true shape of section.

DEVELOPMENT OF SURFACES

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones - development of lateral surfaces of combined solids – prism and cylinder, cylinder and cylinder with axes at right angles with no offset.

ISOMETRIC AND PERSPECTIVE PROJECTION

Principles of isometric projection – isometric view and projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray and vanishing point methods.

TEXT BOOK

1. Bhatt, N.D., Engineering Drawing, Charotar publishing House, New Delhi, 46th Edition, 2003.

REFERENCES

1. Nataraajan, K.V., A text book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 2006.
2. Shah, M.B., and Rana, B.C., Engineering Drawing, Pearson Education, New Delhi, 2005.
3. Gopalakrishnana, K.R., Engineering Drawing (Vol. I and II), Subhas Publications, 1998.
4. Luzadder and Duff, Fundamentals of Engineering Drawing, Prentice Hall of India Pvt Ltd, New Delhi, XI Edition, 2001.
5. Venugopal, K., Engineering Graphics, New Age International (P) Limited, 2002.

MEC181	WORK SHOP (Common to all branches)	L	T	P	C
		0	0	3	1

CARPENTRY

Carpentry tools - practice in marking, sawing, planing and chiseling – making simple joints: lap joint, T-joint, dovetail joint, mortise and tenon joint.

FITTING

Fitting tools - practice in marking, filing, punching, hacksawing - fitting to size and drilling - making of simple mating profiles: V, square, dovetail, half round joints.

SHEET METAL

Study of press, die and tools - sheet metal layout - development of lateral surfaces -simple exercises: blanking, forming, bending and flanging.

DRILLING

Drilling and tapping in drilling machines

DEMONSTRATION ON

i) Welding operations like butt joint and lap joints in Arc welding
ii) Foundry operations like mould preparation for split pattern
iii) Smithy operations like the production of hexagonal bolt
iv) Preparation of plumbing line sketches – basic pipe connections involving the fittings like valves, taps, couplings, unions, reducers, elbows and other components used in household fittings.

CHY181	CHEMISTRY LABORATORY (Common to all branches)	L	T	P	C
		0	0	3	1

1. Preparation of standard and buffer solutions.
2. Estimation of hardness of water sample by EDTA method.
3. Determination of dissolved oxygen in a sample of water.
4. Estimation of chloride ion in water sample.
5. Determination of alkalinity of water sample.
6. Estimation of hydrochloric acid by pH titration
7. Estimation of ferrous ion by potentiometric titration.
8. Estimation of mixture of acid by conductometric titration
9. Estimation of iron by spectrophotometric method.
10. Flame photometry – Determination of Na & K.

SEMESTER II

		L	T	P	C
HSS102	**ENGLISH FOR TECHNICAL COMMUNICATION II** (Common to all branches)	2	0	0	2

GRAMMAR AND VOCABULARY

Grammar and Vocabulary - Introduction to grammatical models - Proper use of tenses, concord, voice, articles, punctuation, and modal auxiliaries.

RECEPTION SKILLS

Listening and Language Development - Improving listening skills - comprehension practice - Comprehend classroom lectures, simple technically oriented passages - Listening to news bulletins, pre-recorded talks, different speech styles, comprehending the essential meaning - Physical and psychological barriers to listening - Steps to overcome the barriers - Practice in note-taking while listening.

SPEAKING TECHNIQUES

Speaking practice - Improving conversing skills - Improving self-expression - Developing confidence and fluency in oral communication - Physical and psychological barriers to speaking - Steps to overcome the barriers - Formal and public speaking practice - Extemporary talk practice - Speech process - fluency and accuracy in speech - Developing persuasive speaking skills - Conversation in a given milieu, social and cultural surroundings - Practice in giving small talks on local topics for a minute or two - Goal oriented group discussion - Participating in seminars - Independent and effective communication.

READING STRATEGIES

Reading comprehension - Vocabulary extension methods - Speed reading practice - technical and non-technical materials - Practice in various reading techniques - skimming, scanning, eye reading - Looking for specific information - Comprehending the given passages, technical information.

WRITTEN COMMUNICATION

Basic grammatical structures - Alphabet of other languages - Paragraph writing - Expressing the idea in writing - Avoiding and correcting common errors - Effective writing techniques - brevity, clarity, objectivity and simplicity - Discourse writing - definition, description, instruction - Note-making - Proof reading - Mechanics of writing - Writing formal, informal letters, Technical reports - Reference skills - using dictionary better.

TEXT BOOKS

1. Rizvi M Ashraf, Effective Technical Communication, Tata McGraw-Hill, 2005.
2. Rutherfoord Andrea J, Basic Communication Skills for Technology, Pearson Education, 2002.

REFERENCES

1. Deborah C Andrews, Margaret D Bickle, Technical Writing - Principles and Forms, Macmillan, 1978.
2. Manivannan G, English for Engineers - A Book on Scientific and Technical Writing, Govi Publications, 2005.
3. Sarah Freeman, Written Communication in English, Orient Longman, 2000.
4. Thomson A J & AV Martinet, A Practical English Grammar, OUP, 4th Edition, 1986.
5. Tom Hutchinson, Alan Waters, English for Specific Purpose, Cambridge University Press, 1987.

MAT 102	MATHEMATICS II (Common to all Branches)	L	T	P	C
		3	0	0	3

SEQUENCES AND SERIES

Convergence and divergence of infinite series – series of positive terms – comparison, D'Alembert's ratio, Raabe's and Cauchy's root tests – Convergence of alternating series – Leibnitz's test (proof of theorems and tests not included) – elementary notions of absolute and conditional convergence - Power series – Taylor's theorem(one variable).

ANALYTIC FUNCTION AND CONFORMAL MAPPING

Function of a complex variable – Analytic function – Necessary conditions – Cauchy – Riemann equations – Sufficient conditions (excluding proof) – Properties of analytic function – Harmonic conjugate – Construction of Analytic functions - Conformal mapping - w = z+a, az, 1/z, e^z, sin z, cos z and bilinear transformation – fixed points – cross ratio.

COMPLEX INTEGRATION

Statement and application of Cauchy's integral theorem and integral formula – Taylor and Laurent expansions – Isolated singularities – Residues - Cauchy's residue theorem - Contour integration over unit circle and semicircular contours (excluding poles on boundaries)- evaluation of real integrals using contour integration.

MULTIPLE INTEGRALS

Review of Riemann integrals - Double integration – Cartesian and polar coordinates – change of order of integration – change of variable between Cartesian and polar – area as double integral – Triple integration in Cartesian, cylindrical and spherical polar coordinates – volume as triple integral.

VECTOR CALCULUS

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proof) – Simple applications

TEXT BOOKS

1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 8th Edition, 2001.
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Engineering Mathematics Volume II, Scitech Publications (India) Pvt. Ltd., Chennai, 1st Edn., Reprint 2000.

REFERENCES

1. Grewal, B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 37th Edition, 5th Reprint, 2004.
2. Venkataraman, M. K., Engineering Mathematics, The National Publishing Company, Chennai, 2nd Edition, Reprint 2001.
3. Venkataraman, M. K., Engineering Mathematics –The National Publishing Company, Chennai, 11th Edition, Reprint 2002.

PHY 103	**PHYSICS II** (Common to Civil and Mechanical Engineering)	**L**	**P**	**T**	**C**
		3	**0**	**0**	**3**

THERMAL AND NUCLEAR PHYSICS

Mode of heat transfer - Thermal conductivity - Thermal diffusivity - Thermal insulations in buildings, application of heat transfer - Nuclear forces- Nuclear fission, Nuclear reactor uncontrolled chain reaction, Nuclear fusion .

CONDUCTING MATERIALS

Electron theory of solids – classical free electron theory, quantum free electron theory - Band theory of solids

SEMI CONDUCTING AND SUPER CONDUCTING MATERIALS

Semi conducting materials - Introduction, types of semi conducting materials, carrier concentration - Hall Effect –Determination of Hall coefficient - Superconducting Phenomena - Properties of superconductors, Type I and Type II superconductors, High T_c Superconductors, Application of super conductors.

MAGNETIC MATERIALS

Classical theory of magnetism quantum theory of paramagnetism, Ferromagnetism, Ferrites, Applications of magnetic materials.

DIELECTRIC MATERIALS AND OPTICAL MATERIALS

Polarization - Electronic, Ionic, Orientational and space charge polarization , Internal field and deduction of Clausius -Mosotti relation - Dielectric materials – properties, classification, insulating materials - Optical properties of semiconductor- imperfection of crystals, Luminescence , Fluorescence and phosphorescence - Light Emitting Diode, Liquid crystal displays.

TEXT BOOK

1. William F.Smith, Foundations of Materials Science and Engineering, McGraw-Hill, New York, 3rd Edition, 2003.

REFERENCES

1. Aswani K.G., A Text book of Material Science, S.Chand & Co., Ltd., New Delhi,2nd Edition, 2001.
2. Wahab M.A., Solid State Physics, Narosa Publishing House, New Delhi, Second edition, 1999.
3 Avadhanulu, M.N., Kshirsagar, P.G., A Text Book of Engineering Physics, S.Chand & Co. Ltd., New Delhi, 6th edition, 2003.
4 Pillai, S.O., Solid State Physics, 5th edition, New Age International Publication,New Delhi, 2003.

5 Ali Omar.M., Elementary Solid State Physics, Pearson Education (Singapore)Pvt. Ltd., Indian Branch, New Delhi, 2002.
6 Murthy, V.S.R., Jena, A.K., Gupta, K.P., and Murthy, G.S., Structure and Properties Of Engineering Materials, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2005.

		L	P	T	C
EEE101	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING** (Common to all branches)	**4**	**0**	**0**	**4**

ELECTRICAL CIRCUITS

Introduction to electric circuits – laws of electric circuits– Ohm's Law, Kirchoff's Laws– analysis of DC circuits–mesh, nodal – introduction to AC circuits– average Value, RMS value, power and power factor–analysis of 3 phase AC circuits – balanced and unbalanced circuits

ELECTRICAL MACHINES

DC Machines –principle of operation–DC generators–emf equation, characteristics, types– DC motors–shunt, series, compound– single phase transformer – principle of operation, emf equation, phasor diagram –induction motors–single phase, three phase–alternators– principle of operation, emf equation , characteristics

ELECTRICAL MEASUREMENTS

Moving coil –ammeter, voltmeter – moving iron instruments – ammeter, voltmeter – dynamometer – wattmeter, energy meter

BASIC ELECTRONICS

Semiconductor devices – introduction, construction, types – pn junction diode –working principle, characteristics– zener diode– working principle, characteristics uni–junction transistor– operation, characteristics –field effect transistor– operation, characteristics–

bipolar junction transistor– operation, characteristics–applications– half wave and full wave rectifiers

DIGITAL ELECTRONICS

Introduction to binary number system–logic gates –AND, OR, NOT, NAND, NOR, exclusive OR–boolean algebra– combinational circuits – half adder, full adder, half subtractor, full subtractor

INTEGRATED CIRCUITS

Operational amplifier–introduction, DC characteristics, AC characteristics–types of operational amplifier–inverting, non–inverting– applications– scalar, adder, Subtractor, differentiator, and integrator

TEXT BOOKS

1. Edward Hughes., Electrical &Electronics Technology, Pearson Education ltd, 9th edition, 2005.
2. Kothari.D.P.,and.Nagrath.I.J.,Basic Electrical Engineering, Tata McGraw Hill,2nd Edition.

REFERENCES

1. Malvino,A P., Electronic Principles, TataMcGraw Hill International, 1998.
2. Vincent Del tora.,Electrical Engineering fundamentals, Prentice hall of India , 2nd edition 2003.
3. Muraleedharan.K.A., Muthusubramanian .R., and Salivahanan .S., Basic Electrical and Electronics and Computer Engineering, Tata McGraw Hill, 1997.

CHY 101	ENVIRONMENTAL SCIENCES (Common to all branches)	L	T	P	C
		3	0	0	3

NATURAL RESOURCES

Definitions – Scope of Environmental Sciences - Forest Resource – Food Resource – Land Resource – Water – Mineral resources - Utilization of Natural Resource, Impact on Environment – Conservation of Natural Resources

ECOSYSTEM AND BIODIVERSITY

Concept – structure and function – energy flow in ecosystem – ecological succession – food chain – food web, ecological pyramids – biodiversity, definition, values, threats to biodiversity, conservation of biodiversity

ENVIRONMENTAL POLLUTION

Definition, causes, effects and control measures of air, water and soil pollution – thermal and nuclear pollution

MANAGEMENT OF ENVIRONMENTAL POLLUTION

Solid waste management – treatment methods adopted for municipal sewage and industrial effluent – hazardous and biomedical waste management

TOOLS FOR ENVIRONMENTAL MANAGEMENT

Environment impact assessment – precautionary and polluter pay principle – constitutional provision – (air, water and forest) – waste minimization techniques, cleaner technology options, bioremediation

TEXT BOOK

1. Dhameja, S.K., Environmental engineering and Management, S. K. Kataria and sons, New Delhi, 1st edition 2004

REFERENCES

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, 1st edition, 2001
2. Miller, T.G. Jr., Environmental Science, Wadsworth Publishing Co. USA, 2nd edition, 2004
3. Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media., New Delhi, 2nd edition, 2004
4. Masters, G. M., Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi, 2nd edition, 1997
5. Henry, J. G., Heike, G. W., Environmental Science and Engineering, Prentice Hall International Inc., New Jersey, 1st edition, 2005

CSE102	PROGRAMMING LANGUAGES (Common to all branches)	L	T	P	C
		2	0	0	2

BASIC ELEMENTS OF C & CONTROL STATEMENTS

Introduction to C- Structure of C language – Lexical elements of C- Operators and Expressions-Operator precedence and associativity of operators -Input and Output Functions-Library Functions –Header Files-Simple Computational problems. Decision Making: if statement - if-else statement - else-if ladder - switch statement – Looping Control Structure - the break statement - ? : operator - Continue statement - goto statement – Problems using Control Structures.

FUNCTIONS, PROGRAM STRUCTURES & ARRAYS

Prototypes and Functions – Declaring, defining and accessing Functions- Parameter passing methods-Recursion - Storage Classes - Automatic Variables -External Variables – Static and Register Variables – Programs using functions. Defining and Processing an Array - Passing Arrays to Functions - Multidimensional Arrays - Arrays and Strings - Enumerated data types-Programs using sorting, searching and merging of arrays.

POINTERS, STRUCTURES & UNIONS

Pointer Fundaments - Pointer Declarations - Passing Pointers to Functions - Arrays and Pointers - Pointers and One-Dimensional Arrays - Pointers and Multidimensional Arrays - Operations on Pointers - Pointers and Structures - Dynamic Memory Allocation – Command Line Arguments – Programs using Pointers with Functions, Arrays and & Structures. Defining a Structure - Processing a Structure - User-Defined Data Types – Union – Nested structure - Structures and Pointers - Passing Structures to Functions - Self Referential Structures.

DATA FILES & DATA STRUCTURES

Opening and Closing a Data File - Creating a Data File - High Level File Operations - Processing and Updation of Data Files - Unformatted Data Files - Low Level Programming – File Handling Programs. Linked List – Creation, Insertion and Deletion of elements - Stack and Queue implementation using Linked List.

UNIX BASICS & SHELL PROGRAMMING

Shell Fundamentals - Shell Commands - Shell Decisions and Repetitions - Command line usage - Wildcard expansion - Redirection of I/O, pipes and filters. Shell Programming - Simple scripts - Specifying the interpreter - Shell variables - The Environment - Control flow; test, if, for, while, case - Command substitution - Signal catching - Shell functions - Aliases - Reading from the Standard I/P - Startup Files - basename and dirname - Expression evaluation.

TEXT BOOKS

1. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw Hill, Second Edition, 1996.
2. Lowell Jay Arthur and Ted Burns, UNIX Shell Programming, John Wiley & Sons Canada, Ltd, Fourth Edition, 1997.
3. Deshpande P.S, Kakde O.G, C & Data Structures , Dreamtech

Press, First edition, 2004

REFERENCES

1. Brian Kerninghan W, Dennis Richie M, The C Programming language, Pearson Education,2005.
2. Johnsonbaugh R.and Kalin M, Applications Programming in ANSI C, Pearson Education, Third Edition ,2003.
3. Behrouz A.Forouzan and Richard Gilberg F, A Structured Programming Approach Using C, Brooks-Cole Thompson Learning Publications, Second Edition, 2001.
4. Bruce Molay, Understanding UNIX/LINUX Programming: A Guide to Theory and Practice, Prentice Hall, First Edition, 2002.
5. Glass, G., Ables, K. UNIX for Programmers and Users, Prentice Hall, 1999.
6. Stephen Kochan and Patrick Wood, UNIX Shell Programming, Pearson Education, Third Edition, 2003.

MEC 103	ENGINEERING MECHANICS (Except CSE, IT and Bio-Tech)	L	T	P	C
		3	0	0	3

STATICS OF PARTICLES

Fundamental principles and concepts - vector algebra, Newton's laws, gravitation, force external and internal, transmissibility - velocity and acceleration - Couple- Moment about point and about axis - Varignon's theorem - resultant of concurrent and non-concurrent coplanar forces - static equilibrium, free body diagram, reactions - Problem formulation concept in 2-D and 3-D statics.

TRUSSES AND FRAMES

Trusses - assumptions, rigid and non-rigid trusses- simple trusses in plane and space- analysis by method of joints and by method of sections- compound trusses-statically determinate, rigid, and completely constrained - analysis of frames and machines.

FRICTION

Frictional forces- laws of friction- simple contact friction - rolling resistance - belt friction.

PROPERTIES OF SURFACES AND SOLIDS

Centroids of lines - areas, volumes, composite bodies - center of mass - area moment of Inertia - mass moment of inertia - principal moment of inertia.

DYNAMICS OF PARTICLES

Displacements, velocity and acceleration, their relationship – relative motion – Curvilinear motion – Newton's law – work Energy equation of particles – impulse and momentum – impact of elastic bodies.

TEXT BOOK

1. Beer, F.P., and Johnson, E.R., Vector Mechanics for Engineers – Statics and Dynamics, Tata McGraw Hill, New York, 2004.

REFERENCES

1. Merriam, J.L., Engineering Mechanics, Volume I – Statics, and Volume – II, Dynamics 2/e, Wiley International,1998.
2. Irving , H., Shames, Engineering Mechanics, Statics and Dynamics, Third Edition, Prentice Hall of India Pvt. Ltd., 1993.

PHY 181	PHYSICS LABORATORY (Common to all Branches)	L	T	P	C
		0	0	3	1

1. To determine the acceleration due to gravity using Compound Pendulum
2. To determine the Rigidity Modulus of wire using Torsional Pendulum
3. To find thickness of the given two glass plates using single optic lever

4. To determine the thermal conductivity of a bad conductor – Lee's disc method.
5. To determine the refractive index of the material of the prism
6. To find the prominent wave length of mercury spectrum using grating
7. To determine the particle size using Laser
8. To determine the coefficient of viscosity of the liquid by Poiseuille's method
9. To determine the young's modulus of given material using Uniform Bending
10. To Determine the thickness of a given material using Air wedge method
11. To determine the focal length of a biconvex lens using Newton's Rings method
12. To determine the velocity of ultrasonic waves in the liquid using ultrasonic Interferometer.

CSE 181	**PROGRAMMING LANGUAGES LABORATORY** (Common to all branches)	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

WORD PROCESSING, SPREADSHEET, POWERPOINT

1. To create an advertisement in Word.
2. To illustrate the concept of mail merging in word.
3. To create a spread sheet to analyze the marks of the students of a class and also to create appropriate charts.
4. To create the presentation for the department using Power Point.

C PROGRAMMING

5. To write a simple menu driven calculator program using switch statement
6. To write a program to print Pascal's triangle.
7. To write a program for electricity bill preparation.

8. To write a program to print the sine and cosine series.
9. To print Fibonacci series up to N numbers.

ARRAYS AND FUNCTIONS

10. To write a program to perform Matrix multiplication**.**
11. To write a program to sort a given set of numbers.
12. To write a program to perform string manipulation manipulations function like string concatenations, comparison, find the length and string copy without using library functions.
13. To write a program to arrange names in alphabetical order.
14. To write a C program to check whether a number is palindrome or not using functions.
15. To write a program to calculate the factorial of the given number using functions.

POINTERS, STRUCTURES AND FILES

16. To print the mark sheet of n students using structures.
17. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array.
18. To write a program for find the average of numbers using files.
19. To write a program to merge the given two files arguments using command line arguments.

UNIX PROGRAMMING

20. Study of Basic UNIX Commands.
21. Implement ls Command.
22. Write a shell script to determine the properties of a given file.
23. Implement grep function.
24. Write a shell script to find the factorial of given number.
25. Write a shell script to evaluate the given expression using switch-case.

SEMESTER III

		L	T	P	C
MAT201	**MATHEMATICS III** (Common to Bio-Technology, Chemical Engg., Civil Engg., CSE, EEE, EIE and Mechanical Engg.)	**3**	**0**	**0**	**3**

LAPLACE TRANSFORM

Definition of Laplace Transform - Linearity property - condition for existence of Laplace Transform - First and Second Shifting properties - Laplace Transform of derivatives and integrals - Unit step functions - Dirac delta-function - Differentiation and Integration of transforms - Convolution Theorem - Inversion - Periodic functions - Evaluation of integrals by Laplace Transform - Solution of boundary value problems

PARTIAL DIFFERENTIAL EQUATIONS

Formation of PDE - Solution of standard types of first order PDE - Lagrange's linear equation - Linear PDE of second and higher order with constant coefficients

FOURIER SERIES

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine and cosine series - Complex form of Fourier series - Parseval's identity - Harmonic analysis

Z - TRANSFORM

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

FOURIER TRANSFORM

Fourier Integral formula - Fourier Transform - Fourier sine and cosine transforms - Linearity, Scaling, frequency shifting and time

shifting properties - Self reciprocity of Fourier Transform - Convolution theorem - Application to boundary value problems

TEXT BOOKS

1. Kreyszig, E, Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 8th Edition, 2001
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Engineering Mathematics Volume II, Scitech Publications (India) Pvt. Ltd., Chennai, 1st Edition, Reprint 2000, 1999

REFERENCES

1. Grewal , B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 37th Edition, 5th Reprint 2004
2. Venkataraman, M. K., Engineering Mathematics -III A, The National Publishing Company, Chennai, 11th Edition, Reprint 2002
3. Venkataraman, M. K., Engineering Mathematics - III B, The National Publishing Company, Chennai, 13th Edition, Reprint 1999

CIV 201	MECHANICS OF SOLIDS	L	T	P	C
		3	1	0	4

STRESS, STRAIN AND DEFORMATION IN SOLIDS

Tension, compression and shear stresses – Hooke's law – Stress–strain diagram for mild steel – Ultimate stress and working stress – Elastic constants and relationships between them – Composite bars – Temperature stresses – Strain energy due to axial load – Stresses due to suddenly applied load and impact load.

TWO DIMENSIONAL STATE OF STRESS

Two dimensional state of stress at a point – Normal and shear stresses on any plane – Principal planes and principal stresses –

Graphical treatment – Two dimensional states of strains at a point – Principal strains and their directions.

BENDING OF BEAMS

Types of beams – Types of supports – Types of loads - Shear force and bending moment at any cross section of a beam –shear force and bending moment diagrams for cantilever, simply supported and over hanging beams for all types of loading – Relationship between load, shear force and bending moment.

STRESSES IN BEAMS

Theory of simple bending – Analysis for bending stresses – Load carrying capacity of beams – Proportioning of sections – Flitched beams – Strain energy due to bending moment – Shear stress distribution – Strain energy due to shear force.

ANALYSIS OF TRUSSES

Analysis of plane trusses by method of joints, method of sections, tension co-efficient method and graphical method.

TEXT BOOKS

1. Popov, E.P., Engineering Mechanics of solids, Prentice Hall of India, New Delhi, 1996.
2. Punmia, B.C., Strength of Materials, Laxmi Publications, 1992.

REFERENCES

1 Kazimi, S.M.A., Solid Mechanics, Tata McGraw –Hill Book company Ltd., New Delhi, 1998.
2. William Nash, Strength of Materials, Mcgraw-Hill International, Singapore, Indian edition, New Delhi, Fourth edition, 2004.

CIV 202	FLUID MECHANICS	L	T	P	C
		3	1	0	4

FLUID STATICS

Definitions - Continuum concept – Units and dimensions - Fluid Properties – Classification of fluids

Fluid Pressure and its measurements (manometers) - forces on immersed plane and curved surfaces – buoyancy - Metacentric height – fluid mass under relative equilibrium.

KINEMATICS OF FLUIDS

Lagrangian and Eulerian methods – Classification of fluids - Streamlines, path lines and streak lines - Continuity equation - Velocity potential and Stream function – Flow nets.

FLUID DYNAMICS

Euler and Bernoulli's equation – Application of Bernoulli's equation – Flow measurement – Laminar flow through parallel plates and pipes – Darcy-Weishbach friction factor – Turbulent flow.

PROBLEMS IN PIPE FLOW

Major and minor losses in pipe flows – Pipes in series and parallel – Pipe networks

MISCELLANEOUS TOPICS

Concept of boundary layer theory – simple applications – introduction to open channel flows – introduction to hydraulic machines.

TEXT BOOKS

1. Arora, K.R.,Fluid Mechanics, Hydraulics and Hydraulic Machines, Standard Publishers andDistributors, New Delhi, 9th Edition, 2005.

2. Bansal, R.K., Mechanics of Fluids, Laxmi Publications, Pvt. Ltd, New Delhi, 1st Edition, 2005.

REFERENCES

1. Modi, P.N., and Seth, S.M., Hydraulics and Fluid Mechanics including Fluid Machines, Standard Book House, New Delhi,2000.
2. Rama Durgaiah,D., Fluid Mechanics and Machinery, New Age International Publishers,New Delhi, 1st Edition, Reprint, 2006.

CIV 203	SURVEYING	L	T	P	C
		3	0	0	3

BASIC SURVEYING

Principles of surveying - Chain surveying - Plane, Geodetic and Topographic surveying- Conventional signs – Linear measurement - Equipment - Reciprocal ranging - Errors and obstacles - Overcoming obstacles in chaining – Chaining on slope ground - Hypotenuse allowance.

COMPASS AND PLANE TABLE SURVEYING

Types of compass - Bearings - Systems and Conversions - Errors in Compass surveying - Adjustment of error by graphical method – Bowditch's rule - Local attraction – Traverse adjustment – Omitted measurements – Plane table surveying - Instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Traverse - Resection - Three point and two point problems.

LEVELLING

Introduction - Levels And Staff - Temporary And Permanent Adjustments Of Levels - Differential Leveling - Fly Leveling - Profile Leveling - Block Leveling - Booking - Reduction of Levels - Checks - Curvature and Refraction - Reciprocal Leveling -

Longitudinal and cross sectioning - Contours - Automatic levels .- Calculation of areas and volumes

THEODOLITE SURVEYING

Introduction – Types of theodolite - Description - Temporary and permanent adjustments - Two face observation – Necessity - Measurements of horizontal angles - Vertical angles - Errors - Compensating and cumulative errors - Elimination of errors.

TACHEOMETRIC SURVEYING

Tacheometric surveying - Stadia method - fixed hair method - anallatic lens - horizontal and inclined sights - vertical and normal staff - subtense bar - Tangential method - constant base and variable base measurements - Simple Problems – EDM And Total Stations.

TEXT BOOKS

1. Punmia, B.C., Surveying Vol. I, Laxmi Publications (P) Ltd, New Delhi, 13th edition, 2004.
2. Punmia, B.C., Surveying Vol. II, Laxmi Publications (P) Ltd, New Delhi, 15th edition, 2004.

REFERENCES

1. Bannister, A., and Raymond, S., Surveying, ELBS, Sixth Edition, 1992.
2. Arora, K. R., Surveying Vol. I and II, Standard Book House, New Delhi, 1991.

CIV 204	GEOLOGY AND BUILDING MATERIALS	L	T	P	C
		3	0	0	3

GENERAL GEOLOGY

Geology in Civil Engineering – Branches of geology – Earth Structures and composition – Elementary knowledge on continental drift and plate tectonics - Earth processes – Weathering – Work of

rivers, wind and sea and their engineering importance – Earthquake belts in India - Groundwater – Mode of occurrence – prospecting – importance in civil engineering.

PETROLOGY

Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks - Description occurrence, engineering properties of Rocks – Granite, sandstone, Limestone, Quartzite and Marble.

STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD

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

BUILDING MATERIALS

Cement Ingredients – Manufacturing process –Types and Grades – Properties & Testing of cement and Cement mortar - Concrete Ingredients – Manufacture – Ready Mix Concrete – Properties of fresh concrete and hardened concrete - Mix specification – IS method –types of Concrete – Timber – Market forms – Industrial timber- Plywood - Code Practices - Glass – Ceramics – Sealants for joints.

MODERN BUILDING MATERIALS

Fibre glass reinforced plastic – Clay products –Refractories – Composite materials – Types – Applications of laminar composites – Fibre Textiles – Geosynthetics for Civil Engineering applications - Recycling of Industrial waste as building material - Polymers in Civil Engineering.

TEXT BOOKS

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

REFERENCES

1. Legeet, Geology and Engineering, McGraw Hill Book Company, New Delhi 1998.
2. Bangar, K.M., Principles of Engineering Geology, Standard Publishers & Distributors, New Delhi, 2nd Edition, 2007.

CIV 285	COMPUTER AIDED BUILDING DRAWING	L	T	P	C
		0	0	3	2

1. Buildings with load bearing walls (Flat and pitched roof) – Including details of doors and windows
2. RCC framed structures
3. Industrial buildings – North light roof structures – Trusses
4. Perspective view of one and two storey buildings.

CIV 282	FLUID MECHANICS LABORATORY	L	T	P	C
		0	0	3	2

1. Determination of co-efficient of discharge for orifice.
2. Determination of co-efficient of discharge for notches.
3. Determination of co-efficient of discharge for venturimeter.
4. Determination of Metacentric height.
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes.
7. Study of minor losses in pipes.
8. Study on performance characteristics of Pelton turbine.
9. Study on performance characteristics of Francis turbine.

10. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)

CIV 283	SURVEYING LABORATORY I	L	T	P	C
		0	0	3	2

1. Chain survey - Traversing and plotting of details
2. Compass survey - Traversing with compass and plotting
3. Plane table survey Method of Radiation and Intersection
4. Plane table survey - Solving three point problems
5. Plane table survey - Solving two point problems
6. Plane table survey - Traverse
7. Leveling - Fly leveling – Height of collimation method
8. Leveling - Fly leveling – Rise and fall method
9. Leveling - Longitudinal and cross sectioning
10. Leveling - Contour surveying
11. Theodolite surveying - Measurement of horizontal angle by method of repetition
12. Theodolite surveying - Measurement of horizontal angle by method of reiteration.

SEMESTER IV

		L	T	P	C
MAT 211	**NUMERICAL METHODS** (Common to Civil Engg. EEE, EIE and Mechanical Engg.)	**3**	**0**	**0**	**3**

SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS

Review of open end methods, bracketed end methods - The intermediate theorem (excluding proof) - Iterative method - False position method - Newton – Raphson method for single variable and for simultaneous equations with two variables - Solutions of a linear system by Gaussian, Gauss-Jordan, Jacobi and Gauss – Seidel methods - Eigen value of a matrix by Power method.

INTERPOLATION

Newton forward and backward difference formulae - Newton's divided difference formulae - Lagrange's polynomials - Stirling's Central difference formulae.

NUMERICAL DIFFERENTIATION AND INTEGRATION

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

INITIAL VALUE PROBLEMS

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's predictor and corrector method.

BOUNDARY VALUE PROBLEMS

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- Lab assignments for Numerical methods using **MatLap / C / C++.**

TEXT BOOKS

1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 8th Edn. , 2001.
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Numerical Methods, Scitech Publications (India) Pvt. Ltd., Chennai, 2nd Edn., Reprint 2006, 2001.

REFERENCES

1. Jain, M.K., Iyengar, S.R.K., Jain, R.K., Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd., New Delhi, 4th Edn., 2003.
2. Francis Scheid, Theory and Problems of Numerical Analysis, Schaum's Outline Series, Singapore, 2nd Edition, 1989.

CIV 205	STRENGTH OF MATERIALS	L	T	P	C
		3	1	0	4

DEFLECTION OF BEAMS

Governing differential equation – Slope and deflection of beams – Macaulay's method – Moment area method – Conjugate beam method – Newmark's method.

COLUMNS AND STRUTS

Columns – Behaviour of axially loaded short, medium and long column members – Buckling load - Euler's theory – Different end conditions – Empirical formulae – Rankine's formula – Straight line

formula – Secant formula for columns subjected to eccentric loading.

CYLINDERS AND SHELLS

Stresses and deformations in thin cylinders and spherical shells due to internal pressure –Thick cylinders – Lame's equation – Hoop stress and radial stress distribution – Compound cylinders – Shrink fit.

TORSION OF SHAFTS AND SPRINGS

Theory of torsion – Stresses and deformation in solid circular and hollow shafts – Stepped shafts – Composite shafts – Stresses due to combined bending and torsion – Strain energy due to torsion - Deformations and stresses in helical springs - Leaf springs - Buffer springs

UNSYMMETRICAL BENDING

Moment of inertia – Product of inertia – Principal axes – Principal moments of inertia of symmetrical and unsymmetrical sections – Symmetrical and unsymmetrical bending – Bending stresses in beams subjected to unsymmetrical loading – Shear centre – Beams curved in plan.

TEXT BOOKS

1. Bedi, D.S., Strength of Materials S.Chand and Co. Ltd., 1984.
2. Punmia, B.C., Strength of Materials", Laxmi Publications, 1992.

REFERENCES

1. Boresi, A.P., Side Bottom O.M., Seeli, F.B., and Smith, J.P., Advanced Mechanics of Materials, John Wiley & Sons, 1993.
2. Sadhu Singh, Strength of Materials, Khanna Publishers, New Delhi, 1988.

CIV 206	HYDRAULICS AND HYDRAULIC MACHINERY	L	T	P	C
		3	1	0	4

CRITICAL FLOW

Types and regimes of flow – velocity distribution – specific energy concept – critical flow computations – application.

UNIFORM FLOW AND GRADUALLY VARIED FLOW(GVF)

Manning's and Chezy's equation – computation of normal depths – compound channels – most economical section – Velocity measurement.

Dynamic equation for GVF – Classification of flow profiles – computation of GVF profiles – direct step method, standard step method and graphical integration method.

RAPIDLY VARIED FLOW

Hydraulic jumps – Balengar momentum equation -classification of jumps – surges.

TURBINES AND PUMPS

Classifications of turbine – velocity triangle diagram for Pelton, Francis and Kaplan Turbine – specific speed - characteristics curves for turbines – draft tube – governing of turbines

Pumps – classification – centrifugal pump – positive displacement pumps – indicator diagrams – air vessels – gear pump – characteristic curves for pumps.

DIMENSIONAL ANALYSIS AND SIMILITUDE

Rayleigh's method - Buckingham's Pi-theorem – model study/similitude – examples from pipe flow, open channel flow and hydraulic machines.

TEXT BOOKS

1. Arora, K.R.,Fluid Mechanics, Hydraulics and Hydraulic Machines, Standard Publishers and Distributors, New Delhi, 9th Edition, 2005.
2. Bansal, R.K., Fluid Mechanics and Hydraulic Machines, Laxmi Publications, Pvt. Ltd, New Delhi, 1st Edition, 2005.

REFERENCES

1. Modi, P.N., & Seth, S.M., Hydraulics and Fluid Mechanics including Fluid Machines Standard Book House, New Delhi, 2000.
2. Rama Durgaiah,D., Fluid Mechanics and Machinery, New Age International Publishers, New Delhi, 1st Edition, Reprint, 2006.

CIV 207	CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3

CONCRETE CONSTITUENTS

Aggregates classifications, IS Specifications, properties, grading, methods of combining aggregates, specified gradings, testing of aggregates, fibers – Cement - grade of cement, chemical composition, testing of cement, hydration of cement, structure of hydrated cements, special cements – water - chemical admixtures, mineral admixtures.

MIX DESIGN

Properties of fresh and hardened concrete - strength, elastic properties, creep and shrinkage, variability of concrete strength quality control - Principles of concrete mix design, methods of concrete mix design - testing of concrete – High Strength Concrete Mix Design – Super Plasticizers - Principles involved for high performance concrete with fly ash or GGBS replacements.

SPECIAL CONCRETES

Light weight concrete, fiber reinforced concrete, polymer concrete, super plasticised concrete - epoxy resins and screeds for rehabilitation – properties and applications – high performance concrete – Ready mix Concrete

CONCRETING METHODS

Process of manufacturing of concrete - methods of transportation, placing and curing – extreme weather concreting - special concreting methods - vacuum dewatering - under water technology - special form work.

CORROSION ENGINEERING

Introduction to corrosion of steel in concrete – Factors responsible for corrosion of steel in concrete – Transport mechanisms of ions in concrete – Corrosion of reinforced and pre- stressed concrete – Corrosion in blended cement concrete – Corrosion monitoring in R.C.C and pre-stressed concrete structures – Special steels and concretes – Coatings to concrete – Coatings to steel - Cathodic protection of concrete structures – Repairing of corroded concrete structures – Repair materials – Residual life estimation – Deterioration of concrete.

TEXT BOOK

1. Shetty, M.S., Concrete Technology, S. Chand & Company Ltd., Delhi, 2000.

REFERENCE

1. Neville, A.M., Properties of Concrete, Pitman publishing limited, London.1999.

CIV 208	MECHANICS OF SOILS	L	T	P	C
		3	1	0	4

INTRODUCTION

Nature of Soil – Properties of soils - phase relation - sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification system – Soil compaction - factors affecting compaction – field compaction methods and monitoring.

SOIL WATER AND WATER FLOW

Soil water – Influence of clay minerals – Capillary rise – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – quick sand condition - Seepage – Laplace Equation - Introduction to flownet.

STRESS DISTRIBUTION

Stress distribution in soil media – Boussinesque formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts – Westergaard equation for point load.

COMPRESSIBILITY AND SETTLEMENT

Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test – Field consolidation curve – NC and OC clays - problems on final and time rate of consolidation.

SHEAR STRENGTH

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear,

Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand – Stress path for conventional triaxial test.

TEXT BOOKS

1. Punmia, B.C., Soil Mechanics and Foundations, Laxmi Publications Pvt. Ltd, New Delhi, 16th Edition,2005.
2. Gopal Ranjan and Rao, A.S.R., Basic and Applied soil mechanics, New Age International Publishers, New Delhi, 2nd Edition, 2nd Reprint, 2006.

REFERENCES

1. Coduto, D.P., Geotechnical Engineering Principles and Practices, Prentice Hall of India Private Limited, New Delhi, 2002.
2. McCarthy, D.F., Essentials of Soil Mechanics and Foundations Basic Geotechniques, Sixth Edition, Prentice-Hall, New Jersey, 2002.
3. Das, B.M., Principles of Geotechnical Engineering, , Thomas Books cole, 5th edition, 2002
4. Muni Budhu, Soil Mechanics and Foundations, John Willey & Sons, Inc, New York, 2000.

CIV 209	WATER SUPPLY ENGINEERING	L	T	P	C
		3	0	0	3

WATER SUPPLY SYSTEMS – SOURCE AND CONVEYANCE

Objectives – Population forecasting – Design period – Water demand characteristics – Sources of water – Source selection.

WATER QUALITY PARAMETERS

Water quality parameters & significance – Standards – Intake structures – Conveyance – Hydraulics – Laying, jointing & testing of pipes – Pump selection – Appurtenances.

DESIGN PRINCIPLES OF WATER TREATMENT

Objectives – Selection of unit operations and processes – Principles of flocculation, sedimentation, filtration, disinfection – Design principles of flash mixer, flocculator, clarifiers, filters.

DISINFECTION

Disinfection devices – Softening – Demineralisation – Aeration – Iron removal – Defluoridation – Operation and Maintenance aspects - Residue Management.

DISTRIBUTION

Requirements – Components – Service reservoir design – Analysis of distribution network – Hardy Cross method – Equivalent Pipe method – Computer application – Leak detection

TEXT BOOKS

1. Garg, S.K., Environmental Engineering I & II, Khanna Publishers, New Delhi, 2000.
2. Modi, P.N., Environmental Engineering I & II, Standard Book House, New Delhi, 2000.

REFERENCES

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999.
2. Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993.
3. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987.

4. Metcalf and Eddy, M.C., Wastewater Engineering – Treatment & Reuse, Tata McGraw-Hill Publications, New Delhi, 2003.

CIV 284	ADVANCED SURVEYING LABORATORY	L	T	P	C
		0	0	3	2

1. Determination of tachometric constants
2. Measurements of heights and distances by stadia tacheometry
3. Measurements of heights and distances by tangential tacheometry
4. Measurements of heights and distances by solution of triangles
5. Setting out of simple curves – linear methods
6. Setting out of simple curves – angular method
7. Setting out of transition curve
8. Permanent adjustments of theodolite
9. Measurements of heights and distances using subtense bar
10. Study of instruments – planimeter, pantagraph, hand levels, clinometer, Ceylon, Ghat tracer, Sextant, Automatic levels and total station.

CIV 281	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	3	2

1. Test involving axial compression to obtain the stress – strain curve.
1. Test involving axial tension to obtain the stress – strain curve and the strength.
2. Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness.
3. Test involving flexure to obtain the load - deflection curve and hence the stiffness.
4. Tests on springs
5. Hardness tests
6. Shear test

7. Test for impact resistance

The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

CIV 286	SOIL MECHANICS LABORATORY	L	T	P	C
		0	0	3	2

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
6. Determination of moisture - Density relationship using standard Proctor test.
7. Permeability determination (constant head and falling head methods)
8. Determination of shear strength parameters.
9. Direct shear test on cohesionless soil
10. Unconfined compression test on cohesive soil
11. Triaxial compression test
12. One dimensional consolidation test (Determination of co-efficient of consolidation only)
13. Field density test (Core cutter and sand replacement methods)

SEMESTER V

CIV 301	STRUCTURAL ANALYSIS	L	T	P	C
		3	1	0	4

INDETERMINATE BEAMS

Static and Kinematic indeterminacy - Propped cantilever and fixed beams - Theorem of three moments – Analysis of continuous beams – Shear force and bending moment diagrams for continuous beams.

SLOPE DEFLECTION AND MOMENT DISTRIBUTION METHODS

Application of slope-deflection and moment distribution methods to analysis of continuous beams with and without settlement - Rigid plane frames with and without sway.

REDUNDANT FRAMES

Pin-jointed and rigid-jointed indeterminate frames – Energy method – Analysis of indeterminate frames – Lack of fit – Temperature effects.

ROLLING LOADS AND INFLUENCE LINES

Rolling loads – Single concentrated load – Uniformly distributed load – Two concentrated loads – Curves of maximum Bending Moment diagram and Shear Force Diagram– Equivalent Uniformly Distributed Load - Influence line for statically determinate beams for bending moment and shear force due to concentrated and uniformly distributed loads – Absolute max. Bending Moment and Shear Force – Influence line for forces in the members of statically determinate trusses (Parallel chord truss) – Reversal of stresses.

ARCHES

Analysis of three hinged and two hinged arches – Parabolic and circular arches – Influence lines for three and two hinged arches for horizontal thrust, radial shear and BM at any section.

TEXT BOOKS

1. Negi, L.S., and Jangid, R.S., Structural Analysis, Tata McGraw-Hill Publications, New Delhi, Sixth Edition, 2003.
2. Wang, C.K., Intermediate Structures, McGraw-Hill Publications, 2000.

REFERENCES

1. Wang, C.K., Analysis of Indeterminate Structures, Tata McGraw Hill, New Delhi, 1996.
2. Bhavikatti, S.S., Structural Analysis, Vol. 1 & Vol. 2, Vikas Publications, 2000.

CIV 302	TRANSPORTATION ENGINEERING I	L	T	P	C
		3	1	0	4

HIGHWAY PLANNING AND ALIGNMENT

Tresaguet and Macadam's method of Road Construction - Highway Development in India - Jayakar Committee Recommendations and Realizations, 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, Highway Research Board, 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], Cross sections of different Class of Roads.

GEOMETRIC DESIGN OF HIGHWAYS

Design of Horizontal Alignments – Super elevation, 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]

DESIGN OF RIGID AND FLEXIBLE PAVEMENTS

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 Method and Recommendations- Problems - Design Practice for Rigid Pavements - IRC Recommendations-Problems – Joints.

HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE

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, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test - 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).

HIGHWAY MAINTENANCE

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, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method (Procedure only), Principles of Highway Financing.

TEXT BOOKS

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

REFERENCES

1. IRC Standards (IRC 37 - 2001 & IRC 58 -1998)
2. Bureau of Indian Standards (BIS) Publications on Highway Materials.

CIV 303	DESIGN OF CONCRETE STRUCTURES	L	T	P	C
		3	1	0	4

STRUCTURE AND DESIGN CONCEPTS

Classification of structures – function, material and shape – different structural systems – Basic structural requirements – stability, strength and stiffness – design process – codes of practice - Working stress method – Limit state method – Probabilistic approach to design – load and resistance – Design for strength, stiffness and stability considerations – Choice between different structural

materials – Concrete, timber, Masonry and steel - Dead load – live load – Wind load – Calculation of wind load for a Structure – Seismic load – buoyancy and thermal loads.

DESIGN FOR FLEXURE

Singly and doubly reinforced rectangular beams – Flanged beams – One way and two way rectangular slabs subjected to uniformly distributed load for various boundary conditions and corner effects.

DESIGN FOR BOND, ANCHORAGE, SHEAR AND TORSION

Behaviour of reinforced concrete members in bond and anchorage - Design requirements as per current code - Behaviour of reinforced concrete beams in shear and torsion - Design of reinforced concrete members for combined bending, shear and torsion.

DESIGN OF COLUMNS

Types of columns – Braced and unbraced columns – Design of short column for axial, uniaxial and biaxial bending – Design of long columns.

DESIGN OF FOOTINGS

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

TEXT BOOKS

1. Varghese, P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, Pvt. Ltd, New Delhi,2002.
2. Krishna Raju, N., Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International Publishers, New Delhi, 2003.

REFERENCES

1. Jain, A.K., Limit State Design of RC Structures, Nemchand Publications, Roorkee, 2002.
2. Sinha, S.N., Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002.
3. Unnikrishna Pillai, S., Devadas Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2003.

CIV 304	GEOTECHNICAL ENGINEERING	L	T	P	C
		3	0	0	3

SLOPE STABILITY

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

SITE INVESTIGATION AND SELECTION OF FOUNDATION

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

SHALLOW FOUNDATION

Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing

capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimizing settlement, differential settlement.

FOOTINGS AND RAFTS

Types of foundation – Contact pressure distribution below footings & raft - Isolated and combined footings – types – proportioning - mat foundation – types – use - proportioning – floating foundation.

PILE FOUNDATIONS

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

TEXT BOOKS

1. Murthy, V.N.S., Soil Mechanics and Foundation Engineering, UBS Publishers Distribution Ltd, New Delhi, 1999.
2. Gopal Ranjan and Rao, A.S.R., Basic and Applied soil mechanics, New Age International Publishers, New Delhi, 2nd Edition, 2nd Reprint, 2006.

REFERENCES

1. Das, B.M., Principles of Foundation Engineering (Fifth edition), Thomson Books, 2003.

2. Swamisaran, Analysis and Design of Structures – Limit state Design, Oxford IBH
3. Publishing Co-Pvt. Ltd., New Delhi, 1998.
4. Kaniraj, S.R., Design aids in Soil Mechanics and Foundation Engineering, Tata McGraw
5. Hill publishing company Ltd., New Delhi, 2002.
6. Bowles, J.E., Foundation analysis and design, McGraw-Hill, New Delhi, 1994.

CIV 305	SANITARY ENGINEERING	L	T	P	C
		3	0	0	3

WASTE WATER – OVERVIEW

Sources of wastewater – Quantity of sanitary sewage – Storm run off estimation – Wastewater characteristics and significance.

SEWERAGE TRANSMISSION

Effluent disposal stand over – Design of sewers – Computer applications – Laying, jointing and testing of sewers – Sewer appurtenances – Pump selection.

DESIGN PRINCIPLES

Objectives – Selection of unit operation and process – Design principles of primary and secondary treatment.

SEWAGE TREATMENT

Screen chamber, grit chamber, primary sedimentation tanks, activated sludge process – Aeration tank & oxidation ditch – Trickling filter - Stabilisation ponds – Septic tanks with soak pits.

DISPOSAL

Sludge- treatment and disposal – Biogas recovery – Sewage farming Disposal on land – Disposal into water bodies – Oxygen sag curve – Streeter Phelp's model – Wastewater reclamation techniques

TEXT BOOKS

1. Garg, S.K., Environmental Engineering I & II, Khanna Publishers, New Delhi, 2000.
2. Modi, P.N., Environmental Engineering I & II, Standard Book House, New Delhi, 2000.

REFERENCES

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

CIV 381	ENVIRONMENTAL ENGINEERING LABORATORY	L	T	P	C
		0	0	3	2

1. Sampling and preservation methods and significance of characterization of water and wastewater.
2. Determination of
   i. P^H and turbidity
   ii. Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage

9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

CIV 382	CONSTRUCTION LABORATORY	L	T	P	C
		0	0	3	2

TESTS ON CEMENT

Test to find Specific gravity – Fineness - specific surface – soundness – consistency - initial and final setting time - compressive strength of cement mortar.

TESTS ON FINE AGGREGATE

Tests to find alkalinity, organic content, etc - particle size distribution and fineness modulus - specific gravity and voids ratio - Bulking of sand.

TESTS ON COARSE AGGREGATE

Particle size distribution and fineness modulus - specific gravity - voids - absorption test - crushing and impact strength - abrasion test.

CONCRETE MIX DESIGN

I.S and A.C.I Methods of concrete mix design.

TEST ON FRESH CONCRETE

Slump test - Vee-Bee test - compaction factor test.

TESTS ON HARDENED CONCRETE

Compression test on cubes - Modulus of rupture test - splitting tension test - determination of modulus of elasticity.

SEMESTER -VI

CIV 306	IRRIGATION ENGINEERING	L	T	P	C
		3	0	0	3

HYDROLOGY

Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Abstractions from precipitation- Runoff-Long term runoff, empirical formulae, short term runoff- hydrograph analysis - Flood-Rational and Empirical methods for prediction - Design floods - Ground water- Aquifer types-flow of ground water – Well hydraulics-Types of wells-Other sources of ground water.

IRRIGATION

Necessity of irrigation and type of irrigation systems -Total planning concept-Water requirements of crops-Command area-duty-delta - Consumptive use of water –Irrigation efficiency-Irrigation requirement of crops-Reservoir planning-Site investigation-Zones of storage-Reservoir yield-Reservoir losses and Control-Life of reservoir.

DIVERSION HEAD WORKS

Location – Essential components of Weir and Barrage-Weirs on permeable foundations-Bligh's and khosla's seepage theories - Design procedure.

DAMS

Types of dams and their selection-Gravity dam-Analysis and design. Spillways-Different types and suitability.

IRRIGATION CANALS

Intake structures, Canal Outlets, Canal regulation works-Canal falls-Canal regulators-Canal escapes-Surplussing arrangements in minor

irrigation tanks-Cross drainage works-Types and selection of type of cross drainage works

TEXT BOOKS

1. Asawa, G.L., Irrigation and Water Resources Engineering, New age International publishes, New Delhi, 2005.
2. Punmia.B.C., Pande, B.B., Lal, Irrigation and Water power Engineering, Laxmi Publications (P) Ltd, New Delhi, 2002.

REFERENCES

1. Ven Te Chow etal, Applied Hydrology, Mc Graw -Hill Book Co, Newyork,1992.
2. Subramanya, K., Engineering Hydrology, Tata Mc Graw - Hill publishers, New Delhi
3. Linsley, R.K., Water Resources Engineering, Mc Graw-Hill International Edition, 1996.
4. Mays, L.W., Water Resources Handbook, Mc Graw – Hill International Edition, 1996
5. Modi, P.N., Irrigation, Water Resources, and Water power Engineering, Standard Book House 1990.

CIV 307	DESIGN OF STEEL STRUCTURES	L	T	P	C
		3	1	0	4

DESIGN OF CONNECTIONS

Properties of steel – Structural steel sections - Loads on Structures - Metal joining methods using rivets, welding, bolting - Design of bolted, riveted and welded joints.

TENSION MEMBERS

Types of Tension members –Behaviour of Tension members - Net Sectional Area - Design of Tension Members.

COMPRESSION MEMBERS

Types of compression members – Theory of columns - Basis of current codal provision for compression member design – Slenderness ratio - Design of Compression Members - Design Criteria - Laced and Battened columns - Column Bases.

FLEXURAL MEMBERS

Design of Beams subjected to biaxial bending moment - Design of sections subjected to unsymmetrical bending - Elastic lateral torsional buckling - Beam Columns - Short and Long Beam-Columns – Beam Columns at Ultimate Load - Effects of Slenderness Ratio and Axial force on Modes of Failure - Beam-Column under Biaxial bending.

INDUSTRIAL BUILDING

Design of Industrial building Frames – Design of Purlins for Roof Trusses - Analysis of simple bents - Sway and non-sway frames - Design of Gable frames - Design of knee bracing, vertical bracing.

TEXT BOOKS

1. Ramachandra, Design of steel structures, Vol. 1, Standard Book House, New Delhi,1992.
2. Punmia, B.C., Ashok Kumar Jain & Arunkumar Jain, Comprehensive Design of Steel Structures, Laxmi Publications, New Delhi,2nd Edition, 1998.

REFERENCES

1. Negi, L S., Design of Steel structures, Tata McGraw Hill, New Delhi, 1995.
2. Arya & Ajmani, Design of Steel Structures, Nem Chand & Brothers, 1997.
3. Ragupathy, M., Design of Steel Structures, Tata McGraw-Hill Publishing Co., Ltd., New Delhi, 1996.

CIV 308	TRANSPORTATION ENGINEERING II	L	T	P	C
		3	0	0	3

GEOMETRIC DESIGN OF RAILWAYS

Introduction - typical cross - section - various gauges - coning of wheels and tilting of rails - functions and requirements of component parts of a railway track - creep of rails - geometrical design of railway track - horizontal curves - radius - super elevation - cant deficiency - transition curves - safe speed on curves - different types of gradients - grade compensation - worked out problems**.**

RAILWAY CONSTRUCTION MAINTENANCE AND OPERATION

Construction of railway track-earthwork - plate laying and packing - maintenance of track-alignment - gauge - renewal of component parts and drainage - modern methods of track maintenance points and crossings and their design - track junctions and simple track layouts - details of different types of stations and yards - signaling and interlocking - control of train movements - absolute block system - automatic block system and CTC system.

AIRPORT PLANNING AND DESIGN

Advantages and Limitations of Air Transport - Components of Airports - Airport Planning – Air traffic potential, site Selection, Design of components, Cost Estimates, Evaluation and Institutional arrangements Runway Design – orientation, cross wind component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), - Airport Drainage.

AIRPORT LAYOUTS, VISUAL AIDS AND AIR TRAFFIC CONTROL

Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and Circulation Pattern, Airport Layouts

Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities - Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings - Air Traffic Control – Basic Actions, Air Traffic Control Network - Helipads, Hangars, Service Equipments.

HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT

Definition of Terms – Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports Requirements and Classification of Harbours Site Selection– Speed of water, Dredging - Coast Lines Dry and Wet Docks, Coastal Structures – Piers, Breakwaters, Wharves, Jetties, Quays - Planning and Layouts: Entrance, Position of Light Houses, Navigation Aids - Terminal Facilities – Port Buildings, Warehouse, Transit sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids.

TEXT BOOKS

1. Saxena Subhash, C and Satypal Arora, Course in Railway Engineering, Dhapat Rai and Sons, Delhi, Sixth Edition, 2001.
2. Rangwala, S.C. & Rangwala, P.S., Airport Engineering, Charotar Publishing House, Anand, Sixth Edition, 2006.
3. Bindra, S.P., A course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.

REFERENCES

1. Rangwala, Railway Engineering, Charotar Publishing House, 2007.
2. Khanna, S.K. and Arora, M.G. Airport Planning and Design, Nemchand and Bros, 1994.
3. Mundey, J.S., A course in Railway Track Engineering.
4. Oza and Oza, Elements of Dock and Harbour Engineering, Charotar Publishing House, 1992.

5. Chandola. S.P., A text book of Transportation Engineering, S. Chand & Company Ltd, New Delhi, 1st Edition,2001.

CIV 383	IRRIGATION AND ENVIRONMENTAL ENGINEERING DESIGN AND DRAWING	L	T	P	C
		0	0	3	2

TANK IRRIGATION STRUCTURES

Tank bunds – Tank surplus weirs – Tank sluices weirs on pervious foundations - Percolation ponds – Detailed drawings showing foundation details, plan and elevation.

CANAL TRANSMISSION STRUCTURES

Aqueducts – Syphon aqueducts – Super passage – Canal Syphon – Canal drops – Notch type – Rapid type fall – Syphon well drops – Drawing showing plan, elevation, foundation details.

CANAL REGULATION STRUCTURES

Canal head works – Canal regulator – Canal escape – Silt exclusion structures – Drawing showing detailed plan, elevation and foundation.

WATER TREATMENT

Design & drawing of aerators, chemical feeding facility, flash mixer, flocculator, clarifier – Slow sand filter – Rapid sand filter – Pressure filter – Chlorinator – Bleaching powder dozer Softeners – Demineralization plant Design and drawing of infiltration gallery – Iron removal plants – Fluoride removal plants – Service reservoirs.

WASTE WATER TREATMENT:

Design and drawing of screen chamber – Grit channel – Primary clarifier – Activated sludge process – Aeration tank and oxidation ditch – Trickling filters – Secondary clarifiers – Up flow anaerobic

sludge blanket reactors – Up flow anaerobic filter – Sludge digester – Sludge drying beds – Waste stabilization ponds.

TEXT BOOKS

1. Garg, S.K., Irrigation Engineering and Design of Structures, 2000.
2. Satyanarayana Murthy, Irrigation Design and Drawing, Published by Mrs. L. Banumathi, Tuni, East Godavari District, A.P. 1998.
3. Sharma, R.K., Irrigation Engineering and Hydraulic Structures, Oxford and IBH Publishing Co., New Delhi, 2002.

REFERENCES

1. Manual on Water Supply and Treatment, CPHEEO, Govt of India, New Delhi, 1999.
2. Manual of Sewerage and Sewage Treatment, CPHEEO, Govt of India, New Delhi, 1993.

SEMESTER -VII

CIV 401	ESTIMATING & COSTING	L	T	P	C
		3	1	0	4

PROCEDURE OF ESTIMATING QUANTITIES

Introduction – Main items of work – calculation of quantities of earth work, stone masonry, brick masonry, plastering, cement concrete, R.C.C - Doors, Windows, Flooring, White Washing, colour washing.

RATE ANALYSIS

Factors affecting rates – importance – Materials for different items of work – Rates of materials and labour – Analysis of Rates for cement concrete, R.C.C., brick masonry, Stone masonry, Hollow block masonry, Plastering, Painting, Flooring, Road works, Sanitary Works, Water supply works and Electrical works.

COST ESTIMATE OF BUILDINGS

Approximate methods – Plinth area estimate – Cubical Contents estimate - Detailed estimate – Estimation of the cost of single storeyed buildings by individual wall method and centre line method - Estimation of Roofs – R.C.C. slab roof, GI sheet roof, Tiled Roof, Roof Truss. Estimation of R.C.C. works – Beam, T-beam and Slab, Column, Foundation, Stair case, Retaining wall etc.

COST ESTIMATE OF OTHER STRUCTURES

Estimation of roads – Earth work, Pitching of Slopes, Hill roads - Estimation of R.C.C. slab culvert, Pier, Pipe culvert, R.C.C. T-beam Bridge - Estimation of Irrigation works like Canals, Aqueducts, Syphon, etc. - Estimation of Water supply and sanitary works like septic tank, Soak pit, Manhole, sewer line.

SPECIFICATIONS AND VALUATION

Specifications – Objectives – types of specifications – principles of specification - writing – typical specifications - Valuation – Market value – Book value – Scrap value – Salvage value – annuity – Capitalized values – sinking fund – depreciation – Valuation of a building – Rent fixation – Mortgage – Lease – cash flow and cost control.

TEXT BOOKS

1. Dutta, B.N., Estimating and Costing, S Dutta & Co., Lucknow 2006.
2. Rangawal,S.C., Estimating and Costing, Charotar Anand Publications, 1996.

REFERENCE

1. Kohli, D.D.and Kohli R.C., A Text book on Estimating, Costing and Accounts, S.Chand and Co, New Delhi, 1994.

CIV 402	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	L	T	P	C
		3	0	0	3

SEISMOLOGY

Elements of Engineering Seismology - Theory of Vibration - Response Spectrum - Indian Seismicity - Earthquake History - Behaviour of Structures in the past Earthquakes.

DESIGN CONCEPTS

Seismic Design Concepts - Design spectrum - Principles of capacity design - Earthquake resistant features for masonry and concrete buildings

CODAL PROVISIONS

Provisions of Seismic Code (IS 1893) - Building systems - frames, shear walls, Braced Frames, Combinations -Torsion.

DESIGN AND DETAILING

Performance of Regular Buildings - 3 D Computer Analysis of Building Systems (Theory Only) - Design and Detailing of frames - Shear walls and Frame walls.

SPECIAL PROBLEMS AND CASE STUDIES

Structural Configuration - Seismic performance - Irregular Buildings - Soil performance, Modern Concepts – Base Isolation - Adoptive system - Case studies.

REFERENCES

1. Course Notes on Design of Reinforced Concrete Building, IIT, Kanpur, June 1999.
2. Bungale S.Taranath., Structural Analysis and Design of Tall Buildings, McGraw Hill Book Company, New York, 1999.
3. IITK-BMTPC Earthquake Tips.

CIV 481	COMPUTER AIDED DESIGN AND DRAWING	L	T	P	C
		0	0	3	2

Detailed design and drawing of the following reinforced concrete structures,

1. Cantilever retaining walls
2. Counterfort retaining walls
3. Circular and rectangular underground water tanks
4. Elevated water tanks.
5. Intze type water tank
6. Slab bridge
7. T-beam and Slab Bridge.
8. Rivetted Plate girder
9. Welded Plate girder
10. Gantry Girder

11. Water Tanks
12. Roof Trusses

MAJOR ELECTIVES

CIV 351	PRINCIPLES OF ARCHITECTURE	L	T	P	C
		3	0	0	3

ARCHITECTURAL DESIGN

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

CLIMATE RESPONSIVE DESIGN

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

BUILDING TYPES

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

SITE PLANNING

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

ENVIRONMENTAL DESIGN

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

TEXT BOOK

1. Muthu Shoba Mohan, Principles of Architecture, Oxford University Press, Chennai, 2006.

REFERENCES

1. 1.Francis D.K. Ching, Architecture: Form, Space and Order, John Wiley & Sons Inc, 2nd Edition, New York, 1999.
2. 2.Givoni B., Man Climate and Architecture, Applied Science Series, Elsevier Publishing Company, New York, 2001.
3. Edward D. Mills, Planning the Architects Handbook, Butterworth London, 1995.
4. Gallian B. Arthur and Simon Eisner, The Urban Pattern - City Planning and Design,
5. Affiliated Press Pvt. Ltd., New Delhi, 1995.
6. Margaret Roberts, An Introduction to Town Planning Planning Techniques, Hutchinson, London, 1990.
7. American Planning Association, Planning and Urban Design Standards, Wiley Publishers, New York, 2007.

		L	T	P	C
CIV 352	**CONSTRUCTION TECHNIQUES AND PRACTICES**	**3**	**0**	**0**	**3**

CONSTRUCTION PRACTICES

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering sheet piles – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick — weather and water proof – roof finishes – air conditioning – acoustic and fire protection.

SUB STRUCTURE CONSTRUCTION

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques- driving well and caisson - sinking cofferdam - cable

anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting- Large reservoir construction with membranes and Earth system- well points -Dewatering and stand by Plant equipment for underground open excavation.

SUPER STRUCTURE CONSTRUCTION

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, aerial transporting handling - erecting light weight components on tall structures -erection of transmission towers - Construction sequences in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges -Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks

REPAIR AND REHABILITATION

Study on causes of building damage and deterioration – Assessment of materials and methods of repair and restoration.

CONSTRUCTION EQUIPMENT

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling, drilling, blasting — dewatering and pumping equipment – Transporters.

TEXT BOOKS

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 5th Edition, 1995.

2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, New Delhi 1997.

REFERENCES

1. Jha, J and Sinha, S.K., Construction and Foundation Engineering, Khanna Publishers, New Delhi, 2004.
2. Sharma S.C. Construction Equipment and Management, Khanna Publishers New Delhi, 1988.
3. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988.
4. Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company, New Delhi, 1983.

CIV 353	HYDROLOGY	L	T	P	C
		3	0	0	3

PRECIPITATION

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

ABSTRACTION FROM PRECIPITATION

Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

HYDROGRAPHS

Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

FLOODS AND FLOOD ROUTING

Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control

GROUND WATER HYDROLOGY

Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

TEXT BOOKS

1. Subramanya, K., Engineering Hydrology, Tata McGraw-Hill Publishing Co., Ltd., 2000
2. Raghunath, H.M., Hydrology, New Age International, New Delhi Second Edition, 2006.

REFERENCES

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

CIV 354	GROUND WATER ENGINEERING	L	T	P	C
		3	0	0	3

FUNDAMENTALS OF GROUND WATER

Introduction – Characteristic of Ground water – Distribution of water - ground water column –Permeability - Darcy's Law - Laboratory permeability test - Types of aquifers – Hydro-geological Cycle – water level fluctuations.

HYDRAULICS OF FLOW

Storage coefficient - Specific field - Heterogeneity and Anisotropy - Transmissivity - Governing equations of ground water flow - Steady

state flow - Dupuit Forchheimer assumptions - Velocity potential - Flow nets

ESTIMATION OF PARAMETERS

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

GROUND WATER DEVELOPMENT

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

WATER QUALITY

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

TEXT BOOKS

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

REFERENCES

1. Ven T.Chow & David R. Maidment, Open Channel Flow, Tata McGraw-Hill Publishing Company, New Delhi, 1988
2. Walton, C, Applied Hydrology, Ground Water Resource Evaluation, McGraw-Hill Publications, 1996.
3. Karanth, Ground Water Assessment, Development and Management, Tata McGraw Hill, New Delhi 2006.

CIV 355	INTRODUCTION TO REMOTE SENSING	L	T	P	C
		3	0	0	3

PHYSICAL PRINCIPLES OF REMOTE SENSING

EM Waves – Matter interactions - energy sources and radiation principles - energy interactions in the atmosphere – Atmospheric Windows - Spectral reflectance of earth surface features – Spectral Signatures - water, vegetation and urban areas - Remote sensing platforms and methods

AERIAL PHOTOGRAPHY

Introduction - Principles - B&W and Color photographs – film factors - aerial phtotogrammetry – relief displacement – parallax – height measurement – map preparation from aerial photographs

SATELLITE REMOTE SENSING

Visible, Infra Red and Microwave sensing - Active and passive sensors - Satellites and their sensors, Indian Space Programme - Sources of Data and Imagery

IMAGE INTERPRETATION, CLASSIFICATION AND ANALYSIS

Interpretation principles – interpretation keys – Image Geometry-scale, and resolution - Image statistics – histograms – Image enhancement – Image rectification - Digital image analysis – edge detection – band ratioing – vegetation indices - classification – supervised and unsupervised classification

APPLICATIONS OF REMOTE SENSING

Multitemporal Analysis - change detection - vegetation mapping – land use land cover analysis, geological applications – water resources - urban mapping, and other applications

TEXT BOOKS

1. 1. Lillesand, T.M. and Kiefer, R.W., Remote Sensing and Image Interpretation, John Wiley and Sons, New York 2006.
2. 2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications, 2001.

REFERENCES

1. Manual of Remote Sensing, American Society of Photogram metric Engineering and Remote Sensing, 2003.
2. Charles Elachi, Introduction to the Physics and Techniques of Remote Sensing, 2nd Edition, Wiley Publishers, New York, 2007.
3. Paul M. Mather, Computer Processing of Remotely-Sensed Images, 3rd Edition, Wiley Publishers, London, 2007.
4. Giles M. Foody, Peter M. Atkinson, Uncertainty in Remote Sensing and GIS,
5. Wiley Publishers, London, 2007.
6. Srinivas, M.G., Remote Sensing Applications, Narosa Publishing House, New Delhi, 2001.

CIV 356	HIGHER SURVEYING TECHNIQUES	L	T	P	C
		3	0	0	3

CURVES

Curve Surveying - Horizontal curves - simple, compound and reverse curves - Circular curves - Transition curves - cubic parabola, log - spiral - vertical curves – parabola – setting out of buildings – culverts — marking for foundation and excavation

CONTROL SURVEYING AND SURVEY ADJUSTMENTS

Introduction - Triangulation networks - orders and accuracies- Base line measurement - - intervisibility of stations- instruments and accessories- corrections - extension of base line - Satellite stations - Reduction to centre - Observations for heights and distances - Corrections for refraction, curvature, axis signal - Reciprocal

observations – Adjustments - Types of errors - most probable value - weighted observations - principle of least squares - Normal equations - Method of correlates - adjustment of simple networks.

ASTRONOMICAL SURVEYING

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

PHOTOGRAMMETRIC SURVEYING

Photogrammetry–Introduction – Terrestrial and aerial photographs, Stereoscopy – Parallax – Photogrammetric measurement – basics.

MODERN SURVEYING TECHNIQUES

Electromagnetic distance measurement - Introduction to Total Station – advantages -Introduction to Global positioning systems - Hydrographic Surveying methods - Cadastral surveying - Definition - Uses - Legal values - Scales and accuracies.

TEXT BOOKS

1. Punmia, B.C. Surveying Vol. II and Vol.III, Laxmi Publications, New Delhi, 2006.
2. Kanetkar,T.P, Kulkarni, S.V., Surveying and Levelling volume II, Vidyarthi Griha Prakashan, Pune,2000.

REFERENCES

1. Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill ,2006.
2. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition ,2000.
3. Paul R.Wolf, Elements of Photogammetry with Application in GIS, Tata McGraw-Hill, New Delhi, Third Edition, 2006.

CIV 362	ADVANCED STRUCTURAL ANALYSIS	L	T	P	C
		3	0	0	3

PLASTIC THEORY

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.

SPACE AND CABLE STRUCTURES

Analysis of space trusses using method of tension coefficients – Suspension cables over pulley and saddle arrangements – Cables with two and three hinged stiffening girders.

FLEXIBILITY METHOD

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).

STIFFNESS METHOD

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames.

FINITE ELEMENT METHOD

Introduction – Discretization of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain Triangular elements.

TEXT BOOKS

1. Coates R.C, Coutie M.G. and Kong F.K., Structural Analysis, ELBS and Nelson, 199.0
2. L.S. Negi & R.S. Jangid, Structural Analysis, Tata McGraw-Hill Publications, New Delhi, 2003.

REFERENCES

1. Ghali.A, Nebille, A.M. & Brown, T.G., Structural Analysis: A unified classical and Matrix approach , Spon Press, London and New York, 5th Edition, 2003.
2. Vazirani V.N, & Ratwani, M.M., Analysis of Structures, Khanna Publishers, Delhi, 2000.
3. Pandit, Structural Analysis – A Matrix Approach , Tata McGraw Hill, New Delhi, 2006.
4. William Weaver, Jr., & James M. Gere, Matrix Analysis of Framed Structures, CBS Publishers, 2003.

CIV 363	DESIGN OF MASONRY AND TIMBER STRUCTURES	L	T	P	C
		3	0	0	3

DESIGN CONCEPTS

Classification of structures – function, material and shape – different structural systems – requirements of structures – basic structural requirements – stability, strength and stiffness – design process – codes of practice. - Design for strength, stiffness and stability considerations –Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limitations.

MASONRY WALLS AND COLUMNS

Axially loaded square and rectangular columns with uniaxial eccentricity – Solid walls – Load bearing walls – axially loaded – eccentrically loaded walls with openings – Non load bearing walls.

LATERALLY LOADED MASONRY STRUCTURES

Structures and loads – stability of masonry – middle third rule – Masonry dams – Trapezoidal dams – Retaining walls.

LOAD DISTRIBUTION ELEMENTS

Bed blocks – spread footings for walls and columns – area based on safe bearing capacity.

Design of Reinforced Masonry Introduction – basic concepts – limit state design of reinforced brick masonry – lintels – axially loaded columns.

TIMBER STRUCTURES

Factors affecting the strength – permissible stresses – Design for bending, shear and bearing - Flitched beams – solid and built up columns – combined bending and direct stress – application to form work.

TEXT BOOK

1. Arya A.S., Structural Design in Steel, Masonry and Timber, Nemchand and Bros., Roorkee, 1987.

REFERENCE BOOK

1. Dayarathnam P., Bricks and Reinforced Brick Structures, Oxford & IBH Publishing Co., New Delhi, 2000.

CIV 364	COMPUTATIONAL METHODS IN CIVIL ENGINEERING	L	T	P	C
		3	0	0	3

INTRODUCTION TO NUMERICAL METHODS

Importance of numerical methods in civil engineering - Sources of errors in numerical methods – Number representations - Fixed and floating point numbers - Significant digits - round off errors - pseudo code - Newton-Raphson method - Successive approximation method

- Development of computer algorithms for each of the above methods

EIGEN VALUE - PROBLEMS INTERPOLATION

Determination of Eigen values and Eigen vectors by Power method and Jacobi's method - Newton's formulae - Gauss' formulae - Lagrangian interpolation – Cubic spline interpolation - Numerical solution of ordinary differential equations - Taylor's series method - Euler's method - Runge-Kutta method

APPLICATIONS IN CIVIL ENGINEERING PROBLEMS

Numerical differentiation using Newton's formula - maximum and minimum values of tabulated functions - numerical integration - trapezoidal formula - Simpson's formulae and Gauss quadrature - finite difference method for the solution of boundary value problems - development of computer algorithms for numerical integration

LINEAR PROGRAMMING PROBLEMS

Optimization - Statement of Optimization a problem - linear and nonlinear Programming problems - standard form of linear programming problems - applications of Linear programming in civil engineering

NONLINEAR PROGRAMMING PROBLEMS

Difficulties in nonlinear programming problems – unconstrained - optimization problems – uni-modal function - search methods - one dimensional minimization methods - Fibonacci and golden section methods - examples of one dimensional minimization problems in civil Engineering.

TEXT BOOKS

1. Sastry S.S., Introductory Methods of Numerical Analysis, Prentice Hall of India, New Delhi, 4th Edition, 2006.

2. Scarborough J.B., Numerical Mathematical Analysis, Oxford & IBH
3. Hardley G., ' Linear Programming', Narosa Publishers, New Delhi, 2002.

REFERENCES

1. Rao S.S., Engineering Optimization - Theory and Practice, New Age International Publishers, New Delhi, 3rd Edition, 2005.
2. Chapra, S.C., and Canale, R.P., Numerical Methods for Engineers, McGraw Hill, Inc., 2001.

CIV 365	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

INTRODUCTION

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

DRAINAGE AND DEWATERING

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

INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

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.

EARTH REINFORCEMENT

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – Use of geotextiles for filtration, drainage and separation in road and other works.

GROUT TECHNIQUES

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

TEXT BOOKS

1. Koerner R.M., Construction and Geotechnical Methods in Foundation Engineering, McGraw-Hill, New York 1994.
2. Purushothama Raj, P., Ground Improvement Techniques, Tata McGraw-Hill Publishing Company, New Delhi, 1995.

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, Butterworth, 1995.
3. Koerner, R.M., Design with Geo synthetics, (3rd Edition) Prentice Hall, New Jersey, 2002.

CIV 366	GEOGRAPHIC INFORMATION SYSTEMS	L	T	P	C
		3	0	0	3

INTRODUCTION TO GIS

Map as a model of geographic data - types of maps – Scale, Map projections and coordinate systems

COMPONENTS OF GIS

Data models – Vector and Raster data structures – Topology – Meta data - Data input – Data Editing – Data Management – Data Display

GIS ANALYSIS CONCEPTS

Vector data analysis – Raster data analysis - set theory – intersection – union – Querying, overlay, buffering. Map statistics – Regional analysis, Network analysis – shortest path, location – allocation problems - GIS outputs.

TERRAIN MAPPING AND ANALYSIS

Digital terrain modeling concepts – DEM generations, spatial interpolation - applications of DEM. Uncertainties and errors in GIS - Error propagation

GIS APPLICATIONS

Socio-Economic data visualization and analysis, AM/FM Application – Natural resources – Change analysis Working with GIS Softwares and application demos. Project Work.

TEXT BOOKS

1. Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications 2001.
2. Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publications, London, 2001.

REFERENCES

1. Star J. and Estes. J., GIS – An Introduction, Prentice Hall, USA.
2. 2. Kang-Isung Chang, Introduction to Geographical Information Systems, Tata Mcgraw Hill, New Delhi, 2006.
3. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996.
4. Paul M.Mather, Computer applications in Geography, Wiley Publications, London, 2007.
5. Giles M.Foody and Peter M.Atkinson, Uncertainty in Remote Sensing and GIS, Wiley Publications, New York, 2007.

6. Michael Kennedy, Introducing Geographic Information Systems with ArcGIS, Wiley Publications, New York, 2007.

CIV 367	AIR POLLUTION AND CONTROL	L	T	P	C
		3	0	0	3

INTRODUCTION

Air resource management system - Air quality management - Scales of air pollution problem - Sources and classification of pollutants and their effect on human health vegetation and property - Global implications of air pollution - Meteorology Fundamentals - Atmospheric stability –Atmospheric turbulence - mechanical and thermal turbulence - Wind profiles – Plume rise - Ambient air quality and emission standards – Air pollution indices – Indoor Air Pollutants – Models – Air Quality Sampling and Monitoring.

CONTROL OF PARTICULATE CONTAMINANTS

Settling chambers - Filters, gravitational, Centrifugal – multiple type cyclones, prediction of collection efficiency, pressure drop, wet collectors, Electrostatic Precipitation theory – ESP design – Operational Considerations – Process Control and Monitoring – Automobile air pollution and control.

CONTROL OF GASEOUS CONTAMINANTS

Absorption – principles - description of equipment-packed and plate columns - design and performance equations – Adsorption - principal adsorbents - Equipment descriptions – Design and performance equations – Condensation - Incineration - Equipment description.

BIOLOGICAL AIR POLLUTION

Biological Air Pollution - Control Technologies – Bio-Scrubbers, Biofilters – Operational Considerations – Process Control and Monitoring

NOISE CONTROL

Noise Standards - Measurement – Modeling - Control and preventive measures.

TEXT BOOKS

1. Noel de Nevers, Air Pollution Control Engg., McGraw-Hill, New York, 2000.

REFERENCES

1. Lawrence Kwan, Norman C Perelra, Yung-Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.
2. David H.F Liu, Bela G.Liptak, Air Pollution, Lewis Publishers, 2000.
3. Singal, S.P., Noise Pollution and Control Strategy, Narosa Publishing House, New Delhi, 2005.

CIV 368	ECOLOGICAL ENGINEERING	L	T	P	C
		3	0	0	3

INTRODUCTION TO ECOLOGY AND ECOLOGICAL ENGINEERING

Aim, scope and applications of ecology – Development and evolution of ecosystems – Principles and concepts pertaining to communities in ecosystem – Energy flow and material cycling in ecosystems – productivity in ecosystems – Rationale of ecological engineering and ecotechnology – Classification of ecotechnology – Principles of ecological engineering.

SYSTEMS APPROACH IN ECOLOGICAL ENGINEERING

Classification of systems – open and closed systems - Structural and functional interactions of environmental systems – Environmental systems as energy systems – Modelling and ecotechnology – Elements of modelling – Modelling procedure – Classification of

ecological models – Applications of models in ecotechnology – Ecological economics.

ECOLOGICAL ENGINEERING PROCESSES

Self-organizing design and processes – Multi seeded microcosms – Concept of energy – Determination of sustainable loading of ecosystems.

ECOTECHNOLOGY FOR WASTE TREATMENT

Ecosanitation – Principles and operation of soil infiltration systems – Wetlands and ponds – Source separation systems – Aquacultural systems – Agro ecosystems – Detritus based treatment for solid wastes – Applications of ecological engineering for marine systems.

CASE STUDIES

Case studies of Integrated Ecological Engineering Systems and their commercial prospects.

TEXT BOOKS

1. Rana, Essentials of Ecology and Environmental Science, Prentice Hall of India, New Delhi, 2nd Edition, 2006.

REFERENCES

1. Kangas, P.C. and Kangas, P., Ecological Engineering: Principles and Practice. Lewis Publishers, New York. 2003.
2. Etnier, C. and Guterstam, B., Ecological Engineering for Wastewater Treatment, Lewis Publishers, New York. 1997.
3. White, I.D., Mottershed, D.N. and Harrison, S.J., Environmental Systems – An Introductory Text, Chapman Hall, London. 1994.

CIV 369	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA.

METHODOLOGIES

Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies.

PREDICTION AND ASSESSMENT

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA.

ENVIRONMENTAL MANAGEMENT PLAN

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 – ISO 14000.

CASE STUDIES

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects

TEXT BOOKS

1. Canter,L., Environmental Impact Assessment, McGraw-Hill Inc., New Delhi, 1996.

2. Shukla, S.K. and Srivastava, P.R., "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, New York, 1990.
2. Environmental Assessment Source book, Vol. I, II & III. The World Bank, Washington, D.C., 1991.
3. Judith Petts, Handbook of Environmental Impact Assessment Vol. I & II, Blackwell Science, 1999.

CIV 370	PLANNING AND DESIGN OF BUILDING SERVICES	L	T	P	C
		3	0	0	3

MACHINERIES

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

ELECTRICAL SYSTEMS IN BUILDINGS

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations.

PRINCIPLES OF ILLUMINATION & DESIGN

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination –

Utilization factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering.

Design of modern lighting systems– Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

REFRIGERATION PRINCIPLES & APPLICATIONS

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub-cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

FIRE SAFETY INSTALLATION

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TEXT BOOKS

1. Ambrose, E.R., Heat Pumps and Electric Heating, John and Wiley and Sons, Inc., New York, 1968.

2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 1964.
2. R.G.Hopkinson and J.D.Kay, The Lighting of buildings, Faber and Faber, London, 1969.
3. William H.Severns and Julian R.Fellows, Air-conditioning and Refrigeration, John Wiley and Sons, London, 1988.
4. A.F.C. Sherratt, Air-conditioning and Energy Conservation, The Architectural Press, London, 1980.

CIV 451	REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

DISTRESS IN BUILDINGS

general consideration - distress monitoring- causes of distresses - quality assurance - defects due to climate, chemicals, wear and erosion – inspection - structural appraisal - economic appraisal - causes - diagnosis - remedial measures - thermal and shrinkage cracks - unequal loading - vegetation and trees - chemical action - foundation movements - techniques for repair – epoxy injection.

MOISTURE PENETRATION

Sources of dampness - Moisture movement from ground - Reasons for ineffective DPC - Roof leakage - Pitched roofs - Madras Terrace roofs - Leakage of Concrete slabs -Dampness in solid walls - condensation - hygroscopic salts- remedial treatments - Ferro cement overlay - Chemical coatings - Flexible and rigid coatings

MASONRY AND CONCRETE STRUCTURES

Discoloration and weakening of stones - Biocidal treatments - Preservation -Chemical preservatives - Brick masonry structures -

Distresses and remedial measures – Concrete structures - Causes of deterioration - Diagnosis of causes - Flow charts for diagnosis - methods of repair - Repairing, spalling and disintegration - Repairing of concrete floors and pavements.

STEEL STRUCTURES

Types and causes for deterioration - preventive measures - Repair procedure- Brittle fracture - Lammelar tearing - Defects in welded joints - Mechanism of corrosion - Design to protect against corrosion - Design and fabrication errors - Distress during erection.

STRENGTHENING OF EXISTING STRUCTURES

General principle - relieving loads - Strengthening super structures - plating-Conversion to composite construction - post stressing - Jacketing - bonded overlays- Reinforcement addition - strengthening the substructures - under pinning-Increasing the load capacity of footing

TEXT BOOKS

1. Johnson, S.M., Deterioration, Maintenance and repair of Structures, McGraw-Hill Book Company, New York, 1965.
2. SP25-84 - Hand Book on Causes and Prevention of Cracks on Buildings, Indian Standards Institution, New Delhi, 1984.
3. Richardson, B.A., Remedial Treatment of Buildings, Construction Press, London, 1980.

REFERENCE BOOKS

1. Dension,C Alien and Roper,H., Concrete Structures, Materials, Maintenance and Repair , Longman Scientific and Technical, UK, 1991.
2. Alien, R.T. and Edwards,S.C., Repair of Concrete Structures, Blakie and Sons, UK,1987.

CIV 452	ADVANCED CONCRETE DESIGN	L	T	P	C
		3	0	0	3

LARGE SPAN CONCRETE ROOFS

Classification- Behaviour of Flat slabs- Direct design and equivalent frame method- Codal provisions

FORMS OF SHELLS AND FOLDED PLATES

Structural behaviour of cylindrical shell and folded plate- Method of analysis-beam action, arch action and membrane analysis- Codal provisions- Design of simply supported circular cylindrical long shells and folded plates.

ANALYSIS OF DEEP BEAMS

Design as per IS 456-2000 - Analysis of stresses in concrete chimneys- uncracked and cracked sections- Codal provisions- Design of chimney

OVERHEAD WATER TANKS

Rectangular and circular with flat bottom- spherical and conical tank roofs- staging- Design based on IS 3370

CANTILEVER AND COUNTERFORT RETAINING WALLS

Analysis and Design of cantilever and counterfort retaining walls with horizontal and inclined surcharge.

YIELD LINE ANALYSIS OF SLABS

Virtual work and equilibrium method of analysis- simply supported rectangular slabs with corners held down- uniform and concentrated loads- design of simply supported rectangular and circular slabs

TEXT BOOKS

1. Purushothaman P., Reinforced Concrete Structural Elements-, Tata Mc Graw Hill, New Delhi
2. Ramaswamy, G.S., Design and Construction of Concrete Shell Roofs, Tata Mc Graw Hill, New Delhi, 1998

REFERENCE BOOKS

1. Ashok K Jain , Reinforced Concrete , Nem Chand Bros, Roorkee, 1998.
2. Jain & Jaikrishna, Plain and Reinforced Concrete, Vol. I & II, Nem Chand Bros. Roorkee, 1998.

CIV 453	SMART STRUCTURES AND SMART MATERIALS	L	T	P	C
		3	0	0	3

INTRODUCTION

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

MEASURING TECHNIQUES

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

SENSORS

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

ACTUATORS

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

SIGNAL PROCESSING AND CONTROL SYSTEMS

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

TEXT BOOKS

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

REFERENCES

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

CIV 454	PRE-STRESSED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3

INTRODUCTION – THEORY AND BEHAVIOUR

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

DESIGN

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.

CIRCULAR PRESTRESSING

Design of pre-stressed concrete tanks – Poles and sleepers

COMPOSITE CONSTRUCTION

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

PRE-STRESSED CONCRETE BRIDGES

General aspects – pre-tensioned pre-stressed bridge decks – Post tensioned pre-stressed bridge decks – Principles of design only.

TEXT BOOKS

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

REFERENCES

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

CIV 455	FINITE ELEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

INTRODUCTION – VARIATIONAL FORMULATION

General field 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.

FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS

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.

FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS

Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalized 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.

ISOPARAMETRIC ELEMENTS AND FORMULATION

Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems –

Isoperimetric elements in 1,2 and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS

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.

Introduction To Advanced Topics - Three dimensional problems – Mixed formulation – use of software packages like NISA, ANSYS OR NASTRAN.

TEXT BOOK

1. Chandrupatla, T.R., and Belegundu, A.D., Introduction to Finite Element in Engineering, Third Edition, Prentice Hall, India, 2003.

REFERENCES

1. Reddy J.N., An Introduction to Finite Element Method, McGraw-Hill, Intl. Student Edition, 1985.
2. Zienkiewics, The finite element method, Basic formulation and linear problems,Vol.1, 4/e, McGraw-Hill, Book Co.
3. Rao, S.S., The Finite Element Method in Engineering, Pergaman Press, 2003.
4. Desai, C.S. & Abel J.F., Introduction to the Finite Element Method, Affiliated East West Press, 1972.

CIV 456	SOIL DYNAMICS AND MACHINE FOUNDATIONS	L	T	P	C
		3	0	0	3

INTRODUCTION

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

WAVES AND WAVE PROPAGATION

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

DYNAMIC PROPERTIES OF SOILS

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

DESIGN PROCEDURES

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

VIBRATION ISOLATION

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

TEXT BOOKS

1. Swamisaran, Soil Dynamics and Machine Foundations, Galgotia Publications, Pvt. Ltd., 1999
2. Prakesh S. and Puri V.K, Foundation for machines, McGraw-Hill, New Delhi, 1993
3. Srinivasulu, P and Vaidyanathan, Hand book of Machine Foundations, McGraw-Hill, New Delhi, 1996.

4. Kramar S.L, Geotechnical Earthquake Engineering, Prentice Hall International series, Pearson Education, Singapore, 2000.
5. Kameswara Rao, Dynamics Soil Tests and Applications, Wheeler Publishing, New Delhi, 2003.

REFERENCES

1. Kameswara Rao, Vibration Analysis and Foundation Dynamics, Wheeler Publishing, New Delhi, 1998
2. IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill, 1996.
3. Moore P.J., Analysis and Design of Foundation for Vibration, Oxford and IBH, 1995.

CIV 457	ROCK MECHANICS	L	T	P	C
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CLASSIFICATION AND INDEX PROPERTIES OF ROCKS

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

ROCK STRENGTH AND FAILURE CRITERIA

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

INITIAL STRESSES AND THEIR MEASUREMENTS

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

APPLICATION OF ROCK MECHANICS IN ENGINEERING

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

ROCK BOLTING

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

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.

CIV 458	REINFORCED SOIL STRUCTURES	L	T	P	C
		3	0	0	3

INTRODUCTION

Historical background - Principles of reinforcement of ground- Basic introduction to the elements of ground engineering characteristics of reinforcing materials- definition of reinforced and advantage of reinforced soils

GEOTEXTILES

Definitions, functions, properties, and application of geotextiles, design of Geotextile applications geotextiles associated with other geosynthetics, testing on geotextiles, environmental efforts, ageing and weathering

GEOMEMBRANES

Definitions, functions, properties and applications of geomembranes, design of geomembranes applications Geomembranes associated with other geosynthetics, testing on geomembranes, environmental efforts, ageing and weathering

REINFORCEMENT MECHANISM

Soil reinforcement interaction, behaviour of Reinforced earth walls, basis of wall design, the Coulomb force method, the Rankine force methods, internal and external stability condition, field application of RE, randomly reinforced earth and analysis of reinforced soils, testing of soil reinforcements

APPLICATIONS

Design of reinforced soil structures like retaining walls, embankments, foundation beds, landfills etc.; Case histories of applications.

CIV 459	IRRIGATION WATER MANAGEMENT	L	T	P	C
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IRRIGATION SYSTEM REQUIREMENTS

Irrigation Systems – Supply And Demand Of Water – Cropping Pattern – Crop Rotation – Crop Diversification – Estimation Of Total And Peak Crop Water Requirements – Effective And Dependable Rainfall – Irrigation Efficiencies.

IRRIGATION SCHEDULING

Time Of Irrigation – Critical Stages Of Water Need Of Crops – Criteria For Scheduling Irrigation – Frequency And Interval Of Irrigation

MANAGEMENT

Structural And Non-Structural Strategies In Water Use And Management – Conjunctive Use Of Surface And Ground Waters – Quality Of Irrigation Water.

OPERATION

Operational Plans – Main Canals, Laterals And Field Channels – Water Control And Regulating Structures – Performance Indicators – Case Study.

INVOLVEMENT OF STAKE HOLDERS

Farmer's Participation In System Operation – Water User's Associations – Farmer Councils – Changing Paradigms On Irrigation Management – Participatory Irrigation Management

TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles And Practice", Prentice Hall Of India Pvt. Ltd., New Delhi, 2000.
2. Hand Book On Irrigation Water Requirement, R.T. Gandhi, Et. Al., Water Management Division, Department Of Agriculture, Ministry Of Agriculture, New Delhi.

REFERENCES

1. Hand Book On Irrigation System Operation Practices, Water Resources Management And Training Project, Technical Report No. 33, Cwc, New Delhi, 1990.
2. Maloney, C. And Raju, K.V., "Managing Irrigation Together", Practice And Policy In India, Stage Publication, New Delhi, India, 1994.

CIV 460	HIGHWAY AND AIRPORT PAVEMENT SYSTEMS	L	T	P	C
		3	0	0	3

GENERAL PRINCIPLES OF PAVEMENT DESIGN

Components, Factors affecting pavement stability – vehicle and traffic factors, Moisture Factors – Climatic Factors, Soil Factors, Comparison of highway and Airport pavements.

FLEXIBLE AND RIGID PAVEMENT DESIGN METHODS

Various methods of flexible and Rigid pavement design

PAVEMENT MATERIALS AND CONSTRUCTION METHODS

Soil sub grade – Stone aggregates – Bituminous materials – Portland Cement – Characteristics and Desirable Properties – Tests, Construction Methods.

DRAINAGE AND DRAINAGE STRUCTURES

Surface and sub-surface drainage structures – Design of drainage system and Cross Drainage Structures – Drainage for Hill Roads.

HIGHWAY MANAGEMENT

Pavement Distress – Pavement Evaluation and Strengthening – Pavement Management System – Highway maintenance.

TEXT BOOK

1. S.K. Sharma, Principles, Practice and Design of Highway Engineering, C. Chand and Company Ltd., New Delhi, 1985.

REFERENCES

1. Sharma S.K. and Justo, Highway Engineering, Chand and Co., Roorkee, 1998.
2. Robert F. Baker, (Eds), Handbook of Highway Engineering Van Nostrand Reinttold Company, New York, 1975.

3. Bindra S.P., A Course in Highway Engineering, Dhanpet Raj Publications, New Delhi, 1999.

CIV 461	TRAFFIC ENGINEERING	L	T	P	C
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COMPONENTS OF TRAFFIC ENGINEERING

Role of Traffic Engineering – Road user characteristics – Static & Dynamic Characteristics of vehicle – Statistical techniques and application.

SURVEYS AND STUDIES IN TRAFFIC ENGINEERING

Traffic data nature and need – Volume capacity studies – Speed delay studies – Origin & Destination studies – Parking management – Pedestrian path & cycle track design.

TRAFFIC FLOW CHARACTERISTICS

Speed density flow characteristic, Basic diagram of traffic flow, level of service concepts – Capacity under heterogeneous condition – Urban and Rural condition - Factors affecting traffic flow characteristic – Street Lighting

INTERSECTIONS AND INTER-CHANGES DESIGN

Cross sectional elements, types of intersections and inter-changes – Design Principles – Rotary Design – Delays at intersections – Computer applications in intersection design.

TRAFFIC CONTROL & MANAGEMENT

Traffic Signs, Marking – Types, standard and Location, Road furniture, Parking Regulation, Accident Analysis – Traffic and Environment – Traffic Restraint technique – Low cost traffic management techniques – Transport system management – Travel Demand management.

TEXT BOOK

1. Traffic Engineering and Transport Planning – Kadiyali L.R. Khanna Publishers, 1999.)

REFERENCE

1. Taylor M.A.P. and W. Young, Traffic Analysis – New Technology and New solutions, Harg reen Publishing Company, 1988.

CIV 462	COMPUTER APPLICATIONS IN TRAFFIC ENGINEERING	L	T	P	C
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CAD AND GIS APPLICATIONS

Preparation of CAD drawings for highway elements and transportation infrastructure – Road network mapping – GIS application.

COMPUTER AIDED HIGHWAY DESIGN AND PAVEMENTS MANAGEMENT SYSTEM

Design of highway geometric elements, Pavement Management Systems.

COMPUTER APPLICATIONS

Highway Planning, Route location, Geometric Calculation, Earthwork computations, Soil Engineering, pavement design.

COMPUTER BASED HIGHWAY MANAGEMENT

Pavement Distress – Pavement Evaluation and Strengthening – Pavement Management System – Highway Maintenance.

COMPUTER APPLICATIONS IN TRAFFIC ENGINEERING AND TRANSPORT PLANNING

Signal design and Signal coordination, Network analysis. Application of software like Mix Road, heads etc.

REFERENCES

1. Auto CAD reference Manual.
2. Khannan, S.K. and C.E.G. Justo, Highway Engineering, New Chand & Brothers, Roorkee, 1988.
3. Robert F. Baker (Eds), Hand book of Highway Engineering, Van Nonstandard Keinhold Company, New York, 1975.

CIV 463	SOLID WASTE MANAGEMENT	L	T	P	C
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SOURCES AND TYPES OF MUNICIPAL SOLID WASTES

Sources and types of solid wastes - 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.

ON-SITE STORAGE & PROCESSING

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.

COLLECTION AND TRANSFER

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

OFF-SITE PROCESSING

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

DISPOSAL

Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

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.

CIV 464	INDUSTRIAL WASTE WATER MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Industrial activity and Environment – Sources and types of industrial wastewater – Industrial wastewater and environmental impacts – Industrial waste survey – Industrial wastewater generation rates, characterization and variables – Population equivalent – Toxicity of industrial effluents and Bioassay tests.

INDUSTRIAL POLLUTION PREVENTION

Prevention Vs Control of Industrial Pollution – Benefits and Barriers – Source reduction techniques – Waste Audit – Evaluation of Pollution prevention options – Environmental statement as a tool for pollution prevention – Waste minimization .

INDUSTRIAL WASTEWATER TREATMENT

Equalisation - Neutralisation – Oil separation – Flotation – Precipitation – Aerobic and anaerobic biological treatment – Wet Air Oxidation – Evaporation – Ion Exchange – Membrane Technologies

WASTEWATER REUSE AND RESIDUAL MANAGEMENT

Individual and Common Effluent Treatment Plants – Joint treatment of industrial wastewater - Quality requirements for Wastewater reuse – Industrial reuse – Disposal on water and land – Residuals of industrial wastewater treatment – Quantification and characteristics of Sludge – management.

CASE STUDIES

Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – Sugar and Distilleries

REFERENCES

1. Eckenfelder, W.W., Industrial Water Pollution Control, McGraw-Hill, 1999.
2. Arceivala, S.J., Wastewater Treatment for Pollution Control, Tata McGraw-Hill, New Delhi, 1998.
3. Frank Woodard Industrial waste treatment Handbook, Butterworth Heinemann, New Delhi, 2001.
4. World Bank Group Pollution Prevention and Abatement Handbook – Towards Cleaner Production, World Bank and UNEP, Washington D.C.1998.
5. Paul L. Bishop Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.

CIV 465	SOLID AND HAZARDOUS WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Elements of solid waste management - Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes.

WASTE CHARACTERISATION AND SOURCE REDUCTION

Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – Source reduction of wastes – Recycling and reuse.

STORAGE, COLLECTION AND TRANSPORT OF WASTES

Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Transfer and transport –compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport.

WASTE PROCESSING TECHNOLOGIES

Objectives of waste processing – material separation and processing technologies –methods and controls of Composting – incineration – solidification and stabilization of hazardous wastes

WASTE DISPOSAL

Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills

REFERENCES

1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil "Integrated Solid Waste Management, McGraw- Hill International edition, New York, 1993
2. CPHEEO "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation, Government of India, New Delhi, 2000.
3. Micheael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, McGraw-Hill International edition, New York, 2001
4. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.

CIV 466	PROFESSIONAL PRACTICES IN CIVIL ENGINEERING	L	T	P	C
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PROFESSIONAL PRACTICE

Technical, legal, and ethical considerations in civil engineering practice - examination of contract specifications and technical specification writing.

Fundamentals of Construction Engineering - Introduction to concepts required by professionals involved in the construction industry- Contracts, bidding, estimating, scheduling- Cash flow, Safety, Labor issues- Equipment ownership - Productivity.

HEAVY CONSTRUCTION

Conventional heavy construction - equipment, methods, and practice - planning for critical operations - modeling and simulation, safety - Field studies.

VALUE MANAGEMENT PROCESS

Industry value management processes - Value engineering and LCC- individual value engineering- process simplification- function analysis concept development- design to capacity- constructability, modularization and preassembly- Design effectiveness.

Industry value management processes - mechanical reliability modeling- predictive maintenance- design for maintainability- waste minimization and pollution prevention- sustainable design and construction- planning for startup- lean construction- value engineering change proposals- post-occupancy evaluation- knowledge management and lessons learned systems.

PLANNING & CONTINUOUS QUALITY IMPROVEMENT

Principles and applications for effective early planning of capital facilities- finance, economic decision making- risk management- team alignment - pre-project planning processes and tools.

History- Concepts and principles of continuous quality improvement (CQI) in organizations - Implementation of CQI in engineering and construction companies and projects-Use of statistical process control and management and planning tools in engineering and construction applications.

ADVANCED LEGAL CONCEPTS

Contracts, documentation requirements, claims avoidance, and settlement of claims by alternative dispute resolution. Students conduct and present in-depth studies of the most frequent causes of claims (delay, disruption, acceleration, soil conditions, and changes) and consider the way the court establishes causation and determines damages.

TEXT BOOK

1. Roshan H Namawathi, Professional Practice, Lakshmi publications, fifth edition, New Delhi, 1998.

CIV 467	HOUSING PLANNING AND MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION TO HOUSING

Definition of basic terms – house, home, household, apartments, multi-storeyed buildings, special buildings- Objectives and strategies of national housing policies, Principle of sustainable housing- Housing Laws at State level, Bye-laws at urban and rural local bodies – levels - Development control regulations- Institutions for housing at national, state and local levels

HOUSING PROGRAMMES

Basic Concepts - Contents and standards for housing programme - Sites and services- neighborhoods- open development plots, apartments, rental housing, co-operative housing, slum housing programme- role of public, private and non-government organizations.

PLANNING AND DESIGN OF HOUSING PROJECTS

Formulation of housing projects – Site analysis- Layout design- Design of housing units (Design Problems)

CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS

New constructions techniques – Cost effective modern construction materials, building centers – concept, functions and performance evaluation

HOUSING FINANCE AND PROJECT APPRAISAL

Appraisal of housing projects – Housing finance, Cost recovery – Cash flow analysis, Subsidy and cross subsidy, Pricing of housing units, rents, recovery pattern (Problems).

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.

CIV 468	CONSTRUCTION PLANNING AND MANAGEMENT	L	T	P	C
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CONSTRUCTION PLANNING

Basic concepts in the development of construction plans- Choice of technology and construction method-Defining work tasks-Definition- precedence relationships among activities-Estimating activity durations-Estimating resource requirements for work activities-coding systems

SCHEDULING PROCEDURES AND TECHNIQUES

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences - Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software

COST CONTROL MONITORING AND ACCOUNTING

The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information

QUALITY CONTROL AND SAFETY DURING CONSTRUCTION

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

ORGANIZATION AND USE OF PROJECT INFORMATION

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow

TEXT BOOKS

1. Chitkara, K.K., Construction Project Management Planning, Scheduling and Control, Tata McGraw Hill Publishing Co., New Delhi, 1998.
2. Dhir, B.M., Construction Planning and Management, New Age International Publishers, New Delhi, 2005

REFERENCES

1. Moder.J., C.Phillips and Davis, Project Management with CPM, PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.

2. Willis., E.M., Scheduling Construction Projects , John Wiley and Sons, New Delhi 1986.
3. Halpin,D.W., Financial and Cost Concepts for Construction Management, John Wiley and Sons, New York, 1985.
4. Cliff Schexnayder, Construction Management Fundamentals, Tata McGraw-Hill, New Delhi, 2006
5. Donald S.Barrie & Boyd C.Paulson, Professional Construction Management, Tata McGraw-Hill, New Delhi, Third Edition, 2006.

MINOR ELECTIVES

CHE311	CORROSION SCIENCE AND ENGINEERING	L	T	P	C
		3	0	0	3

CORROSION

Corrosion - Definition, classification, forms of corrosion, expressions for corrosion rate, emf and galvanic series , merits and demerits, Pourbaix diagram for iron, magnesium and aluminium - Forms of corrosion, Uniform, pitting, intergranular, stress corrosion - Corrosion fatigue - Dezincification - Erosion corrosion - Crevice corrosion - Cause and remedial measures, Pilling Bedworth ratio, High temperature oxidation

BOILERS

Boiler water corrosion by carbon dioxide and unstable salts - Corrosion prevention methods by treatment cooling water, specification, types of scales and causes, use of antiscalant - Water treatments - Maintenance of boilers - Protection of boilers during off loading, high temperature, corrosion, turbine corrosion - Corrosion inhibitors, principles and practice, inhibitors for acidic neutral and other media - Corrosion failure - Inspection and analysis of corrosion damage

CORROSION TESTING

Purpose of corrosion testing, classification, susceptibility tests for intergranular corrosion, stress corrosion test, salt spray test, humidity and porosity tests, accelerated weathering tests - ASTM standards for corrosion testing

POLARIZATION

Polarization - Exchange current density, Activation polarization, Tafel Equation , Passivating metals and nonpassivating metals, Effect of oxidizing agents

ELECTROLESS PLATING AND ANODISING

Electroless plating and Anodizing - Cathodic protection, metallic, organic and inorganic coatings, corrosion inhibitors - Special surfacing processes - CVD and PVD processes, sputter coating - Laser and ion implantation, arc spray, plasma spray, flame spray, HVOF

TEXT BOOKS

1. Fontana and Greene., Corrosion Engineering, McGraw Hill Book Co, New York, 1983
2. Raj Narayan ., An Introduction to Metallic Corrosion and its prevention, Oxford and IBH, New Delhi, 1983

REFERENCES

1. Budinski, K.G., Surface Engineering for Wear Resistance, Prentice Hall Inc., Engelwood Cliff, New Jersey, USA, 1988
2. Uhlig, H.H ., Corrosion and Corrosion Control , John Wiley and Sons, New York, USA, 1985

MEC308	MECHATRONICS	L	T	P	C
		3	0	0	3

INTRODUCTION

Introduction to Mechatronics-Systems-Measurement Systems-Control Systems-Mechatronics Approach.

SENSORS AND SIGNAL PROCESSING

Introduction-Performance Terminology-Displacement, Position and Proximity-Velocity and Motion-Fluid Pressure-Temperature Sensors-Light Sensors-Selection of Sensors-Signal Processing.

MICROPROCESSORS AND APPLICATIONS

Introduction-Architecture-Pin - Configuration-Instruction - set-Programming of Microprocessors using 8085instructions-Interfacing

input and output devices-Interfacing D/A converters and A/D converters-Applications-Temperature control-Stepper motor control-Traffic light controller.

TIMERS, RELAYS AND COUNTERS

Introduction-Basic structure - Input/Output Processing – Programming – Mnemonics - Timers, Internal relays and counters-Data handling-Analog Input/Output-Selection of a PLC.

DESIGN AND CASE STUDIES

Stages in Designing Mechatronic systems - Traditional and Mechatronic design -Possible design solutions-Case studies of Mechatronic systems - Pick and place robot - automatic car park system -engine management system.

TEXT BOOKS

1. W. Bolton, Mechatronics, Longman, Second Edition, 1999.
2. Michael B. Histand and David G.Alciatore, Introduction to Mechatronics and Measurement Systems, McGraw Hill International Editions, 1999.
3. HMT Ltd., Mechatronics, Tata McGraw Hill Publishing Co. Ltd., 1998

REFERENCES

1. Bradley ,D.A., Dawson, D.,.Buru, N.C., and.Loader, A.J., Mechatronics , Chapman and Hall, 1993.
2. Ram, K, Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications, Fourth Revised Edition, 1999.

MEC323	MATERIALS MANAGEMENT	L	T	P	C
		3	0	0	3

FUNCTIONS OF MATERIALS MANAGEMENT

Introduction to Materials Management - Objectives - Organizations - Functions - Material Circle - Administration - Integrated approach - Relationship with other department.

PURCHASING MANAGEMENT

Purchasing policies and procedures-Legal aspects-Selection of sources of supply-Make or buy decision-Vendor development-Vender evaluation and rating-Methods of purchasing-Value analysis-Imports-Capital purchasing Ethics.

STORES MANAGEMENT

Store function-Location-Layout, safety tools stores-Inventory-Stock taking-Materials handling – Transportation – Insurance – Standardization -Variety reduction - Materials accounting-Information systems.

INVENTORY MANAGEMENT

Forecasting-ABC analysis- VED, and other classifications EOQ - Spare parts-Management Inventory systems-Quantity, Periodic-Deterministic and probabilistic models-Static inventory model – Reorder point – Lead Time Analysis – Safety stocks Materials requirement planning - Materials Problems in Indian Conditions, Inventory Audit and Information Systems.

TEXT BOOKS

1. Lamer Lee and Donald W Dobler, Purchasing and Materials Management, Text and cases ,Tata McGraw-Hill, New Delhi 1996.
2. Gopalakrishnan P. Purchasing and Materials Management, Tata Mcgraw Hill Publishing Co. Ltd. New Delhi, 2000.

REFERENCES

1. Gopalakrishnan P. , Handbook of Materials Management, Prentice Hall of India,
2. New Delhi 1996.
3. Guptha, P.K and Manmohan, Problem in Operation Research, Sultan Chand & Sons, 1994.
4. Starr & Miller, Inventory Control Theory and Practice, Prentice Hall of India, NewDelhi, 1989.
5. Ahuja, K.K., Material Management, CBS Pub., NewDelhi, l992.
6. Lee J.Krajewski, Larry P.Ritzman, Operations Management Strategy and Analysis Addison, Wesley, 1999.

MEC326	COMPOSITE MATERIALS SCIENCE	L	T	P	C
		3	0	0	3

INTRODUCTION TO COMPOSITE MATERIALS

Introduction to material science - conventional materials - limitations of conventional materials - definition of composite materials - types and characteristics - applications.

METAL MATRIX COMPOSITES (MMC) AND POLYMER MATRIX COMPOSITES (PMC)

MMC – Introduction – processing - microstructure characterization - micromechanics and mechanics of deformation – applications – PMC – introduction – types – fillers – manufacturing processes – applications.

FABRICATION PROCESSES

Fundamentals - bag moulding - compression moulding pultrusion-filament winding - other manufacturing process - quality inspection and non-destructive testing.

TESTING OF COMPOSITES

Introduction to micro-mechanics-unidirectional lamina - laminates – inter-laminar stresses - static mechanical properties - fatigue properties - impact properties - environmental effects - fracture mechanics and toughening mechanisms, damage prediction, failure modes.

FAILURE PREDICTIONS

Failure predictions - design considerations - joint design - codes - design examples - optimization of laminated composites - application of FEM for design and analysis of laminated composites.

TEXT BOOK

1. Ronald Gibson, Principles of Composite Material Mechanics, Tata McGraw Hill, New Delhi, 1994.

REFERENCES

1. Micael hyer, Stress Analysis of Fiber - Reinforced Composite Materials, Tata McGraw Hill, New Delhi, 1998.
2. Mallicak, P.K., Fiber-reinforced composites, Monal Deklar Inc., New York, 1988.
3. Agarwal, B.D., and Broutman, L.J., Analysis and Performance of Fiber Composites, John Wiley and Sons, New York, 1980.

		L	T	P	C
EEE365	**ELECTRICAL MACHINES**	**3**	**0**	**0**	**3**

D.C. MACHINES

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators –Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors.

TRANSFORMERS

Constructional details – Principle of operation – emf equation – Transformation ratio – Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit – Transformer on load – Regulation.

INDUCTION MOTORS

Construction – Types – Principle of operation of three phase induction motors – Equivalent circuit - speed control –Single phase induction motors.

SYNCHRONOUS MACHINES

Construction of synchronous machines-Types – Induced emf – Voltage regulation- Generator-Load Characteristics –Synchronous motor.

SPECIAL MACHINES

Brushless DC motor – Reluctance motor – Hysteresis motor – Stepper motors-Universal motor.

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, Basic Electrical Engineering, TMH, 2nd Edition, 2002.
2. BL. Theraja and A.K. Theraja, Electrical Technology –Volume 2, S.Chand & Co., 2004.

REFERENCES

1. S.K.Bhattacharya, Electrical Machines, TMH, 2nd Edition, 1998.
2. S.K.Pillai, A First Course on Electrical Drives, New Age International, 2nd Edition, 2002.

ECE 201	ELECTRON DEVICES	L	T	P	C
		3	1	0	4

ELECTRON BALLISTICS AND INTRINSIC SEMICONDUCTORS

Energy band structure of conductors, semiconductors and insulators – Density distribution of available energy states in semiconductors – Fermi - Diac probability distribution function at different temperatures – Thermal generation of carriers – Calculation of electron and hole densities in intrinsic semiconductors – Intrinsic concentration – Mass Action Law

SEMICONDUCTOR AND PN JUNCTIONS

Majority and Minority charge carriers – Mobile charge carriers and immobile ions – Drift current in good conductors – PN junction – formation of depletion layer – junction or barrier voltage – forward biased PN junction – reverse biased PN junction – reverse saturation current – Forward & reverse V/I characteristics – junction breakdown – junction capacitance – equivalent circuit of a PN junction – Mechanism of avalanche and Zener breakdown

BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS

Construction of PNP and NPN transistors – BJT current components – Emitter to Collector and Base to Collector current gains – CB and CE characteristics – Breakdown characteristics – Ebers - Moll model – Transistor switching times – Construction and Characteristics of JFET – Relation between Pinch off voltage and drain current – MOSFET – Enhancement and depletion types

METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES

Metal Semiconductor Contacts – Energy band diagram of metal semiconductor junction – Schottky diode and ohmic contacts. Power control devices – Characteristics and equivalent circuit of UJT – intrinsic stand off ratio – PNPN diode – Two transistor model, SCR, Triac, Diac and IGBT

OPTOELELECTRONIC AND OTHER DEVICES

Spectral Response of Human Eye – Light Emitting Diode – Photo emissive devices – Photomultiplier Tube – PhotoVoltaic devices – Bulk Type – Photoconductive Cells – Photodiodes – PN junction Photodiode – PIN Photodiode – Avalanche Photodiode – Piezoelectric Crystals – Voltage Variable Capacitor Diodes – Thermistors – Tunnel Diodes – Tunnel Diode Circuits

TEXT BOOKS

1. Jacob Millman, Christos C.Halkias, Electronic Devices and Circuits, TMH , 1991
2. David A. Bell, Electronic Devices and Circuits, PHI., 3rd Edition, 1998

REFERENCES

1. Donald A.Neaman, Semiconductor Physics and Devices, TMH, 3rd Edition., 2002
2. A.P. Malvino, Electronic Principles, TMH, 3rd Edition, 27th Reprint, 2002
3. Ben G. Streetman, Sanjay Banarjee, Solid state electronic devices, PHI, 5th Edition, 2005.
4. Thomas L Floyd, Electronic Devices (Conventional Flow Edition), Pearson Education, 7th Edition, 2005.

CSE 206	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

INTRODUCTION

Introduction to OOP – Basic Concepts of OOP – Applications of OOP. Introduction to C++ - Introduction to C++ stream I/O – declarations in C++ - Creating New data types in C++ - function Prototypes – Inline functions – Reference Parameters – Const Qualifier – Dynamic memory allocation –Default arguments – Unary Scope resolution operator – Linkage specifications .

CLASSES, CONSTRUCTORS AND FRIEND CLASS

Introduction – Comparing class with Structure – Class Scope – Accessing Members of a class – Constructor – Destructor – Const objects – Const member functions – Friend class –Friend function – This pointer – Data abstraction and Information hiding–Container classes and Iterators.

OVERLOADING & INHERITANCE

Operator Overloading – Fundamentals – Restrictions – Overloading stream – Insertion and stream extraction operators – Overloading unary & binary operators – Converting between types – Overloading ++ and --. Inheritance – Introduction – Protected members – Casting base _class pointers to derived _class pointers – Overloading Base class members in a Derived class – Public, Protocols and Private inheritance – Direct base classes and Indirect Base Classes – Using Constructors and Destructors in Derived classes – Implicit Derived class object to base class object conversion.

VIRTUAL FUNCTIONS, STREAMS AND FILES

Introduction – Type fields and switch statements – Virtual functions – Abstract base classes and concrete classes – Polymorphism – Dynamic binding – Virtual destructors. C++ Stream I/O: Streams – Stream Input – Stream Output – Unformatted I/O – Stream

manipulators – Stream format states – Stream error – States. Files: File Operations –File pointers – Errors handling during file Operations.

TEMPLATES & EXCEPTION HANDLING

Templates – Function templates – Class templates – Overloading template functions – Class template and non type parameters – Templates with Multiple parameters.

Exception handling: When exception handling – Basic of C++ exception – Catching an exception –Re throwing an exception – Exception specifications.

TEXT BOOK

1. Goran Svenk, Object-Oriented Programming Using C++ for Engineering and Technology, Thomson Delmer Learning, 2003.

REFERENCES

1. John R.Hubbard, Programming with C++, Schaums outline series, TMH 2003.
2. Deitel H.M., & Deitel P.J., "How to program C++", PHI 2003.
3. Timothy Budd, An Introduction to OOP, Addison Wesley , 1991.
4. Venugopal, K.R., Rajkumar Buyya,.Ravishankar, T., Mastering C++,TataMcGrawHill, New Delhi, 2004.
5. Bjarne Struoustrup, The C++ Programming Language, Addison Wesley, 2000.

INT355	INTERNET AND WEB TECHNOLOGY	L	T	P	C
		3	0	0	3

BASICS OF NETWORKS

Introduction to Internet and Web – Basics of computer networks – Topologies – signaling methods – Internet and its basics – Web servers – Browsers – Issues for the design of networking – Security issues.

WEBSITE AND WEBCASTING TECHNIQUES

Introduction – Creation of a website – Hyper text and HTML – Document structuring tags – Dynamic HTML – XML – Search Engines – Tools – Channels Push Technology.

JAVA PROGRAMMING

Language basics – Java classes – constructors – Java objects and their creations – Interfacing methods – Classes – Data encapsulation techniques – Java IO.

JAVA COMPONENTS / NETWORK PROGRAMMING

Computer Interface – Creation of GUI – Applets – Java Beans – CORBA – EJBs – Network Programming – Socket creation – URL classes – Socket classes – Programming for security.

DYNAMIC FUNCTIONALITY IN WEB PAGES

CGI – Four steps for CGI – Script specification – CGI Script languages – Dynamic page functionalities using servelets – JSPs – ASPs – COMs – DCOMs,.

TEXT BOOK

1. RajKamal, Internet and Web Technologies, TMH, 2005.

REFERENCE

2. Markur Pope, Mastering Internet Programming , Galgotia Publications, 1996.

HUMANITIES ELECTIVES

HSS001	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION TO QUALITY MANAGEMENT

Definitions – TOM framework, benefits, awareness and obstacles - Quality – vision, mission and policy statements - Customer Focus – customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product and service quality. Cost of quality.

PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology.

STATISTICAL PROCESS CONTROL AND PROCESS CAPABILITY

Meaning and significance of statistical process control (SPC) – construction of control charts for variables and attributed - Process capability – meaning, significance and measurement – Six sigma concepts of process capability - Reliability concepts – definitions, reliability in series and parallel, product life characteristics curve - Business process re-engineering (BPR) – principles, applications, reengineering process, benefits and limitations.

TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT

Quality functions development (QFD) – Benefits, Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation.

TAGUCHI TECHNIQUES

Taguchi techniques – introduction, loss function, parameter and tolerance design, signal to noise ratio - Seven old (statistical) tools - Seven new management tools - Bench marking and POKA YOKE.

REFERENCES

1. Dale H.Besterfield et al, Total Quality Management, Perarson Education, Thrid edition, (First Indian Reprints 2004).
2. Shridhara Bhat K, Total Quality Management – Text and Cases, Himalaya Publishing House, First Edition, 2002.
3. William J.Kolarii, Creating quality, Mcgraw Hill, 1995
4. Poornima M.Charantimath., Total quality management, Pearson Education, First Indian Reprint, 2003.

HSS002	ENGINEERING MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Demand and Revenue Analysis - Demand Forecasting - Production Analysis - Cost and Supply Analysis, Price and output Determination - Investment Analysis - Plant Location - Economic Optimization.

FORMS OF BUSINESS AND FUNCTIONS

Types of Business Organisation, Forms - Planning - Organizing - Designing effective organisations - Coordination

HUMAN RESOURCE DEVELOPMENT

Motivating individuals and workgroups - Leadership for Managerial Effectiveness - Team working and Creativity - Managerial Communication - Personal Management – Time Management - Stores Management - Career Planning.

FINANCIAL MANAGEMENT

Product development - Management techniques in product development - Nature of controlling - Operations Management - Just-in-Time.

GLOBAL ENVIRONMENT

Managing World Economic Change - The global environment - Multinational Strategies - Economic Cycles and Director Investment - Change and Organisation Development - Managerial Ethics and Social responsibilities.

REFERENCES

1. Gail Freeman-Bell and Janes Balkwill, “Management in Engineering - Principles and Practive”, Prentice Hall of India Pvt. Ltd., 1998.
2. Gene Burlon and Manab Thaker, “Management Today Principles and Practice”, Tata McGraw Hill, 1995.
3. M. Joseph, Putti Management - "A Functional Approach”, McGraw Hill, 1999.
4. R.R. Barathwal, “Engineering Economics”, McGraw Hill, 1997.

HSS003	INDIAN ECONOMIC DEVELOPMENT	L	T	P	C
		3	0	0	3

INDIAN ECONOMIC SCENARIO

Indian economy before and after Independence - National income trends and compositions. Sources of capital formation and savings - Sectoral growth. Demographic trends in India and its effect on economic development - Occupational structure of the labour force.

ECONOMIC PLANNING AND POLICY

Indian Economic Planning, fiscal policy, Monetary Policy, Unemployment in India and other economic policies

INDUSTRIAL DEVELOPMENT

Industry: Industrial development during the planning period - Industrial policies Industrial licensing policy – MRTP Act, FERA and FEMA - Growth and problems of small-scale industries - Role of Public sector enterprises in India's industrialization. Impact of economic reforms on Indian industrial sector after 1991.

FOREIGN TRADE

External Sector - Role of foreign trade. Trends in exports and imports - Composition and direction of India's foreign trade - Balance of payments crisis and the New Economic Reforms – Export promotion measures and the new trade policies - Foreign capital – FDI, aid: Multinational corporations in India

ISSUES

Important Areas of Concern - Poverty and inequality. Unemployment. Rising prices. Industrial relations. Industrial structure and causes of industrial backwardness.

REFERENCES

1. Agrawal, A.N. Indian Economy. Problems of Developmental Planning, Wiley Eastern Ltd., Calcutta, latest edition.
2. Ahluwalia, I.J. and I.M.D. Little (eds.), India's Economic Reforms and Development, Essays in honour of Manmohan Singh, Oxford University Press, New Delhi, 1999.
3. Alam, K., Agricultural Development in North East India: Constraints and Prospects, Deep & Deep Publications, New Delhi, 1993.
4. Choudhuri, Pramit. Aspects of Indian Economic Development, Lord George Allen & Unwin Ltd., London, 1975.
5. Dutt, R.C., The Economic History of India Under Early British Rule, Low Price Publications, Delhi, 1950.
6. Dutt, Ruddar and K.P.M. Sundaram, Indian Economy, S. Chand & Co. Ltd., New Delhi, 2001.

HSS004	INDUSTRIAL PSYCHOLOGY	L	T	P	C
		3	0	0	3

INTRODUCTION

The role of the psychologist in industry, the field of occupational Psychology - Study of behaviour in work situation and applications of Psychological principles to problems of selection, Placement, Counseling and training

DESIGN OF WORK ENVIRONMENTS,

Human engineering and physical environment techniques of job analysis, Social environment- Group dynamics in Industry Personal psychology - Selection, training, placement, promotion, counseling, job motivations, job satisfaction .Special Study of problem of fatigue, boredom and accidents,

UNDERSTANDING CONSUMER BEHAVIOUR

Consumer behaviour; study of consumer preference, effects of advertising, Industrial morale - the nature and scope of engineering psychology, its application to industry

WORK METHODS

Efficiency at work, the concept of efficiency, the work curve, its characteristics - The work methods; hours of work, nature of work, fatigue and boredom, rest pauses. The personal factors; age abilities, interest, job satisfaction The working environment - noise, illumination, atmospheric conditions - Increasing efficiency at work; improving the work methods, Time and motion study, its contribution and failure resistance to time and motion studies, need for allowances in time and motion study.

WORK AND EQUIPMENT DESIGN

Criteria in evaluation of job-related factor, job design, human factors, Engineering information, input processes, mediation processes, action processes, methods design, work space and its arrangement, human factors in job design. Accident and Safety - The human and economic costs of accidents, accident record and statistics, the causes of accidents situational and individual factors related to accident reduction

REFERENCES

1. Tiffin,J and McCormic E.J., Industrial Psychology, Prentice Hall, 6th Edn., 1975.
2. McCormic E.J., Human Factors engineering and design, McGraw Hill, 4th Edn.,1976. Mair, N.R.F., Principles of Human relations

HSS006	PROFESSIONAL ETHICS	L	T	P	C
		3	0	0	3

ENGINEERING ETHICS

Functions of Being a Manager – Stock holder and stakeholder management - Ethical treatment of employees - ethical treatment of customers- supply chain management and other issues.

ENGINEERING AS SOCIAL EXPERIMENTATION

Senses of 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.

ENGINEER RESPONSIBILTY FOR SAFETY

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

RESPONSIBILITY AND RIGHTS

Moral imagination, stake holder theory and systems thinking - One approach to management Decision – making Leadership.

GLOBAL ISSUES

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.

REFERENCES

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.
3. Laura Schlesinger, How Could You Do That: The Abdication of Character, Courage, and Conscience, Harper Collins, New York, 1996.
4. Stephen Carter, Integrity, Basic Books, New York, 1996.
5. Tom Rusk, The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life, Viking, New York, 1993.

HSS008	BASICS OF ECONOMICS	L	T	P	C
		3	0	0	3

DEFINITION AND SCOPE OF ECONOMICS

Definitions by A. Smith, A. Marshal and L. Robbins, P.Samuelson and their critical examination - Nature and scope of Economics - Micro-economics in relation to other branches of Economics.

LAW OF DEMAND

Elasticity of demand - price, income and cross, concepts and measurement - Marshallian theory of consumers' behaviour and its critical examination - Indifference curve analysis - Price, income and substitution effects - Giffen goods- Engel curve.

MARKET STRUCTURE

Definition of market. Concepts of product and factor markets. Different types of market: perfect competition, monopoly, imperfect competition, monopolistic, competition and oligopoly. Demand and Supply schedules. Price determination under perfect competition in long and short run. Price determination under monopoly. Discriminating monopoly.

MACRO-ECONOMICS

Meaning, Macro-economic Policy and Its Objectives and Instruments - National Income and Social Accounting - Concepts, components, and measurement - Basic circular flow of income model, Unemployment, trade cycle, Inflation - causes, types, effects and control.

COMMERCIAL AND CENTRAL BANKS

Credit creation, monetary policy and tools - Balance of payments - Items in the balance of payments account, equilibrium in the balance of payments.

REFERENCES

1. Ackley, G., Macroeconomics: Theory and Policy, Macmillan Publishing Company, New York, 1978.
2. Gupta, S.B., Monetary Economics, S. Chand & Co., New Delhi, 1994.
3. Ruddar Datt and K.P.M.Sundharam, Indian Economy, S.Chand & Company Ltd., New Delhi, 2003.
4. Kindleberger, C.P., R.D. Irwin, International Economics, Home Wood, 1973.
5. Lewis, M.K. and P.D. Mizan, Monetary Economics, Oxford University Press, New Delhi, 2000.
6. Ahuja H.L., Economic Environment of Business, Macroeconomic analysis, S.Chand & Company Ltd., New Delhi, 2005.
7. Gupta, G.S. Macroeconomics, Theory and Applications, Tata McGraw-Hill publishing company Ltd., New Delhi, 2001.
8. D.N.Dewedi, Macro economic – Theory and policy, Tata McGraw-Hill publishing company Ltd., New Delhi, 2001.

HSS010	INTERNATIONAL TRADE AND FINANCE	L	T	P	C
		3	0	0	3

INTERNATIONAL TRADE

International Trade – Meaning and Benefits – Basis of International Trade – Foreign Trade and Economic Growth – Balance of Trade – Balance of Payment – Current Trends in India – Barriers to International Trade – WTO – Indian EXIM Policy.

EXPORT AND IMPORT FINANCE

Special need for Finance in International Trade – INCO Terms (FOB, CIF, etc.,) – Payment Terms – Letters of Credit – Pre Shipment and Post Shipment Finance – Forfeiting – Deferred Payment Terms – EXIM Bank – ECGC and its schemes – Import Licensing – Financing methods for import of Capital goods.

FOREX MANAGEMENT

Foreign Exchange Markets – Spot Prices and Forward Prices – Factors influencing Exchange rates – The effects of Exchange rates in Foreign Trade – Tools for hedging against Exchange rate variations – Forward, Futures and Currency options – FEMA – Determination of Foreign Exchange rate and Forecasting.

DOCUMENTATION IN INTERNATIONAL TRADE

Export Trade Documents - Financial Documents – Bill of Exchange- Type- Commercial Documents - Performa, Commercial, Consular, Customs, Legalized Invoice, Certification of Origin Certificate Value, Packing List, Weight Certificate, Certificate of Analysis and Quality, Certificate of Inspection, Health certificate. Transport Documents - Bill of Landing, Airway Bill, Postal Receipt, Multimodal Transport Document. Risk Covering Document: Insurance Policy, Insurance Cover Note. Official Document: Export

Declaration Forms, GR Form, PP From, COD Form, Softer Forms, Export Certification, Certification of Origin, GSPS – UPCDC Norms

EXPORT PROMOTION SCHEMES

Government Organizations Promoting Exports – Export Incentives : Duty Exemption – IT Concession – Marketing Assistance – EPCG, DEPB – Advance License – Other efforts I Export Promotion – EPZ – EQU – SEZ and Export House.

REFERENCES

1. Adrian Buckley, Multinational Finance, Prentice Hall of India, 3rd edition-1998.
2. Levi, International Finance, Tata McGraw-Hill, 3rd Edition, 1997.
3. Shapiro, Multinational Financial Management, Prentice Hall of India, 4th edition, 2001.
4. Madura, International Financial Management, South Western, 6th edition, 2001.

HSS011	INFORMATION SYSTEMS FOR MANAGERIAL DECISION MAKING	L	T	P	C
		3	0	0	3

INTRODUCTION

Information system – establishing the framework – business model – information system architecture – evolution of information systems.

INFORMATION SYSTEM

Functional areas, Finance, marketing, production, personnel – levels, Concepts of DSS, EIS, ES – comparison, concepts and knowledge representation – managing international information system.

SYSTEM DEVELOPMENT

Modern information system – system development life cycle – structured methodologies – designing computer based method, procedures control, designing structured programs.

IMPLEMENTATION AND CONTROL

Testing security – coding techniques – detection of error – validation – cost benefits analysis – assessing the value and risk information systems.

SOFTWARE ENGINEERING

Software engineering qualities – design, production, service, software specification, software metrics, and software quality assurance – software life cycle models – verification and validation.

REFERENCES

1. Gordon B.Davis, Management Information System: Conceptual Foundations, Structure and Development, McGraw-Hill, 1974.
2. Joyce J Elam, Case series for Management Information Systems', Simon and Schuster Custom Publishing, 1996.
3. Steven Alter, Information Systems – A Management Perspective – Addison -Wesley, 1999.
4. James A O'Brein, Management Information Systems, Tata McGraw-Hill, New Delhi, 1999.

HSS013	COST ANALYSIS AND CONTROL	L	T	P	C
		3	0	0	3

INTRODUCTION TO COSTING

Costing, Elements of costing, Types of cost, Preparation of cost sheet.

COST ANALYSIS

Marginal costing, Cost - volume – Profit analysis, Break-Even-Analysis, Break – Even-Chart, Applications.

CONTROL TECHNIQUES

Budgeting and Budgetary control, Types of Budgets , Preparation of purchase Budget, Flexible budgets, Cash Budget, Sales Budget, Materials Budget, Master Budget, Zero based Budgeting.

STANDARD COSTING

Types of Standards, Setting up of standards, Advantages and Criticism of Standard Costing – Control through variances.

ACTIVITY BASED COSTING

Transfer Pricing, Target costing, Life Style Costing, Activity Based Costing (only theory).

REFERENCES

1. R.S.N.Pillai and Bagavathi – Management Accounting, S.Chand & Co. Ltd., New Delhi (2002 edition).
2. R.Narayanaswamy – Financial Accounting – A Managerial Perspective-1997. Prentice Hall India Pvt. Ltd., New Delhi.
3. Bhattacharya S.K. John Dearden – Accounting for Management Text and cases (2000 edition) – Vikas publishing House, New Delhi.
4. Charles T.Horngren – Introduction to Management Accounting (2001 edition) Prentice Hall, New Delhi.

HSS014	MARKETING MANAGEMENT	L	T	P	C
		3	0	0	3

MARKETING

Meaning - concept - functions - marketing Planning & implementation marketing Programmes - Marketing environment –

Market Segmentation and consumer behaviour – Influencing factors, Decision process – Marketing mix – Marketing department.

PRODUCT

Meaning - Product planning - policies - positioning - New product development Product life cycle – BCG Matrix-branding. Packing, labeling.

PRICING

Pricing objectives – Setting and modifying the price – Different pricing method Product line pricing and new product pricing

DISTRIBUTION

Nature of Marketing channels - Types of Channel flows - Channel functions - Channel co-operation, conflict and competition - Direct Marketing Telemarketing, Internet shopping.

PROMOTION

Promotion Mix - Advertisement - Message - copy writing – Advertisement - budgeting - Measuring advertisement effectiveness - Media strategy - sales promotion - Personal selling, publicity and direct marketing.

REFERENCES

1. Philip Kotler, Marketing Management- Analysis Planning and Control, Prentice Hall of India, New Delhi.
2. Cundiff, Still & Govoni, Fundamentals of Modern Marketing, Prentice Hall of India, New Delhi.
3. Ramaswamy. V S & Namakumari. S, Marketing Management- Planning Implementation and Control, Macmillan Business Books, 2002.
4. Jobber, Principles and Practice of Marketing, McGraw-Hill.

		L	T	P	C
HSS015	MANAGEMENT CONCEPTS AND TECHNIQUES	3	0	0	3

DEVELOPMENT OF MANAGEMENT THOUGHT

Scientific Management Movement, Administrative Movement, Human- Relations Movement, Decision-Science Movement, Behavioral Movement, Systems Movement, Contingency Movement

ESSENTIALS OF PLANNING

Objectives, goals, Programmed Decisions and Un programmed Decisions; Decision-Making, Creativity in Decision-Making, Forecasting and Strategy to Formulation.

EFFECTIVE ORGANIZING

Span of Control, Departmentation, Authority; Responsibility, Bureaucracy and Adhocracy; Group Dynamics

REALITIES OF ORGANIZATIONAL LIFE

Organizational Politics, Organizational Power, Organizational Conflict

COMMUNICATION & CONTROL

Communication Process Evaluation, Control Process, Qualities of a Good Control System, Management Audit, Human – Offset Accounting, Cost Benefit Analysis.

REFERENCES

1. Herold Koontz and Heinz Weihrich, 'Essentials of Management', McGraw-Hill Publishing Company, Singapore International Edition, 1990.
2. James A.F. Stone and R.Edward Freeman, ‘Management’, Prentice Hall, 1992.

3. Joseph. L. Massie, 'Essentials of Management', Prentice Hall, 1985

HSS016	ORGANIZATIONAL PSYCHOLOGY	L	T	P	C
		3	0	0	3

FOCUS AND PURPOSE

Definition, need and importance of organizational Behaviour – nature and scope – frame work.

INDIVIDUAL BEHAVIOUR

Personality – types – factors influencing personality – theories – learning – types of learners – learning theories – organizational Behaviour modification. Attitudes – characteristics – components – formation – measurement. Perceptions – importance – factors influencing perception – interpersonal perception.

GROUP BEHAVIOUR

Organization structure – formation – groups in organizations – influence – group dynamics – emergence of informal leaders and working norms – group decision making techniques – interpersonal relations – communication – control.

POWER

Leadership styles – theories – leaders Vs managers – sources of power – power centers – power and politics.

DYNAMICS OF ORGANIZATIONAL BEHAVIOURS

Organizational climate – factors affecting organizational climate – importance. Job satisfaction – determinants – measurements – influence on behavior. Organizational change – importance – stability Vs change – proactive Vs reaction change – the change process – resistance to change – managing change. Organizational

development – characteristics – objectives – team building. Organizational effectiveness – perspective – effectiveness Vs efficiency – approaches – the time dimension – achieving organizational effectiveness.

REFERENCES

1. Stephen P.Robins, Organisational Behavior, Prentice Hall of India, 9th edition, 2001.
2. Hellriegel, Slocum and Woodman, Organisational Behavior, South-Western, Thomson Learning, 9th edition, 2001.
3. Schermerhorn, hunt and Osborn, Organisational behavior, John Wiley, 7th edition, 2001.
4. Jit S.Chand, Organisational Behavior, Vikas publishing House Pvt. Ltd. 2nd edition, 2001.
5. Fred Luthans, Organisational Behavior, McGraw Hill Book Co., 1998.
6. New Strom & Davis, Organisational behaviour, McGraw Hill, 2001.
7. Jaffa Harris and Sandra Hartman, Organisational Behaviour, Jaico, 2002.

HSS017	INTERNATIONAL ECONOMICS	L	T	P	C
		3	0	0	3

INTRODUCTION

The Traditional Theory of International Trade, The Basic Trade Model, Heckscher-Ohlin-Samuelson Model, Effects of Tariffs & Quotas, Theory of Factor Movements - New Theories of International Trade and Industrial Policies.

EXCHANGE RATE & BALANCE OF PAYMENT

The Balance of Payments and National Accounts, Determinants of Exchange Rates The Exchange-Rate Regime Choice and a Common Currency Area, International Debt and Currency Crises.

INTERNATIONAL REGULATORY AUTHORITY

Political Economy of Trade Disputes, the FTA and the WTO - The role of the IMF and other International Financial Organizations.

Reasons for Protection World Trade, International Movements of Capital - The Balance of Trade and Other Measures of International Transactions. Export and import policies.

INTERNATIONAL MACROECONOMICS

European Monetary Unification and the Euro - Preferential Trading Arrangements and the NAFTA International Policies for Economic Development, Trade Outsourcing and Off shoring

REFERENCES

1. Bhagwati N., A. Panagariya and T. N. Srinivasan, Lectures on International Trade, MIT Press, 2nd edition, 1998.
2. Obstfeld M., and K. Rogoff, Foundation of International Macroeconomics, McGraw-Hill, 1996.
3. Romer, D., Advanced Macroeconomics, McGraw Hill, 1996.

HSS018	COMMUNICATION SKILLS	L	T	P	C
		3	0	0	3

COMMUNICATION IN BUSINESS

Systems approach, forms of business communication, management and communication, factors facilitating communication.

COMMUNICATION PROCESS

Interpersonal perception, selective attention, feedback, variables, listening barriers to listening, persuasion, attending and conducting interviews, participating in discussions, debates and conferences, presentation skills, paralinguistic features, oral fluency development.

BUSINESS CORRESPONDENCE

Business letter. Memos, minutes, agendas, enquiries, orders, sales letters, notice, tenders, letters of application, letter of complaints.

TECHNICAL REPORTS

Format, Choice of vocabulary, coherence and cohesion, paragraph writing, organization.

PROJECT REPORTS

Project proposal, project reports, and appraisal reports.

REFERENCES

1. Sharan J.Genrson and Steven M.Gerson, Technical Writing - Process and Product, Pearson Education, 2000.
2. Raymond V.Lesikar, John D. Pettit and Mary E.Flatley, Lesikass Basic Communication, Tata McGraw Will, 8th Edition, 1999.
3. Stevel. E. Pauley, Daniel G.Riordan, Technical Report Writing Today, AITBS Publishing & Distributors, India 5th edition, 2000.
4. Robert L.Shurter, Effective letters in business, Third Ed., 1983.
5. McGraith, Basic Managerial Skills for all Prentice Hall of India, 6th Edition, 2002.
6. Halliday, M.A.Ky R.Hasan, Cohesion in English, Longman, London, 1976.

HSS019	OPERATIONS RESEARCH	L	T	P	C
		3	0	0	3

INTRODUCTION TO LINEAR PROGRAMMING

Introduction to applications of operations research in functional areas of management - Linear Programming - formulation, solution by graphical and simplex methods (Primal - Penalty, Two Phase), Special cases - Dual simplex method.

TRANSPORTATION MODELS AND ASSIGNMENT MODELS

Transportation Models (Minimising and Maximising Cases) – Balanced and unbalanced cases – Initial Basic feasible solution by N-W Corner Rule, Least cost and Vogel's approximation methods - Check for optimality - Solution by MODI / Stepping Stone method - Cases of degeneracy - Transshipment Models - Assignment Models (Minimising and Maximising Cases) – Balanced and Unbalanced Cases - Solution by Hungarian and Branch and Bound Algorithms - Travelling Salesman problem - Crew Assignment Models.

INTEGER LINEAR PROGRAMMING AND GAME THEORY

Solution to pure and mixed integer programming problem by Branch and Bound and cutting plane algorithms - Game Theory - Two person Zero sum games - Saddle point, Dominance Rule, graphical and LP solutions.

REPLACEMENT MODELS AND DECISION THEORY

Replacement Models-Individuals replacement Models (With and without time value of money) – Group Replacement Models - Decision making under risk – Decision trees – Decision making under uncertainty.

PROJECT MANAGEMENT METHOD AND SIMULATION

PERT / CPM – Drawing the network, computation of processing time, floats and critical path. Resource leveling techniques - Application of simulation techniques for decision making.

REFERENCES

1. Kalavathy S, Operations Research, Vikas Publishing House, Second Edition, third Reprint 2004.
2. Paneerselvam R., Operations Research, Prentice Hall of India, Fourth Print, August 2003.

3. Tulsian P.C, Vishal Pandey, Quantitative Techniques (Theory and Problems), Pearson Education, Asia, First Indian Reprint 2002.

HSS020	HUMAN RESOURCE MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Functions of a human resources manager - recruitment and selection processes interview methods.

HR- EVALUATION AND DEVELOPMENT

Performance appraisal, Training and development, disciplinary procedures, collective bargaining and employee welfare.

TRENDS IN HRM

The recent methods and trends in HRM with a few case studies in the context of globalization.

STRATEGIC ROLE OF HUMAN RESOURCE MANAGEMENT

Job analysis Personnel planning and recruiting Employee testing and selection, interviewing candidates, Appraising performance.

CAREER AND COMPENSATION

Managing careers Compensation Benefits and services Labor relations and collective bargaining Employee safety and health

REFERENCES

1. Decenzo and Robbins, Human Resource Management, Wiley, 6th edition, 2001.
2. Biswajeet Pattanayak, Human Resource Management, Prentice Hall of India, 2001.

3. Eugene McKenna and Nic Beach, Human Resource Management, Pearson Education.
4. Dessler, Human Resource Management, Pearson Education Limited, 2002.
5. Mamoria C.B and Mamoria S., Personnel Management, Himalaya Publishing.
6. Wayne Cascio, Managing Human Resources, McGraw-Hill, 1998.
7. Ivancevich, Human Resource Management, McGraw-Hill, 2002.

HSS022	BANKING THEORY	L	T	P	C
		3	0	0	3

EVOLUTION OF BANKING SYSTEM
Central Banking functions, Reserve Bank control over banks.

BANKER - CUSTOMER RELATIONSHIP
Bank as borrowers, customer accounts, duties of paying and collecting bankers.

LENDING BY BANKS
RBI control over loans and advances, Securities for loans.

AGENCY SERVICES BY BANKS
Banker as bailee, safe deposit vaults, credit cards.

CONSUMERS OF BANKING SERVICES
Protection against deficiency in banking services.

REFERENCES

1. M.L.Tannan, Tannan's Banking Law and Practice in India, India Law House, New Delhi, 1997.

2. S.N.Gupta, The Banking Law in theory and Practice Vol. I & II, Universal Law Publishing Co., 1999.
3. M.S.Parthasarathy, Banking Law-Leading Indian Cases, N.M.Tripathi, 1985.
4. L.C.Goyle, Law of Banking and Bankers, Eastern Law House, 1995.

HSS023	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

ENTREPRENEURIAL COMPETENCE

Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneur – Personality Characteristics of Successful. Entrepreneur – Knowledge and Skills Required for an Entrepreneur.

ENTREPRENEURIAL ENVIRONMENT

Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services - Central and State Government Industrial Policies and Regulations - International Business.

BUSINESS PLAN PREPARATION

Sources of Product for Business – Pre-feasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

LAUNCHING OF SMALL BUSINESS

Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching.

MANAGEMENT OF SMALL BUSINESS

Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units - Effective Management of small Business.

REFERENCES

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.
2. P. Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai,1997.
3. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001.
4. Prasama Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill Publishing Company Limited, 1996.
5. P.C.Jain (ed.), Handbook for New Entrepreneurs, EDII, Oxford University Press, New Delhi, 1999.
6. Staff College for Technical Education, Manila and Centre for Research and Industrial Staff Performance, Bhopal, Entrepreneurship Development, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1998.

HSS024	INDUSTRIAL PSYCHOLOGY	L	T	P	C
		3	0	0	3

1. A Perspective of Industrial Economics
2. The Analysis of Markets and Market Structure
3. Goals of Firms/Industry and Market Performance
4. Vertical Integration and Diversification
5. Technical Progress and Issues of Public Policy

REFERENCES

1. Gupta, G.S. Macroeconomics, Theory and Applications, Tata McGraw-Hill publishing company Ltd., New Delhi, 2001.

2. Samuelson, Paul A., and Nordhaus, W.D., Economics, Tata MGraw-Hill publishing company Ltd., New Delhi 2004.
3. D.N.Dewedi, Macro economic – Theory and policy, Tata McGraw-Hill publishing company Ltd., New Delhi, 2001.
4. K.P.M.Sundaram, Money Banking and international Trade, Himalaya Publishing House.

HSS031	ENGLISH ADVANCE LEVEL	3	0	0	3

Course Objectives : Acquisition of higher order Language skills: Style, Idiom,Nuance. Literature Appreciation.

Course Content : Writing: Essays, Reports, Reading: Select Literary Texts: Prose, Poetry, Drama, Short Stories,

Book Review, Oral Skills : Presentations; Discussions

REFERENCES

1. Cambridge Advanced Learners' Dictionary 2005.
2. Palgrave's Golden Treasury: Ed. Palgrave, Frances Taylor London: Oxford University Press, 1861.
3. 20th Century English Literature, London: Penquin 1992.
4. The Garden of Forking Paths and other stories : Harris, V.C. New Delhi: Oxford University Press, 2002.
5. Discussion Materials: Film / News Clippings, Plays etc.