'Annexure-A'

Department of Computer Science and Engineering
National Institute of Technology, Hamirpur
(July 2015 Onwards)

FIRST YEAR													
I Semester							**II Semester**						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	CSS-111	Engineering Mathematics-I	3	1	0	3	1	CSS-121	Engineering Mathematics-II	3	1	0	3
2	CSS-112	Physics for Computer Engineers	3	1	0	3	2	CSS-122	Chemistry for Computer Engineers	3	1	0	3
3	CSD-113	Computer Fundamentals & Programming	3	1	0	3	3	CSH-123	Communication Skills	3	1	0	3
4	CSD-114	Computer Workshop	1	0	3	2	4	CSD-124	Basic Electrical Engineering	3	1	0	3
5	CSD-115	Basic Electronics Engineering	3	1	0	3	5	CSS-125	Chemistry Lab	0	0	3	1
6	CSH-116	Engineering Economics and Management	3	1	0	3	6	CSH-126	Communication Skills Lab	0	0	3	1
7	CSD-117	Physics Lab	0	0	3	1	7	CSD-127	Engineering Graphics	1	0	3	3
8	CSD-118	Computer Fundamentals & Programming Lab	0	0	3	1							
9	CSD-119	Basic Electronics Engineering Lab	0	0	3	1							
		Total	**Hrs = 33**			**20**				**Hrs = 26**			**17**

SECOND YEAR													
III Semester							**IV Semester**						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	CSS-210	Probability & Queuing Models	3	1	0	3	1	CSD-221	Computer Organization	3	1	0	3
2	CSD-211	Discrete Structure	3	1	0	3	2	CSD-222	Operating System	3	1	0	3
3	CSD-212	Object Oriented Paradigm	3	1	0	3	3	CSD-223	Data Structure	3	1	0	3
4	CSD-213	Computer Graphics	3	1	0	3	4	CSD-224	System Software	3	1	0	3
5	CSD-214	Microprocessor and Interfacing	3	1	0	3	5	CSD-225	Theory of Computation	3	1	0	3
6	CSD-215	Digital Electronics & Logic Design	3	1	0	3	6	CSS-226	Basic Environmental Science and Engineering	3	1	0	3
7	CSD-216	Object Oriented Paradigm Lab	0	0	3	1	7	CSD-227	Computer Organization Lab	0	0	3	1
8	CSD-217	Computer Graphics Lab	0	0	3	1	8	CSD-228	Operating System Lab	0	0	3	1
9	CSD-218	Microprocessor and Interfacing Lab	0	0	3	1	9	CSD-229	Data Structure Lab	0	0	3	2
10	CSD-219	Digital Electronics & Logic Design Lab	0	0	3	1							
		Total	**Hrs = 36**			**22**				**Hrs = 33**			**22**

CSS-111 ENGINEERING MATHEMATICS-I

Matrices

Matrices, Related matrices, Complex matrices (Hermitian and skew-Hermitian matrices, Unitary matrix), Solution of linear system of equations, Rank of a matrix, Gauss-Jordan method, Normal form of a matrix, Vectors, Linear dependence, Consistency of a linear system of equations, Rouche's theorem, System of linear homogeneous equations, Linear and orthogonal transformations, Characteristic equation, Eigen values, Eigen vectors, Properties of eigen values, Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic form and their reduction to canonical form.

Infinite Series

Convergence and divergence of infinite series, Geometric series test, Positive term series, p-series test, [Comparison test, D'Alembert's ratio test, Cauchy's root test (Radical test), Integral test, Raabe's test, Logarithmic test, Gauss's test] (without proofs), Alternating series and Leibnitz's rule, Power series, Radius and interval of convergence.

Differential Calculus

Indeterminate forms, Partial Differentiation and its geometrical interpretation, Homogeneous functions, Euler's theorem and its extension, Total differentials, Composite function, Jacobian, Taylor's and Maclaurin's infinite series, Errors and increments, Introduction to limits and Indeterminate forms, Maxima and minima of functions of two variables, Method of undetermined multipliers. Curve tracing.

Integral Calculus

Quadrature, Rectification, Surface and Volume of revolution for simple curves, Double integrals and their applications, Change of order of integration, Change of variables, Triple integrals and their applications, Change of variables.

Vector Calculus

Differentiation of vectors, Curves in space, Velocity and acceleration, Relative velocity and acceleration, Scalar and vector point functions, Vector operator del, gradient, divergence and curl with their physical interpretations, Formulae involving gradient, divergence and curl. Line, surface and volume integrals, Theorems of Green, Stokes and Gauss (without proofs) and their verifications and applications, Irrotational and Solenoidal fields.

Text Books

1. Advanced Engineering Mathematics: by Erwin Kreyszig, John Wiley and Sons, NC, New York.
2. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.

Reference Books

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
2. Differential & Integral Calculus: by N. Piskunov, MIR Publications.

CSS-112 PHYSICS FOR COMPUTER ENGINEERS

Dielectric Solids

Polarization, polarizability, susceptibility, polar and nonpolar dielectrics, dispersion and absorption, electronic, ionic and orientational polarizabilities. Magnetism, para, dia and ferromagnetic solids, exchange interactions and antiferromagnetism, magnetic ordering, spin waves, applications in computer science.

Semiconductor Device Physics

Energy bands in solids, the E-k diagram, Density of states, Occupation probability, Fermi level and quasi Fermi levels, p-n junctions, Schottky junction and Ohmic contacts. Semiconductor optoelectronic materials, Bandgap modification, Heterostructures and Quantum Wells.

Lasers and fiber Optics

Concepts of maser and laser, spontaneous and stimulated emission, characteristics of laser light, three and four level laser system, coherence,; Ruby, He-Ne, CO2 and semiconductor lasers, applications of lasers in computer science.

Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, applications of optical fibers.

Electrostatics and Electrodynamics

Gauss's law in dielectric medium, Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.

Superconductivity

Introduction and discovery of superconductivity, superconducting materials, Meissner effect, critical magnetic field and critical current, type -I and type-II superconductors, Isotope effect, BCS theory of superconductivity, flux quantization, SQUIDS, applications of superconductivity

Text / References books:

1. J. Singh, Semiconductor Optoelectronics:Physics and Technology, McGraw-Hill Inc. (1995)
2. Introduction to Solid State Physics, C. Kittel.
3. Solid State Physics, N.W. Ashcroft and N.D. Mermin.
4. A text Book of Engineering Physics; M.N. Avadhanulu and P.G. Kashirsagar, S. Chand & Co. Ltd.
5. Modern Engineering Physics; A.s. Vasudeva, S. Chand & Co. Ltd.
6. Optical Electronics; AK Ghatak and Thyagarajan, Foundation Books, New Delhi.
7. Introduction to electrodynamics; David J Griffiths, Prentice Hall of India, New Delhi
8. Concepts of modern Physics; Arthur and Beiser, McGraw Hill Publication.
9. Optical Fiber Communication and Technology, D.K. Mynbaev and L.L.Scheiner, Pearson Education

CSD-113 COMPUTER FUNDAMENTALS AND PROGRAMMING

Programming fundamentals

Introduction to computer, block diagram and organization of computer, number system and binary arithmetic, processing data, hardware, software, firmware, types of programming language-Machine language, Assembly level language, higher level language, source file, object file, translators-assembler, compiler, interpreter, translation of source code into object code, library files, linking, loading process and executable code, testing and debugging, software maintenance, hardware maintenance.

Programming Techniques

Steps in program development, algorithm, flowchart, pseudo code, evolution and classification of programming languages.

'C' as Structured programming language

'C' character set, literals, keywords, identifiers, data types and size, variable declaration, expression, labels, statements, formatted input output statements, types of operators, data type conversion, mixed mode arithmetic's, control structures. 'C' functions, library functions, parameter passing, recursion, storage classes, scope rules and visibility, arrays: declaration, initialization and usage, pointers, dynamic storage allocation, structures and unions, self-referential structures. 'C' files, function for file handling, 'C' pre-processors and command line arguments, macros and conditional compiler directives.

Text and Reference Books

1. P.K.Sinha, "Computer fundamentals", BPB Publication
2. Byron Gottfried, "Programming with C", Tata McGraw Hill.
3. Herbert Schildt, "The complete Reference C", TMH
4. YashwantKanetkar, "Let us C", BPB Publication
5. Henrry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", Jaico Books.
6. Briain W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

CSD-114 COMPUTER WORKSHOP

Objectives:

PC Hardware Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, Linux and the device drivers. Troubleshooting Hardware and software - some tips and tricks.

Internet & World Wide Web: Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene(protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

Productivity tools: Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware

Identification of peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. A practice on disassemble the components of a PC and assembling them to working condition.Installation of MS windows and LINUX on PC. Exposure to Basic commands and system administration in Linux including: Basic Linux commands in bash, Create hard and symbolic links.

Hardware Troubleshooting (Demonstration):

Students have to be given a PC which does not boot due to improper assembly or defective peripherals. Identifying problem and fixing it for getting to working condition.

Software Troubleshooting (Demonstration): Students have to be given a malfunctioning CPU due to system software problems.

Internet & World Wide Web

Orientation & Connectivity Boot Camp and surfing the Web using Web Browsers: Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers.

Search Engines &Netiquette: Students should know what search engines are and how to use the search engines.

Cyber Hygiene (Demonstration): Awareness of various threats on the internet. To install an antivirus software and to configure their personal firewall and windows update on their computers.

Using LaTeX and word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

References/Text Book:

1.HTML Programming, Freeman and Robson, Oreilly publications
2.Computer peripherals and interfacing, Jyotisnehi, Firewall Media
3.http://openbookproject.net/courses/intro2ict/hardware/peripherals.html

CSD-115 BASIC ELECTRONICS ENGINEERING

Semiconductors

Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors, Charge Densities in Semiconductors, Mass action Law, Current Components in Semiconductors, The Continuity Equation, Injected minority Charge Carrier, Hall effect.

PN Junction Diode

Characteristic and analysis, Types of diodes – Zener diodes, Photodiodes, Light emitting diodes (LED's), Varactor diodes and tunnel diodes. Rectifiers and filter circuit: Half wave, full wave and Bridge rectifier circuits and their analysis, L, C and Pi filters, Basic regulator supply using zener diode, Clipping and clamping circuits.

Transistors

Construction and characteristics of bipolar junction, transistors (BJT's)-Comm. Base, Comm. emitter, Comm. Collector configuration. Transistor at low frequencies – small signal low frequency transistor model (h-parameters). Analysis of transistor amplifier circuit using h-parameters. Transistor biasing and bias stabilization: the operating point, stability factor, analysis of fixed base bias, collector to base bias, Emitter resistance bias circuit and self bias circuit. Bias compensation techniques.

Field Effect Transistor

Construction and characteristics of JFET, JFET biasing circuit, JFET amplifier, MOSFET construction and characteristics.

Amplifiers And Oscillators

Classification of amplifiers, concept of feedback, general characteristics of feedback amplifiers, Single stage RC coupled amplifier. Oscillators – Criterion for Oscillation, type of oscillators: Hartley oscillator, Colpitt Oscillator, RC Phase shift oscillator, Crystal oscillator.

Operational Amplifiers:

Introduction to Op-amp, Inverting and non-inverting configuration, Applications – adder, subtractor, integrator, differentiator.

Text Books

1. Integrated devices & Circuits by Millman & Halkias.
2. Electronics Devices and Circuit Theory by R. Boylestad.

Reference Books

1. Electronics Devices and Circuits-II by A.P. Godre & U.A. Bakshi.
2. Electronics Devices and Circuit by G.K. Mithal.

CSH-116 ENGINEERING ECONOMICS AND MANAGEMENT

Unit-I

The Elementary Economics and Demand, Law of Demand, The Elasticity of Demand, Price, Income and Cross-Elasticity of Demand.

Unit -II

Production function, Laws of returns to scale, Economies and diseconomies of scale of production, Least cost combinations, Cost and cost curves, Revenue and revenue curves, Break even analysis.

Unit –II

Long Range and Short Range Budgeting, Criteria for Project Appraisal, Social Benefit-Cost Analysis, Concept and Techniques of Depreciation, Book Keeping, Single and double entry system, Journal and ledger, Trading account, profit and loss account, Balance Sheet.

Unit IV

Introduction to Management: Classification, characteristics, and objectives of management, Social Responsibility and Ethics, Development of Management thought, Nature and function of management, Management by Objective.

The nature and purpose of organization, Basic Departmentation, line / Staff Authority and Decentralization, Organizational Culture

Unit –V

Human Resource Management: Selection, Training and Development, Performance Appraisal, Teamwork, Team Building for Enhanced Efficiency and Productivity, Leadership Processes and framework, Content theories and Importance of Motivation.

Unit –VI

Personality: personality factors, Big –five model, The Myers-Briggs Type Indicator (MBIT)

Persons Perceptions: making judgments about others. Attribution theory, frequently used short cuts in judging others with special reference to organization.

Decision Making: establish link between perception and individual decision making. Factors affecting perception and decision making. Concept and techniques of forecasting, Strategic and Tactical decisions, Decision making process, Rationality & Creativity in decision making. Program Evaluation and Review Technique, Critical Path Method.

Text Books References:

1. Managerial economics: by Craig Peterson & W. Cris Lewis, PHI Publication
2. Modern Microeconomics: by A. Koutsoyiannis, Macmillian
3. Managerial Economics Theory and Application: by D.M. Mithani, Himalaya Publication House
4. Project Planning Analysis, Selection, Implementation and Review: by Prasanna Chandra, Tata McGraw Hill.
5. Engineering Economics: by Degramo, Prentice Hall
6. Fundamental of Management : by S.P.Robbins & D.A. Decenzo, Wiley India Edition
7. Management in Global perspectives: by Koontz , Tata McGraw Hill
8. Principles of Management: by Anil Bhat, Oxford

CSS-121 ENGINEERING MATHEMATICS-II

Fourier Series

Euler's formula, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and even periodic functions, Expansion of odd and even periodic functions, Half-range series, Typical wave-forms, Parseval's formula, Practical harmonic analysis.

Ordinary Differential Equations

Brief review of first order ordinary differential equations, Exact equations, Equations reducible to exact equations, Equations of the first order and higher degree, Clairaut's equation, Applications of differential equations of first order (Orthogonal trajectories). Linear differential equations with constant co-efficients, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations), Simultaneous linear equations with constant co-efficients, Applications of linear differential equations in engineering.

Complex Numbers

Applications of De Moivre's theorem, Exponential, Circular, Hyperbolic and Logarithmic functions of a complex variable, Inverse Hyperbolic functions, Real and imaginary parts of Circular and Hyperbolic functions, Summation of the series-'C+iS' method.

Functions Of Complex Variable

Limit and derivative of complex functions, Cauchy-Riemann equations, Analytic functions and its applications, Geometrical representation of complex function, Conformal mapping and standard transformations, Complex integration, Cauchy's theorem, Cauchy's integral formula, Series of complex terms, Taylor's and Laurent's series, Cauchy's residue theorem and its application for the evaluation of real definite integrals.

Integral Transforms

Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Laplace Transforms of periodic functions, Bessel functions, Error function, Dirac-delta Function, Heaviside's Unit Function, Applications to linear simultaneous differential equations.

Text Books

1. Advanced Engineering Mathematics: by Erwin Kreyszig, John Wiley and Sons, NC, New York.
2. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.

Reference Books

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill.
2. Vector Calculus: by C. E. Weatherburn. John Wiley and Sons, NC, New York.
3. Complex variables and Applications: by R. V. Churchill, T. J. Brown & R. F. Verhey, McGraw Hill.
4. Differential Equations: by Shepley L. Ross, John Wiley & Sons, New York.

CSS-122 CHEMISTRY FOR COMPUTER ENGINEERS

Polymers

Introduction, classification, tacticity, types of polymerization, coordination polymerization, mechanisms of polymerization, synthesis and applications of some important polymers Effect of polymer structure on properties, Moulding of plastics into articles, Conducting polymers: preparation, types, properties and applications.

Science of Composite Materials

Introduction, Classification, constituents of composites, Fiber reinforced composites, unidirectional fibre reinforced composites, short fibre reinforced composites, particle reinforced composites, important types and failures of fiber reinforced composites, Advantages and applications of composites.

Characterization Techniques

Introduction to spectroscopy; UV-Visible spectroscopy- Absorption laws, Instrumentation, formation of absorption bands, Theory of electronic spectroscopy, Chromophore and auxochrome concept, fluorescence & phosphorescence, application of UV-Visible spectroscopy ; IR spectroscopy- Principle, theory of molecular vibrations, selection rules, spectral features of some classes of compounds, important features of IR spectroscopy and applications; NMR- Principle, relaxation processes, Instrumentation, shielding-desheilding effects, spinspin coupling, coupling constant, applications of NMR; MS spectroscopy- Basic principle, Instrumentation, determination of molecular formulae, important features of mass spectroscopy; Chromatography- Introduction, types, gas chromatography ; thermal method- instrumentation, fundamental principles and applications of TGA, DTA and DSC.

Nanochemistry

Introduction to nanochemsitry, synthesis, characteristics and applications of carbon nanostructures fullerenes, carbon nano tubes and graphene.

Fuels and Non-Conventional Energy Sources

Introduction, classification, solid, liquid and gas fuel; Nuclear energy- Breeder reactor and light water nuclear reactor for power generation (Block diagram only),solar energy conservation and solar cells; Fuel Cells- Introduction, types and their characteristics, alternate fuels.

Corrosion and Its Control

Introduction, Types of corrosion – chemical and electrochemical, Mechanisms of corrosion, factors affecting corrosion and different protection techniques for corrosion control.

Lubricants

Introduction, Mechanisms of lubrication, Types and selection of lubricants, synthetic lubricants, properties and different methods for testing of lubricating oils and greases. Books recommended.

***Text Books*:**

1. Applied Chemistry- A textbook for engineers and technologist by H.D. Gesser.
2. Engineering Chemistry: by P C Jain & Monika Jain
3. A Text Book of Engineering Chemistry: by Shashi Chawla

Reference Books:

1. Fundamental of organic spectroscopy by Y. R. Sharma
2. Introduction to spectroscopy by Pavia, Lampman, Kriz.
3. Science and Engineering of Materials by Askeland and Phule
4. Introduction to nanotechnology by C. P. Poole Jr. and F.J. Owens
5. Principles of polymerization by George Odian
6. Textbook of polymer science by F.W. Billmeyer Jr.

CSH-123 COMMUNICATION SKILLS

The Process Of Comunication

Introduction. What is communication? Barriers to communiction. Different types of communiction. Written vs. oral communicatio. Diffeent types of face-to-face interactions, characteristics and conventions of conversation, conversational problems of second foreign language users, difference between conversation and other speech events.

Telephone Techniques

Speaking and listening, commonly used phrases in telephone conversations, reading: confence calls, vocabulary, writing and listening, leaving a message, grammar and usage: the perfct tense, pronunciation: contracted forms.

Job Applications And Interviews

Reading, vocabulary, apply for a job, curriculum vitae, language focus: some useul words, study skills: prepriing for an interview, listening, speaking , writing.

Group Discussions:

Reading, writing skills, listening: how to be succesful in a group discussion, study skills, language facts, vicabulary, speaking, grammar: connectives, pronunciation

Managing Organistional Structure

Warm up, value to influence and lead, reading: the role of a manager, vocabulary: leadership. Speaking and listening, language focus, degree of probability Grammar: modals, wriing, reports, pronunciation.

Meetings

Reading: a sucessful meeting, speaking: one to one meetings, language focus: opening, middle and close, study skills, editing, listening, criteria for sucssful meetings, vocabulary, grammar: reporting verbs, writing:memos, pronunciation: stress according to part of speech.

Taking Notes And Preparing Minutes

Taking notes, the note-taking skill: the essential components, the note-taking skill: an example preparing minutes, format of minutes, language and style of minutes, grammar: using the passive voice.

Presenttion Skills-1

Reading, presentation skills, grammar: verbs often required in presentations, language focus, listening: importance of body language in presentations, speaking: preparing an outline of a presentation, pronunciation.

Prentation Skills-II

Reading: structure of presentation, study skills: visual aids, ending the presentation, language focus: taking about increase and decrease grammar: prepositions. Listening: podium panic, speaking, pronunciation: emphasizing the important words in context.

Negotiation Skills

Language focus, idiomatic expressions, study skills: process of negotiations, grammar: phrasal verbs, listening: effective negotiations, speking, writing.

Reference books:

1. Effective technical communication by M. Ashraf rizvi Pub:tata McGrow Hill (2009)
2. Developing communiction skills by krishna mohan Pub: Mac Millan India Limited (2009)
3. An approach to communiction skills by Indrajit Bhatacharya Pub: Dhanpat Rai Co. Pvt. Ltd. New Delhi (2007)
4. Handbook of practicl commu. Skills by wright, chrissie, Pub: jaico publishing house, mumbai (2007)
5. The skills of communicating by bill scott. Pub: jaico publishing house, mumbai (2009)

CSD-124 BASIC ELECTRICAL ENGINEERING

Electric Circuits

Introduction to linear and non linear circuits, circuit elements, various sources and source transformation, star delta transformation, solution of D.C. circuits using Kirchoff's laws, signal wave forms and passive elements specifications, basic theorems, generation of A.C. sinusoidal voltage and currents, average and r.m.s. values, Form factor and peak factor, phasor representation, phasor in polar, rectangular and exponential forms, terminal relationship for pure passive elements and their combination in series and parallel.

Analysis of single phase series, parallel and series-parallel circuits. Active and reactive power, P.F. and volt-ampares, frequency response and Q-factor.Analysis of balanced three phase A.C. circuits - Introductory concept, voltage, current and power in three phase balanced circuits. Introduction to Domestic Electric Wiring and Storage Batteries.

Electromagnetic and Transformer

Magnetic circuit concept, B-H curves characteristics of magnetic materials, practical magnetic circuits, magnetic circuits with D.C. and A.C. excitation, hysteresis and eddy current losses.

Magnetic force, self and mutual inductances, Faraday`s laws, Lenz`s Law, statically and dynamically induced EMFs, energy stored in magnetic fields. Principle of Transformer operation, construction & equivalent circuit of transformer.

Measuring Instruments

Introduction to galvanometer (Moving coil and moving iron), ammeter, voltmeter, wattmeter, energy meter, use of shunt and multiplier.

Electrical Machines

Fundamentals of D.C. and A.C. machines.

Books/References:

1. Fundamentals of Electric Circuits by Charles K Alexander and Matthew N. O. Sadiku, TMH Publication,2nd Edition, 2009.
2. Electrical Engineering Fundamentals by Vincent Del Toro, PHI Publication, Second Edition
3. Electrical Technology by H Cotton, CBS Publishers and Distributors,7th Edition, 2005
4. Basic Electrical Technology by A.E. Fitzgerald, McGraw Hill Publication

CSD-127 ENGINEERING GRAPHICS

Basic Concepts

Sheet layout, Border Lines, Title Block, Introduction to drawing instruments and use of instruments, Types of line and their uses, Technical lettering as per BIS codes.

Basic Elements

Significance and scope of drawing, Methods of Dimensioning, Different types of projections and their uses. Basic definition of geometrical objects: solids, lines, points and planes.

Projections of Points

Projections of points in different quadrant, Projection of point on auxiliary planes.

Projections of Lines

Projections of lines in different quadrant, Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane, Shortest distance, intersecting lines.

Projection of Planes

Types of planes (perpendicular to both the reference planes, perpendicular to one plane and parallel to other plane, perpendicular to one plane and inclined to the other plane), Projection of planes parallel to one of the reference of plane (when the plane is parallel to H.P, when the plane is parallel to V.P), projection of plane inclined to one reference plane and perpendicular to other.

Orthographic Projections

Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Books/References:

1. Narayana K L and Kanaiah P, “Engineering Graphics”, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Gill P S, “Engineering Graphics and Drafting”, Katria and Sons, Delhi.
3. Bhat N D, “Elementary Engineering DrawingPlane and solid Geometry”, Chartotar Publishing House, Anand.
4. A Text Book of Engg Drawing by R. K. Dhawan, S. Chand and Co. Ltd
5. Engineering Drawing by Basant aggarwal and B.C Rana

CSS-210 PROBABILITY AND QUEUING MODEL

Probability and Random Variable

Axioms of probability – Conditional probability – Total probability – Baye's theorem – Random variable- Probability mass function – probability density function – properties – Moments – Moment generating function and their properties.

Standard Distributions

Binomial, poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties- Function of a random variable. Probability density function and its properties

Two Dimensional Random Variables

Joint distributions – Marginal and conditional distribution – Covariance – Correlation and regression – Transformation of random variables- Central limit theorem.

Random Processes And Markov Chains

Classification – Stationary process – Markov process –Poisson process- Birth and death process – Markov chains- transition probabilities – Limiting distributions.

Queueing Theory

Markovian models – M /M/1, M/M/C, finite and infinite capacity- M/M/8 queues – Finite source model – M/G/1 queue (steady state solution only) – Pollaczek – Khintchine formula- Special cases.

Text Books

1. Ross, S., "A first course in probability " , Sixth Edition , Pearson Education , Delhi , 2002.
2. Medhi j., "Stochastic Processes ", New Age Publishers, New Delhi, 1994. (Chapters 2,3 & 4)
3. Taha, H.A., "Operations Research – An introduction", Seventh Edition, Pearson Education Edition Asia, Delhi, 2002.

References

1. Veerarajan. T., "Probability, Statistics and Random. Processes", Tata McGraw – Hill, Second Edition, New Delhi, 2003.
2. Allen., A.O., " Probability , Statistics and Queuing Theory ", Academic press , New Delhi, 1981.
3. Gross, D. and Harris, C.M., "Fundamentals of Queuing theory ", John Wiley and Sons, Second Edition, New York, 1985.

CSD-211 DISCRETE STRUCTURE

Introduction to Preliminaries and Predicate Calculus

Basic concepts of discrete mathematics and related problems**,** propositions and predicates, disjunction and conjunction, tautologies and contradiction, laws of equivalence, rules of substitution and transitivity, normal forms.

Set Theory and Functions

Basic concepts, ,Venn Diagrams, set operations, power set, methods of proof for sets, Relations and ordering, Types of relations, Graph and matrix of a relation, properties of a relation, Functions: definitions and notation, one to one, onto, one to one and onto, composition, identity and inverse, related results.

Graph Theory

Basic concepts of graph theory, multigraphs and weighted graphs, walk path and circuits, Warshall's algorithm: shortest path, Eulerian paths and circuits, Hamiltonian paths and circuits, factors of a graph and planar graphs, Graph colorings.

Binary Trees

Introduction, complete and extended binary tree, traversing binary tree, binary search tree, Heaps, Huffman's algorithm.

Basics of Structures

Mathematical induction, Algebraic structures properties, Semi group, Monoid, Group and Sub group - examples and standard results, generators and evaluation of powers, cosets and Langranges's theorem, rings, integral domains, fields.

Logic and Recursion

Propositional calculus - propositions, logical operators, truth tables, Lattice, propositions generated by a set of recurrence relations – partial and total recursion - problems.

Text and Reference Books

1. J. P. Tremblay and R Manohar, "Discrete Mathematical structures with applications to Computer Science", McGraw Hill.
2. C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill.
3. Scheinerman, Edward, Mathematics: A Discrete Introduction, Cengage.
4. Roman, Steven. An Introduction to Discrete Mathematics, Saunders, NY.
5. Rosen, Kenneth h. Discrete Mathematics and Its Applications, McGraw/Hill
6. Barnett, Steven. Discrete Mathematics, Addison Wesley
7. Dossey, John A. et al, Discrete Mathematics, Addison-Wesley,
8. SemyourLipscdutz, Marc Lipson, "Discrete Mathematics", Schaum's outlines, Tata McGraw-Hills.

CSD-212 OBJECT ORIENTED PARADIGM

Concepts of Object-Oriented Programming

Oriented Programming Paradigm, Basic concepts of OOP's, Benefits of OOPS, Introduction to object oriented design and development, Design steps, Design example, Object oriented languages, Comparison of structured and object-oriented programming languages.

Arrays, Pointers and Functions

Arrays, Storage of arrays in memory, Initializing Arrays, Multi-Dimensional Arrays, Pointers, accessing array elements through pointers, Passing pointers as function arguments, Arrays of pointers, Pointers to pointers, Functions, Arguments, Inline functions, Function Overloading Polymorphism.

Classes and Objects

Data types, operators, expressions, control structures, arrays, strings, Classes and objects, access specifiers, constructors, destructors, operator overloading, type conversion.

Storage classes

Fixed vs Automatic declaration, Scope, Global variables, register specifier, Dynamic memory allocation.

Inheritance

Inheritance, single Inheritance, Multiple Inheritance, Multi level inheritance, hierarchical inheritance, hybrid inheritance, Virtual functions.

Streams and Files

Opening and closing a file, File pointers and their manipulations, Sequential Input and output operations, multi-file programs, Random Access, command line argument, string class, Date class, Array class, List class, Queue class, User defined class, Generic Class.

Exception Handling and Graphics

List of exceptions, catching exception, handling exception. Text Mode, Graphics mode functions, Rectangles, and Lines, Polygons & Inheritance, Sound & Motion, Text in Graphics Mode.

Standard Template Library

Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, Container Classes, General Theory of Operation, Vectors.

Text and Reference Books

1. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications,
2. Balagurusamy, 'Object Oriented programming with C++", Tata McGraw Hill.
3. Bjarne Strustrup, "The C++ programming Language", Addison Wesley,
4. Booch, "Object Oriented Analysis and Design with Applications, Addison Wesley.
5. Chair H. Pappas & William H. Murray, "The Complete Reference Visual C++", TMH.

CSD-213 COMPUTER GRAPHICS

Introduction to Computer Graphics

Overview of Graphics Systems, Display Devices, Hard copy Devices. Interactive Input Devices, Display Processors, The Graphical Kernel System, Output Primitives, Line drawing algorithms, Circle Generation algorithms, Character Generation.

Raster Scan Graphics

Line Drawing Algorithms, Circle Generation, General Function Rasterization, Scan Conversion-Generation of the display, Image Compression, Polygon Filling, Fundamentals of Antialiasing.

Two-Dimensional Geometric Transformation & Viewing

Basic Transformation, Translation, Rotation, Scaling, Other Transformation Reflection, Shear, Transformation functions, Window to viewport co-ordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping.

Three- Dimensional Concepts & Object Representations

Three Dimensional Display Methods, Parallel Projection, Perspective Projection, Translation, Rotation, Scaling, Composite Transformation, Three dimensional Transformation function, Polygon Surfaces, Curved Lines and surfaces, Bezier Curves and surfaces, B-Spline Curves and surfaces.

Graphics hardware

Display technology, random scan, raster scan display processing, input devices for interaction.

Visible Lines and Visible Surfaces

Visual Realism, Hidden line and hidden surface removal: depth buffer algorithm, geometric computations, scan line coherence algorithms, area coherence algorithms, priority algorithm, shading and color models, Modeling methods.

Rendering

A simple illumination model, Transparency, Refraction effects in transparent materials, Simple Transparency Models, Z-Buffer Transparency, Shadows, Texture.

Text and Reference Books

1. D.F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill.
2. Hearn and Baker, “Computer Graphics”, PHI.
3. S. Harrington, “Computer Graphics - A programming approach”, McGraw Hill.
4. D.F. Rogers, “Mathematical Elements for Computer Graphics”, McGraw Hill.

CSD-214 MICROPROCESSOR AND INTERFACING

Introduction to Microprocessor

History and Evolution, types of microprocessors, 8085 Microprocessor, Architecture, Bus Organization, Registers, ALU, Control section, Instruction set of 8085, Instruction format, Addressing modes, Types of Instructions.

Assembly Language Programming and Timing Diagram

Assembly language programming in 8085, Macros, Labels and Directives, Microprocessor timings, Microinstructions, Instruction cycle, Machine cycles, T states, State transition diagrams, Timing diagram for different machine cycles.

Serial I/O, Interrupts and Comparison of Contemporary Microprocessors

Serial I/O using SID, SOD. Interrupts in 8085, RST instructions, Issues in implementing interrupts, Multiple interrupts and priorities, Daisy chaining, Interrupt handling in 8085, Enabling, disabling and masking of interrupts. Brief comparison of contemporary 8-bit microprocessors like Z-80, M68000 with 8085.

Data Transfer techniques

Data transfer techniques, Programmed data transfer, Parallel data transfer using 8155. Programmable parallel ports and handshake input/output, Asynchronous and Synchronous data transfer using 8251A. Programmable interrupt controller 8259A. DMA transfer, cycle stealing and burst mode of DMA, 8257 DMA controller.

Microprocessor Interfacing Techniques

Interfacing memory and I/O devices, Addressing memory, interfacing static RAMs, Interfacing and refreshing dynamic RAMs, Interfacing a keyboard, Interfacing LED and seven segment displays, interfacing a printer, Interfacing A/D converters, D/A converters.

Architecture of 8086

Memory Address space and data organization,- segment registers and memory segmentation, Generating memory addresses, IO address space, addressing modes, Comparison of 8086 and 8088, minimum mode maximum mode, system timing, introduction to Pentium and further series of microprocessors.

Text and Reference Books

1. B. Ram, “Fundamentals of microprocessors and microcomputers”, Dhanpat Rai and Sons.
2. R.S. Gaonkar, “Microprocessor Architecture, Programming and applications with the 8085/8080A”, Wiley Eastern Ltd.
3. YU-Cheng Liu & Glenn A Gibson, “Microprocessor System, Architecture Programming & Design”.
4. Douglas V Hall, “Microprocessors& Interfacing”. McGraw-Hill
5. D.V. Hall, “Microprocessors and Digital Systems”, McGraw Hill
6. A.P. Mathur, “Introduction to Microprocessor”, Tata McGraw Hill.

CSD-215 DIGITAL ELECTRONICS & LOGIC DESIGN

Number System & Codes

Binary, Octal, Hexadecimal number systems and their inter-conversion, Binary Arithmetic (Addition, Subtraction, Multiplication and Division), Diminished radix and radix compliments, BCD codes, 8421 code, Excess-3 code, Gray code, error detection and correction, Hamming code.

Logic Gates, Boolean Algebra & Logic Families

Axiomatic definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard forms, Digital Logic Gates. Various Logic Families like TTL and ECL etc., working and their characteristics, MOS and CMOS devices.

Combinational Logic Design

The map method, Two, Three, Four and Five variable maps, Sum of products and Product of Sums Simplification, NAND and NOR implementation, incompletely specified functions, Ex-OR functions, The tabulation method, Determination of Prime implicants, Selection of Essential Prime implicants, The cubenotation, Sharp operation, Iterative Consensus, Generalized Consensus, Minimization of Multiple outputswitching functions, Determining Prime implicants using Generalized Consensus, Finding a Minimum cover, Breaking cyclic and similar structures.

MsiAndPld Components

Binary adder and subtractor, Multiplexers, Decoders / Demultiplexers, Read Only Memory, Programmable Logic Arrays, Programmable Array Logic.Implementation of Combinatorial Logic using these devices.

Introduction to Sequential Logic

Introduction, S-R Flip-flops, JK flip-flop, D flip-flop, T flip-flop, master slave flip-flop. Flip-flop excitation table, Classification of sequential circuits, Registers and A to D and D to A converter circuits, design & analysis of synchronous and asynchronous sequential circuits: Counters, Sequence Detector and Sequence Generator.

Semiconductor Memories

Introduction, Memory organisation, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories.Content addressable memories, Programmable logic arrays, Charged-Coupled device memory.

Books Suggested:

1. M. Morris Mano, Digital Design, Prentice Hall of India.
2. Thomas Downs and Mark F Schulz, Logic Design with Pascal, Van Nostrand Reinhold.
3. Digital principle and applications Malvino and Leach- (TMH)
4. Modern digital systems design Cheung (WPC)

CSD-221 COMPUTER ORGANIZATION

General System Architecture

Stored Program control concept (Von-Newman architecture principle), Flynn's Classification of computers (SIMD, MISD, MIMD), Structure organization (CPU, Caches, Main memory, Secondary memory unit & I/O), Register Transfer Operation, Micro-operation, Instruction Set Architecture (Instruction set based classification of processor i.e. RISC, CISC, RISC vs CISC Comparison), Addressing Modes, Operation instruction set (Arithmetic & logical, Data transfer, Control flow), Instruction set format.

Processor Design

Arithmetic & logic unit, Stack organization, CPU Architecture types, Accumulator Based- Register, Stack-Memory, Register, Detailed data path of a typical register based CPU, Fetch, Decode, and Execute Cycle.

Computer Arithmetic

Addition & Subtraction, Multiplication Algorithms (Booth's Multiplication Algorithm), Division Algorithm, Floating point arithmetic operations.

Control Design

Microprogrammed& Hard-wired control options, Hard-wired design methods, State table method, Multiplier control, CPU control unit. Microprogrammed, Basic concepts, control Memory, Address Sequencing.

I/O Organization & Memory Hierarchy

Programmed, Interrupt driven & Direct Memory Access, Synchronous & synchronous data transfer, The need for Memory Hierarchy, locality of reference principle, Memory Hierarchy, cache, main & secondary, Memory parameters, access cycle time, cost per unit.

Introduction to Parallelism

Goals of parallelism, Instruction level parallelism, pipelining, superscaling, Processor level parallelism, Multiprocessor system overview.

Text and Reference Books

1. J.P. Hayes, "Computer architecture &Organization", McGraw Hill.
2. William Stallings, "Computer Organisation and Architecture, Designing for Performance", Pearson Education Asia.
3. M. Morris Mano, "Computer system architecture". PHI
4. David A. Patterson & John. L. Hennessy, "Computer Architecture: A quantitative Approach". Morgan Kaufmann

CSD-222 OPERATING SYSTEM

Evolution of operating systems

Evolution of operating systems, Types of operating systems. The process concept, system programmer's view of processes, operating system's views of processes, operating system services for process management.

CPU Scheduling

Scheduling concepts, scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling.

Concurrent programming and Deadlocks

Critical regions, Conditional critical regions, Monitors, Interprocess communication, Messages, Pipes, Semaphores, Modularization, Synchronization, Concurrent languages. Deadlocks: Characterization, Prevention, Avoidance, Detection and Recovery, Combined approach to Deadlock Handling, precedence graphs.

Memory management

Memory Management, Contiguous allocation, static-swapping, overlays, dynamic partitioned memory allocation, demand paging, page replacement, segmentation.Non-contiguous allocation, paging, Hardware support, Virtual Memory.

File systems

A Simple file system, General model of a file system, Symbolic file system, Access control verification, Logical file system, Physical file system, Allocation strategy module, Device strategy module, I/O initiators, Device handlers, Disk scheduling.

Networks, Security and Design Principles

Network operating system, distributed operating system, external security, operational security, password protection, access control, security kernels, hardware security, layered approach, design principle.

Text and Reference Books

1. J.L. Peterson and A. Silberchatz, “Operating System Concepts”, Addison Wesley.
2. Harvey M. Dietel, “An Introduction to Operating System”, Addison Wesley.
3. C. Crowley, “Operating Systems - A Design Oriented Approach”, Irwin Publishing
4. W. Stallings, “Operating systems”, Prentice Hall.
5. A.S. Tanenbaum, “Modern Operating system”, PHI

CSD-223 DATA STRUCTURE

Introduction

Data types, data structures, abstract data types, the running time of a program, the running time and storage cost of algorithms, complexity, asymptotic complexity, big O notation, obtaining the complexity of an algorithm.

Development of Algorithms

Notations and Analysis, Storage structures for arrays - sparse matrices - structures and arrays of structures, Stacks and Queues: Representations, implementations and applications.

Linked Lists

Singly linked lists, Linked stacks and queues, operations on Polynomials, Doubly Linked Lists, Circularly Linked Lists, Operations on linked lists- Insertion, deletion and traversal, dynamic storage management – Garbage collection and compaction.

Trees

Basic terminology, General Trees, Binary Trees, Tree Traversing: in-order, pre-order and post-order traversal, building a binary search tree, Operations on Binary Trees - Expression Manipulations - Symbol Table construction, Height Balanced Trees(AVL), B-trees, B+ -trees.

Graphs

Basic definitions, representations of directed and undirected graphs, the single-source shortest path problem, the all-pair shortest path problem, traversals of directed and undirected graphs, directed acyclic graphs, strong components, minimum cost spanning tress, articulation points and biconnected components, graph matching.

Sorting and Searching Techniques

Bubble sorting, Insertion sort, Selection sort, Shell sort, Merge sort, Heap and Heap sort, Quick sort, Radix sort and Bucket sort, Address calculation, Sequential searching, Binary Searching, Index searching, Hash table methods.

Text and Reference Books

1. J.P. Tremblay and P.G. Sorenson, “An Introduction to Data Structures with applications”, Tata McGraw Hill.
2. S. Sahni, “Data structures, Algorithms ad Applications in C++”, WCB/McGraw Hill.
3. Aho Ullman and Hopcroft, “ Data Structures and Algorithms”.
4. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, “Data Structures using C”, Pearson Education
5. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures – A Pseudocode Approach with C”, Thomson Brooks / COLE

CSD-224 SYSTEM SOFTWARE

System Software

Distinction between system software and application software, Components of System Software, Evolution of System Software, H/W Independent features of System Software, General features of a System Software, Layered Organization of System Software, Overview of Compilers and Interpreters.

Machine Language and Microprocessor

Defining and Usage of Macro Expression, Macro Definition Language: Macro generation, Positional Parameters and Keyword parameters, Conditional Macro expansion, Macro Calls within Macros and its implementation, Macro Instructions Defining Macros, One-Pass Macro Processor.

Assembler

Machine Structure, Machine Languages, Elements of Assembly language Programming, Machine Independent features: Instructions, Program location, Command to Loader, Machine Dependent features: Literals, Symbol defining statements, Expressions, Program Block, Control section and program linking, Design of Two-Pass Assembler, Data Structures Format of Databases, Algorithm, A Single-Pass Assembler.

Loaders

Object Code, Function to be performed by Object Code, Machine dependent Features: Location, Linking, Machine Independent features: Automatic Library Search, Loader options, Overlay program, Loader Schemes: Compile and go Loaders, Absolute Loaders, Relocatability: Non-Relocating Program, Relocatable Program, Self-Relocating Programs, Algorithms for Relocating Loaders Using Relocation bit, Algorithm for Relocating loader Using Relocatable Location table, design of BSS Loader, Linking Schemes.

System Software Tools

Elements of System software Tools, Text Editor: Line and Stream Editor, Screen Editor, Structure Editor, Word Processor, Editor Structure, Debug Monitor, Programming Environment, DOS functions, Keyboard Management, Screen Management, Window or Display management, Text or Graphics, Overlayed or Tiled, Transcription and Image Buffer process per Window, Multi Tasking Window System, Machine and Assembly language Programming Interface. Device Driver Programming

Virus

Classification of Virus, Virus Detection and Control System, Virus in other environment, case studies.

Text and Reference Books

1. John J. Donovan, “System Programming”, TMH
2. D. M. Dhamdhere, “System Software and Operating System”, TMH.
3. Leland L. Black, “System Software-An Introduction to System Programming”, AddisonWesley.
4. Intel Users manual for 8086, 80386 & 80486, Pentium & Pentium pro.

CSD-225 THEORY OF COMPUTATION

Machines

Basic machine, FSM , Transition graph, Transition matrix, Deterministic and non-deterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata.

Regular Sets and Regular Grammars

Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

Formal Grammars & Languages

Basic definitions and examples of languages, Chomsky hierarchy, Regular grammars, context free & context sensitive grammars, context free languages, non-context free languages, Chomskey normal forms, binary operations on languages.

Turing Machines & Pushdown Automata

TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, composite & iterated TM, Pushdown automata, Acceptance by PDA.

Computability

Basic concepts, primitive & partial recursive function, Recursive function, Decidability, Kleen's theorem.

Undecidibility

Properties of recursive & recursively enumerable languages, Universal Turing machine and undecidable problem, Rice's theorem & some more undecidable problems.

Computational Complexity Theory

Definition, linear speed-up, tape compression & reduction in number of tapes, Hierarchy Theorem, Relation among complexity measures, Transition lemmas & non deterministic hierarchies, properties of general complexity measures, the gap, speed-up, union theorem, Automatic complexity theorem.

Text and Reference Books

1. John E. Hopcroft, Jeffery Ullman, "Introduction to Automata theory, Langauges & computation", Narosa Publishers.
2. E.V. Krishnamurthy, "Introductory Theory of Computer science". East West Press
3. K.L.P. Mishra, "Theory of computer Science", Prentice Hall of India Pvt. Ltd.

CSS – 226 BASIC ENVIRONMENTAL SCIENCE & ENGINEERING

Environmental Management, Resources and Legislation

Environmental disturbances, quantification of environmental issues, soil resources and their classification, equitable use of resources, natural resource management, food chain and trophic levels, environmental impacts of energy development, legislation.

Global Atmospheric Change

The atmosphere of earth, global temperature, greenhouse effect, radiative forcing of climate change, global warming potential, carbon cycle, carbon emissions from fossil fuels, regional impacts of temperature change, global initiatives

Physical, Chemical and Biological Processes

Particle dispersion, methods of expressing particle concentrations, stoichiometry, chemical equilibria, solubility of gases in water, carbonate system, organic chemistry, nuclear chemistry, nuclear fission and fusion, basic atmospheric properties, fundamentals of microbiology.

Population and Economic Growth

The nature of human population growth, population parameters, industrialisation, urbanisation, sustainable development, sustainable consumption, resettlement and rehabilitation issues, health and the environmental impacts.

Solid and Hazardous Waste Management

Integrated solid waste management, hazardous waste management, biomedical waste treatment technologies and disposal options, e-waste management, waste minimisation for sustainability, waste management – Indian scenario.

Pollution and Monitoring

Water resources, characteristics of water, water pollutants, oxygen demanding wastes, surface water quality, groundwater quality, water and wastewater treatment systems.

Air quality standards, emission standards, criteria pollutants, air pollution and meteorology, atmospheric dispersion, emission controls. Effect of noise on people, rating systems, community noise sources and criteria, traffic noise prediction, noise control.

References:

1. Mackenzie L. Davis and David A. Cornwell.2010. Introduction to Environmental Engineering, 4e. Tata McGraw-Hill Education Private Limited New Delhi.
2. Gilbert M. Masters.2007. Introduction to Environmental Engineering and Science Pearson Education. Dorling Kindersley (India) Pvt. Ltd. Delhi.
3. J. Glynn Henry and Gary W. Heinke.2004. Environmental Science and Engineering, Pearson Education (Singapore) Pte. Ltd.