Courses (IT)

Semester – I

IT

	L	T	P	C
Introduction to Discrete Mathematics	3	1	0	4
Physics	3	1	2	5
Introduction to Programming	2	0	0	2
Introduction to Programming Lab	0	1	4	3
Digital Logic Design	3	0	4	5
Spoken and Written Communication	2	0	0	2
Total Credit				**21**

Semester - II

IT

	L	T	P	C
Calculus	3	1	0	4
Data Structure	3	0	0	3
Data Structure Lab	0	1	4	3
Basic Electronics Circuits	3	1	2	5
Computer Organization	3	0	4	5
Introduction to Information Technology	1	0	2	2
Total Credit				**22**

Semester - III

IT

	L	T	P	C
Object Oriented Design & Programming	3	0	0	3
Object Oriented Design & Programming LAB	0	1	4	3
Information Technology in Knowledge Society	3	0	2	4
Algorithms and Problem Solving	3	0	2	4
Probability and Statistics	3	1	0	4
Economics	3	0	0	3
Total Credit				**21**

Semester - IV

IT

	L	T	P	C
Database Management System	3	0	0	3
Database Management System LAB	0	1	4	3
Operating Systems	3	0	0	3
Operating Systems LAB	0	1	4	3
Operations Research	3	1	0	4
Science Technology and Society	3	0	0	3
Technical Writing	1	0	4	3
Total Credit				**22**

Summer-I

IT

	L	T	P	C
Rural Internship *	0	0	6	3

*Pass/Fail

Semester - V

IT

	L	T	P	C
Computer Networks	3	0	0	3
Computer Networks LAB	0	1	4	3
Software Engineering	3	0	2	4
Web Technology	3	0	2	4
Information Security	3	0	0	3
Environmental Science	3	0	0	3
(SC) Elective - 1	3	0	0	3
Total Credit				**23**

Semester - VI

IT

	L	T	P	C
Software Project Management	3	0	2	4
Human Computer Interaction	3	0	0	3
Human Computer Interaction LAB	0	1	2	2
Introduction to Information Retrieval	3	0	2	4
E-Commerce	3	0	0	3
(TE) Elective – 1	3	0	0	3
(HM) Elective - 1	3	0	0	3
Total Credit				**22**

Summer-II				
IT				
	L	T	P	C
Research / Industrial Internship*	0	0	6	3

*Pass/Fail

Semester - VII				
IT				
	L	T	P	C
Professional Ethics	2	0	0	2
Management Information Systems	2	1	0	3
System Administration and Maintenance	2	0	4	4
(SE) Elective - 2	3	0	0	3
(TE) Elective - 2	3	0	2	4
(TE) Elective - 3	3	0	2	3
(TE) Elective - 4	3	0	0	3
Total Credit				**22**

Semester - VIII				
IT				
	L	T	P	C
Project	0	0	36	18
Total Credit				**18**

Possible Electives

Category	Subjects
(HM) Elective – 1	Introduction to Business and Finance, Principles of Management, IT in Rural Development, Modernity and Political Theory, Approaches to Science Fiction, Approaches to Indian Society, …
(SC) Elective – 1	Numerical Methods, Graph Theory, Combinatorial Games, Algebraic Structures, Optimization Techniques, Quantum Mechanics, …
(SC) Elective – 2	Modeling and Simulation, Nano Science, Bio-informatics, Number Theory, Modern Optics, Statistical Data Analysis, …
(TE) Elective – 1	Distributed Systems, Digital Architecture Systems, Semantic Web, Embedded Systems, Software Testing & Quality, Models of Computation, Verification and Specification, …
(TE) Elective – 2	Information Assurance, Digital Rights Management, Financial Technologies, Healthcare Systems, Cryptography & Coding Theory, The Constitution of India, Cyber Crimes & Law, …
(TE) Elective – 3	Machine Learning, Artificial Intelligence, Data Analytics, Big Data, Image Processing, Pattern Recognition, Computer Vision, Speech Processing, …
(TE) Elective – 4	Enterprise Resource Planning, e-Business, e-Governance, Entrepreneurship Development, Mobile Technologies, …

Structure of the Curriculum

- Total Credits requirement – 153 for graduation
- Credits requirement – 24 for Internships and Projects.
- Rural Internship after Semester IV (credit not counted for graduation requirement. It is a pass/Fail course)
- Research or Industrial Internship in summer after Semester VI (credit not counted for graduation requirement. It is a Pass/Fail course)
- One full semester project (credit not counted for graduation requirement. This credit would be considered for computation of CPI). This is enabling students to take project in industry or any other research organization.

- 70% of the total credit is for IT courses
- 20% of the total credit is for science courses
- 10% of the total credit is for humanities courses
- Technical elective 4 in numbers
- Science elective 2 in numbers
- Humanities elective 1 in number

Semester - I

Introduction to Discrete Mathematics (3-1-0: 4)

Course Contents:

FOUNDATION: Propositional and predicate logic, logical equivalences, predicates and quantifiers, translation from language to logical expressions, nested quantifiers, set theory, set operations, set identities and functions, inverse and composition functions, graph of functions.

NUMBER THEORY: Division operator, prime factorization, properties of prime numbers, prime number theorem, GCD and LCM, modular arithmetic and applications, sequences and summations.

COUNTING: Permutation and combinations, pigeonhole principle, inclusion-exclusion principle, binomial theorem, Pascal identity and triangle.

MATHEMATICAL REASONING and INDUCTION: Rules of inference, direct proof, proof by contradiction, proof by contrapositive, mathematical induction and second law of mathematical induction.

RECURSION: Definition, recursive algorithm, recurrence relations, solving recurrence relations.

RELATIONS: Relations and their properties, applications and representations, equivalence relations, partial ordering, Hasse diagram.

GRAPHS: Introduction and terminology, representation, isomorphism, connectivity, Warshall‘s algorithm, Euler and Hamilton path, shortest path.

TEXT BOOK:
Discrete Mathematics and its Application, 7th Ed, K. Rosen, Tata McGraw Hill, 2011.

REFERENCE BOOK:
1) Discrete Mathematical Structure, 4th Ed, B. Kolman, R.C. Busby and S. C. Ross, PHI, 2000.
2) Discrete Mathematics, Richard Johnsonbaugh, Prentice Hall, 2007.
3) Mathematics: A Discrete Introduction, 3rd Ed., Edward R. Scheinerman, Cengage Learning, 2006.
4) Mathematical Structure for Computer Science, 6th Ed, J. Gersting, Freeman, 2006.

Physics (3-1-2: 5)

Course Contents:

COORDINATE SYSTEM: Cartesian, cylindrical and spherical coordinates; unit vectors and their time derivatives.

REVIEW OF PARTICLE DYNAMICS: Inertial and non-inertial frames of reference, centrifugal and coriolis forces; conservative force, work-energy theorem; centre of mass, conservation of momentum; collision in one and two dimensions. small oscillations, free, forced and damped oscillations.

ATOMIC PHYSICS: Rutherford and Bohr's atomic model, quantum numbers, atomic spectra, energy levels.

ELEMENTARY PARTICLES: Nuclear model, protons and neutrons, nuclear force, introduction of elementary particles.

CONCEPTUAL FOUNDATION of MODERN PHYSICS: Electromagnetic waves, blackbody radiation, Planck's law of radiation, photoelectric effect, wave-particle duality, Compton wavelength, de-Broglie wave, Heisenberg's uncertainty principle, contribution of Dirac, Pauli, Schrodinger and Born in foundation of quantum mechanics, topics in Quantum Mechanics.

INTRODUCTION TO APPLIED PHYSICS: A non-mathematical exposure to applied physics such as:
pendulum, heat engine, transformer, optical microscope, electron microscope, scanning tunneling microscope, laser diode, photo detector, solar cells, transistors.

TEXT BOOK:
Concepts of Modern Physics. A.Beiser, Tata McGraw-Hill, New Delhi, 1995.

REFERENCE BOOK:
1) Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Ed, R. Eisberg and R. Resnick, John-Wiley, 1985.
2) Quantum Mechanics: Theory and Applications 5th Ed, AjoyGhatak, Macmillan, 2004.

Introduction to Programming (2-0-0: 2)

Course contents:

INTRODUCTION TO PROGRAMMING: Programming methods, paradigms, problem solving techniques, algorithm development, flow charts.
LINUX ENVIRONMENT: Editor, compiler, debugger.
BASICS OF PROCEDURAL PROGRAMMING: Constants, variables, expressions, operators, assignment, basic input and output, built-in functions, program debugging.
VARIABLES AND OPERATORS: Basic data types, precedence and order of evaluation, pointers, memory allocation of variables.
CONTROL STRUCTURES: Selection statements, iteration statements.
FUNCTIONS AND PROGRAM STRUCTURE: Return values, actual and formal parameters, parameter passing: call by value versus call by reference, external variables, scope rules, header files, and recursion.
ARRAYS: Character arrays, one and two dimensional arrays; pointer arrays, command-line arguments.
I/O: ASCII data files, file pointers, end-of-file.
BASIC DATA STRUCTURES: Structures, defining new types, enumerations, dynamic memory allocation, dynamic arrays, linked lists and other pointer-based structures.

TEXT BOOK:
C How to Program, 6th Ed, P Deitel and H Deitel, Prentice Hall of India, 2010.

REFERENCE BOOK:
1) C programming language, 2nd Ed, Kernighan, Brian W. & Ritchie, Dennis M, New Delhi.
Prentice Hall of India, 1998.
2) A Book on C, 4th Ed, Kelley, A.L. and Pohl Ira, Pearson India, 2002
3) A Structured Programming Approach Using C, 1st Ed.,Forouzan, Behrouz, Course
Technology, 2012.
4) Practical C Programming, 3rd Ed, Oualline, Steve, Shroff Publishers, 2000.
5) C programming: The essentials for engineering and scientists, Brooks, David R. New
York. Springer, 1999.

Introduction to Programming Lab (0-1-4: 3)

Course contents:
Lab and take home assignments based on the course "Introduction to Programming".

Digital Logic Design (3-0-4: 5)

Course Contents:

NUMBER SYSTEMS: Representations, signed, 1's complement, 2's complement, saturation and overflow in fixed point arithmetic.

BOOLEAN ALGEBRA: Axioms and theorems, DeMorgan's law, universal gate, duality, expression manipulation using axioms and theorems.

COMBINATIONAL LOGIC: Introduction to switching algebra, canonical forms, two-level simplification, boolean cube, logic minimization using K-map method, QuineMcCluskey tabular method, minimization for product-of-sum form, minimization for sum-of-product form, multiplexers, demultiplexers, decoders, encoders, hazard free synthesis, Arithmetic circuits, adders, half adder, full adder, BCD adder, ripple carry adder, carry-lookahead adder, combinational multiplier.

SEQUENTIAL LOGIC: Simple circuits with feedback, basic latches, clocks, R-S latch, master-slave latch, J-K flip flop, T flip-flop, D flip-flop, storage registers, shift register, ripple counter, synchronous counters, Finite State Machine (Moore/Mealy Machines), FSM with single/multiple inputs and single/multiple outputs etc.

HARDWARE DESCRIPTION LANGUAGE: Programming and simulation, structural specification, behavioral specification, dataflow modelling, testbench, testing using test vectors, testing using waveforms, design of basic blocks to build larger circuits, case studies, adder, ALU, counters, shift registers, register bank, FSM design example etc.

TEXT BOOK:
Digital Fundamentals,10thEd, Floyd T L, Prentice Hall, 2009.

REFERENCE BOOK:
1) Digital Design-Principles and Practices, 4thEd, J F Wakerly, Prentice Hall, 2006.
2)Digital Design, Morris Mano, Prentice Hall, 2002
3) Digital Systems: Principles and Applications, Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, Pearson Education, Limited, 2011.
4) Fundamentals of Digital Logic with Verilog Design, 2nd Ed, S. Brown and Z. Vrsaniec, McGraw Hill, 2007

Spoken and Written Communication (2-0-0: 2)

Course Contents:

Unit-I:
Course Instructor should make an optimal use of cinema for increasing the students' familiarity with English. Testing be done on the basis of the student's comprehension of the plot and the ability of describe scenes from the film. Class room exercise of asking students to comment on the plot or scenes of a given film – not in writing but by standing before the entire class and speaking in English — be frequently carried out. The aim of this unit is to make the student feel confident about her/his ability to form sentence in English for discursive communication.

Unit-II:
Course Instructor should use audio tapes, Ted Lectures, radio news broadcast or celebrated speeches, etc for exposing the students' to a real time' and good spoken English. Class room tests be set to check the students' ability to respond to their listening experience in writing. This will help the Course Instructor to continually assess the requirements of the students and provide corrective advise. Testing the writing skills of students will require setting several questions of very short composition tasks, from 50 words to 150 words. The topics chosen for the composition tasks should be selected from the topics covered in the classroom discussions or from the life on the campus.

Unit-III:
Students should be provided four to five extended samples of written English such as short stories or newspaper editorials for them to mark their difficulties – words, idioms, sentence structures, etc. This will help the students in

improving their ability to do focused reading of serious written literature. Testing of the reading comprehension skills be tested by giving them in advance of the test several passages for reading. The Course Instructor may select one or more of those seen passages' for the examination purpose.

TEXT BOOK:
Prism: Spoken and Written Communication, Prose & Poetry published by Orient Longman, 2008.

Reading materials:
The Bet – Anton Chekov
Socrates and the Schoolmaster – F. L. Brayne
An Astrologer's Day – R. K. Narayan
The Gift of the Magi – O' Henry
With the Photographer – Stephen Leacock
Speech on Indian Independence – Jawaharlal Nehru

Semester II

Calculus (3-1-0: 4)

Course Contents:

FUNDAMENTALS: Limits, continuity, differentiability, mean value theorems, and Taylor‘s theorem; fundamental theorem of integral calculus, definite integrals, trapezoidal and Simpson’s rule; sequences and series, tests for convergence: absolute and conditional convergence; power series and radius of convergence.

FUNCTIONS OF SEVERAL VARIABLES: Partial derivatives, chain rule, gradient and directional derivative; Taylor’s theorem for functions of several variables; maxima, minima and saddle points.

VECTOR CALCULUS: Gradient, divergence and curl. double, triple, line and surface integrals; theorems of Green, Gauss, Stokes and their applications.

INTRODUCTION TO COMPLEX VARIABLES: Complex numbers and the complex plane, derivative and analytic functions.

DIFFERENTIAL EQUATIONS: First order equations, second linear differential equations, partial differential equations ⟆ basic concepts and important examples, Laplace and Fourier transforms.

TEXT BOOK:
Calculus and Analytical Geometry, 9th Ed, G B Thomas and R L Finney, Addison-Wesley, 1999.

REFERENCE BOOK:
1) Differential and Integral Calculus, 3th Ed, Schaum’s Outline Series, McGraw Hill, 1992.
2) Advanced Engineering Mathematics, 8th Ed, R. Kreyszig, John Wiley, 1999.

Data Structures (3-0-0: 3)

Course Contents:

INTRODUCTION: Representation of data on a computer, data types & array and linked list representations ways of representing programs and associated data on computers

ANALYSIS TOOLS: Notion of the running time of an algorithm, recurrences, parameters of performance.

DICTIONARY OPERATIONS: Find, max, min, successor, predecessor (query operations); insert, delete (modify operations)

LIST DATA: Stacks, queues, variants implementation using arrays and linked lists
SORTING: Comparison based sorting algorithms, other sorting algorithms, lower bounds for comparison-based sorting algorithms best-case, worst-case and average-case running times; quicksort, heap Sort, insertion sort, bubble sort etc.

ORDER STATISTICS: Maximum and minimum elements of a set, Finding median, searching for an element of a given rank, finding the rank of a given element, ranks of a subset of elements, maintaining rank information for a dynamic set.

TREES: heaps, Binary search trees (BST), heights of BST

BALANCED BSTs: Red Black trees, AVL Trees, 2,3,4-trees, B Trees

GRAPHS: Representation using adjacency matrices and adjacency lists, Graph searching algorithms BFS and DFS.

TEXT BOOK:
Data Structures and Algorithms in C++ -- Goodrich, Tamassia, Mount; Wiley.
Data Structures and Algorithms, Aho, Hopcroft and Ullman, Addison-Wesley, 1999.

REFERENCE BOOK:

Introduction to Algorithms, 3th Ed, Cormen, Lieserson and Rivest, PHI, 2011.

Data Structures Lab (0-1-4:3)

Lab and take home assignments based on the course "Data Structures". It is essential for the instructor to use the tutorial hours of this course to give hands on of any object oriented programming language so that students can code the assignments given.

Basic Electronic Circuits (3-1-2: 5)

Course Contents:

ANALOG CIRCUIT ELEMENTS: Resistor, Capacitor, Inductor, Concepts of LLFPB, Non-linear circuit elements, Incremental equivalent of nonlinear elements, Voltage and Current sources, Controlled sources, Active circuits, Practical circuit elements of different types.

ANALYSIS OF LINEAR CIRCUITS: Kirchhoff's laws, D-C analysis of resistive circuits, Time-domain analysis of a-c circuits ,Sinusoidal steady state analysis of a-c circuits – notions of phasors, impedance, transfer function and frequency response, Frequency response vs transient response , Superposition theorem, Thevenin's and Norton's theorems, Two-port parameters, Analysis of circuits having controlled sources.

AMPLIFIERS: Diodes, BJT, FET, Amplifier parameters, Controlled source models, Active devices as controlled sources, Different amplifier configuration using the OPAMP, Frequency response of OPAMP and OPAMP-based amplifiers, Power amplifiers using OPAMP and transistors.

OSCILLATORS: Amplifier with feedback, Condition of harmonic oscillation, RC oscillator circuits.
WAVEFORM GENERATORS: OPAMP as a comparator, Regenerative comparator, Timer, Relaxation oscillator, Non-sinusoidal waveform generator using comparator.

D-C POWER SUPPLY: Half-wave and full-wave rectifiers, Shunt capacitor filter, Ripple and voltage regulation, Voltage regulator using zener diode, Active voltage regulator.

TEXT BOOK:
1) Electronic Principles, 7th Ed, Albert Malvino, and David Bates, Tata McGraw-Hill, 2006.
2) Microelectronic circuits, 5th Ed, A Sedra , K Smith, A N Chandorkar, Oxford University Press,2009.

REFERENCE BOOK:
1) Network Analysis, 3th Ed, Van Valkenburg, PHI, 2000.
2) Introduction to electric circuits, 8th Ed, R C. Dorf and J A Svoboda John Wiley, 2000.
3) Engineering Circuit Analysis, 6th Ed, William H.Hayt, Jack Kemmerly , Steven Durbin, Tata McGraw-Hill, 2002.
4) Electric circuit fundamentals, Sergio Franco, Oxford University Press, 1995.
5) Foundations of Analog and Digital Electronic Circuits, Anant Agarwal and Jeffrey Lang, Morgan Kaufman, 2005.

Computer Organization (3-0-4: 5)

Course Contents:
von NEUMANN MACHINE: Functional units, stored program concept, ALU, data paths, registers, status flags; instruction cycle.

DATA REPRESENTATION: Integer data; fixed and floating point systems; representation of non-numeric data (characters, strings, records, and arrays).

ASSEMBLY/MACHINE LEVEL: Instruction sets and types (arithmetic, data movement, and control); instruction formats and addressing modes, subroutine call and return mechanisms; representations of fundamental high-level programming constructs at the assembly language
level; Heap vs. Stack vs. Static vs. Code segments.

MEMORY SYSTEM: Principles of temporal and spatial locality; cache memories (address mapping, block size, replacement and store policy); virtual memory (page table, TLB); disk organization and data access from disk drive.

I/O COMMUNICATION: Handshaking, buffering, programmed I/O, interrupt-driven I/O, bus protocols.

TEXT BOOK:
1) Introduction to Computing Systems: From Bits and Bytes to C and Beyond, 2th Ed, Yale Patt and Sanjay Patel, Tata McGraw-Hill, 2001.
2) Computer Systems: A Programmer's Perspective, 1st Ed Bryant and O'Hallaron, Pearson, 2002.

REFERENCE BOOK:
1) The Essentials of Computer Architecture and Organization, 3rd Ed, Null and Lobur, Jones & Bartlett/Viva Books, 2011.
2) Structured Computer Organization, 6th Ed, Tanenbaum and T Austin, Pearson, 2012.
3) Computer Organization and Architecture, 8th Ed, Stallings, Pearson, 2010.
4) Computer System Organization, N. Jotwani, Tata McGraw Hill, 2009.

Introduction to Information Technology (1-0-2: 2)

Course contents

Students of BTech CS and BTech IT, will take this course separately. These courses aim at introducing the broad perspective of computer science and information technology to the respective students. Students get to understand the breadth of the subject area they would be exploring in the coming years. It is expected that more than one faculty instructor would deliver the lectures of these courses.

The course content of Intro. to IT is composed of following four modules.

Module 1
This module starts with discussions on different aspects of information technology in organization from business, economic and social perspectives. It then follows computer hardware and software requirement in organizational needs in order to meet various aspects of IT/ITeS usage in real-world applications. The module ends with highlighting important factors of data and knowledge management in organization.

Module 2
This module brings up IT revolution in communication medium and computing paradigms. The coverage of all these aspects would focus on the topics that how IT technologies have been evolving in past two decades and how things would move in coming years to come.

Module 3
This module emphasizes on applications, implementation, and integration aspects of IT/ITeS usage in competitive advantage. The module will illustrate how does an enterprise system function? CRM issues get resolved and so on. The last part of this module will discuss e-commerce scenarios and applications.

Module 4
This module focuses on decision support system, managerial involvement, data acquisition, repository, and recovery aspects. The module concludes with stressing on ethical practice and legal aspects while handling IT technologies and data.

TEXT BOOK

- Introduction to Information Technology, 3/e -- Turban, Rainer, Potter. John Wiley & Sons, 2005.

  Online resource: http://bcs.wiley.com/he-bcs/Books?action=contents&itemId=0471347809&bcsId=1918

  [All four modules of the course have been designed based on the chapters given in the book. Adequate materials and supplementary notes available online in the site mentioned above.]

Semester III

Object Oriented Design and Programming (3-0-0: 3)

Course Contents:

INTRODUCTION: Principles of OOD; programming Paradigms; benefits of OOD&P, applications of OOD;
Classes and objects; access qualifiers; instance creation; constructors, parameterized constructors, overloaded constructors, constructors with default arguments, copy constructors, static class members and static objects.

FUNCTIONS an OPERATORS: Function prototyping, function components, passing parameters, inline functions, default arguments, overloaded function; array of objects, pointers to objects, dynamic allocation operators, dynamic objects; Operator overloading, overloading unary and binary operator, overloading the operator using friend function, stream operator overloading, data conversion.

INHERITANCE: Defining derived classes, single inheritance, protected data with private inheritance, multiple inheritance, multi level inheritance, hierarchical inheritance, hybrid inheritance, multipath inheritance, constructors in derived and base class, abstract classes, virtual function and dynamic polymorphism, virtual destructor.

EXCEPTION HANDLING: Principle of exception handling, exception handling mechanism, multiple catch, nested try, re/throwing the exception.

OBJECT ORIENTED DESIGN: Requirements modeling, business modeling, component based development; Rational Unified Process (RUP), process overview, phases and iterations, static structure of the process, core workflows; UML history, building blocks of UML, structural modeling, behavioral modeling; Use Case Diagrams, Modeling Ordered Interactions: Sequence Diagrams; case studies.

TEXT BOOK:

1) Introduction to object-oriented programming, B. Timothy, Pearson, 2001.

2) Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, C. Larman , Prentice Hall, 2004.

REFERENCE BOOK:
1) Object Oriented Design and Patterns, C. Horstmann, John Wiley & Sons, 2005.
2) Unified Modeling Language User Guide, G. Booch, J. Rumbaugh, I. Jacobson, Pearson Education, 2001.
3) Object-Oriented Systems Analysis and Design using UML, Bennett, McRobb, Farmer, McGraw-Hill, 2002

Object Oriented Design and Programming Lab (0-1-4: 3)

Course Contents: Lab and take home assignments based on the course “OOD & P”. Emphasis on following topics:

- Eclipse (or NetBeans) IDE introduction
- Compiling & running programs on IDE
- Object oriented coding conventions
- Simple example of object-oriented design and message passing
- Problems on object based iteration
- Problems on object based arrays, matrices, and strings
- Design oriented problems on object polymorphism
- Design oriented problems on object inheritance & overriding
- Object-oriented designing of advanced data structures (linked list, trees, graphs, tables)
- Problems on object based linked lists
- Problems on object based trees
- Problems on object based graphs
- Mini Projects

Information Technology in Knowledge Society (3-0-2: 4)

Course Contents: The course consists of four modules.

Module 1
Introduction: Introduction to knowledge society; factors in knowledge society; digital age; information architecture - concepts and principles; information architecture practice; human computer interaction; information storage; information retrieval; strategic information management and leadership.

Module 2
Social networks analysis: Actors and actions in social networks; relational ties; network models; inter-dependency; third-party service; trust and ownership; user behavior, patterns; privacy.

Module 3
Digital Library: Libraries and information organizations; modern documentary tradition; digital libraries; e-science and digital humanities; ethics; plagiarism.

Module 4
Digital Economy: introduction to e-commerce, B2B, B2C, C2C; plastic money, e-cash/coin; mobile payment; strengths and constraints; economic and social perception in digital economy.

TEXT BOOK:
1) Fundamentals of information studies, J. Lester, W. Koehler, Neal-Schuman Publishers, 2007.

2) Information Technology for Management, 8/e -- Turban, Volonino. John Wiley & Sons, 2011.

REFERENCE:
Research Methods, C. H. Busha, Encyclopedia of Library and Information Science, Volume25, pp. 254-293, Marcel Dekker Inc., New York.

Algorithms and Problem Solving (3-0-2: 4)

Course Contents:

INTRODUCTION: Definition, properties of algorithms, analysis of algorithms.

DIVIDE AND CONQUER: Binary search, maximum and minimum element, analysis of sorting and searching algorithms.

GREEDY METHOD: Optimal storage on tapes, Knapsack problem, Minimum spanning trees, Single source shortest path method.

DYNAMIC PROGRAMMING: All pairs shortest path, Optimal binary tree, Multistage graphs.

BACKTRACKING: Solution space and tree organization, The Eight Queens problem, sum of subset problem, Graph coloring, Knapsack problem.

BRANCH AND BOUND: O/I Knapsack problem, traveling sales person problem, efficiency measures.

NP HARD AND NP COMPLETE PROBLEMS: Basic concepts, problems and applications.

TEXT BOOK:
1) Introduction to Algorithms, 3th Ed -- Cormen, Lieserson and Rivest, PHI, 2011.
2) How to Solve it by Computers -- Dromey, Pearson, 2007

REFERENCE BOOK:
1) Fundamental Algorithms- The Art of Computer Programming, Vol- I, 2nd Ed, Donald E. Knuth, Narosa Publishing House, Bombay, 2002.
2) Fundamentals of Computer Algorithms, 2nd Ed, E. Horowitz, S.Sahni, S.Rajasekaran, Galgotia Publications, New Delhi, 2003.
3) Design and Analysis of Algorithms, 3rd Ed, Aho A V, J E Hopcroft, J D Ullman, Pearson Education, Singapore, 2000.

Probability and Statistics (3-1-0: 4)

Course Contents:

INTRODUCTION: Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' theorem and independence.

RANDOM VARIABLES: Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, probability and moment generating function, median and quantiles, Markov inequality, Chebyshev's inequality.

SPECIAL DISTRIBUTIONS: Discrete uniform, binomial, geometric, negative binomial, hypergeometric, Poisson, continuous uniform, exponential, gamma, beta, normal, lognormal, inverse Gaussian, Cauchy, double exponential distributions, reliability and hazard rate, reliability of series and parallel systems.

JOINT DISTRIBUTIONS: Joint, marginal and conditional distributions, product moments, correlation and regression, independence of random variables, bivariate normal distribution.

TRANSFORMATIONS: functions of random vectors, distributions of order statistics, distributions of sums of random variables.

SAMPLING DISTRIBUTIONS: Mean, median, variance, standard deviation, The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Chi-Square, t and F distributions.

ESTIMATION: Unbiasedness, consistency, the method of moments and the method of maximum likelihood estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions.

TESTING OF HYPOTHESES: Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, the most powerful test and Neyman-Pearson Fundamental Lemma, tests for one sample and two sample problems for normal populations, tests for proportions, Chi square goodness of fit test and its applications.

TEXT BOOK:
Introduction to Probability and Statistics for Engineers and Scientists, S. M. Ross, Academic Press, 2009.

REFERENCE BOOK:
1) Introduction to Probability and Statistics, J.S. Milton & J. C. Arnold, Cengage Learning, 2008
2) Introduction to Probability Theory and Statistical Inference, H.J. Larson, Wiley, 1982.
3) A First Course in Probability, S.M. Ross, Prentice Hall, 2001.

Economics (3-0-0: 3)

Course Contents

The Problems of Economic Organisation; Demand and Supply; Price Determination; Elasticity of Demand and Supply; Theory of Production; Production function; Law of diminishing returns; Analysis of Cost; Fixed and variable costs; Marginal cost; Market Structure and Various Types of Markets; Perfectly Competitive Market; Monopolistic Markets; Aggregate Demand and Aggregate Supply; Determination Of National Income and criticisms; Consumption, Saving and Investment; Business Cycle and remedies; International Trade; Balance of Payment; Case for and against

free trade; Economics of banking; Interest rates and demand for money; Role of Central Bank; Inflation: measurement, causes and index numbers.

TEXT BOOK:

1) Economics, P. Samuelson & Nordhaus, Tata-McGraw Hill.
2) Indian Economy, Ruddar Datt & Sundaram, S. Chand & Co.

Semester IV

Database Management System (3-0-0: 3)

Course Contents:

INTRODUCTION AND CONCEPTUAL MODELING: Databases and database users; database system concepts and architecture; data modeling using the entity relationship (ER) model; enhanced entity relationship.

DATA STORAGE AND INDEXING: Introduction, record storage, and primary file organization index structures for files; single level indexing; multilevel indexing.

RELATIONAL MODEL: The relational data model; relational database constraints; relational algebra; relational calculus; relational database design by ER and EER; relational mapping; SQL; the relational database standard; examples of relational database management systems; Oracle.

DATABASE DESIGN THEORY AND METHODOLOGY: Functional dependencies and normalization for relational databases, relational database design algorithms and further dependencies.

SYSTEM IMPLEMENTATION TECHNIQUES: Query processing and optimization, transaction processing concepts, concurrency control techniques, database recovery techniques .

OBJECT AND OBJECT RELATIONAL DATABASES: Object database concepts, the ODMG standard for object databases, object relational systems and SQL.

EMERGING APPLICATIONS: Distributed databases and client/server models, XML Database (DTD, XML Schema), Query for XML Database, NoSQL.

TEXT BOOK:
Fundamentals of Database Systems, R. Elmasri, S. B. Navathe, Prentice Hall, New Delhi, 2007.

REFERENCE BOOK:
1) Database System Concepts, A. Silberschatz, H. F. Korth, S. Sudharshan,Tata McGraw Hill, New Delhi, 2005.
2) Introduction to Database Systems, C. J. Date, Prentice Hall, New Delhi, 2004.

Database Management System Lab (0-1-4: 3)

Course Contents:

Lab and take home assignments based on the course “DBMS”. Emphasis on following topics:

ER MODELING TOOL (ERWin): Introduction to ERWin; Adding Entity types & relations; Forward generation.

ABSTRACT QUERY LANGUAGE INTERPRETER (JCup & JFlex): Relational Algebra (syntax, RA interpreter); Domain Relational Calculus (syntax, DRC interpreter); Datalog (syntax, Datalog interpreter).

RELATIONAL DATABASE MANAGEMENT SYSTEM (Oracle): SQL* Plus Utility; SQL* Loader Utility; Programming with Oracle using JDBC API.

RELATIONAL DATABASE MANAGEMENT SYSTEM (MySQL): MySQL Utility; Bulk loading of data; MySQL and PHP programming; Making an online Address Book.

DATABASE DESIGN TOOLKIT (DBD): Coding Relational Schemas & Functional Dependencies; Invoking SWI-Prolog Interpreter; DBD system predicates (xplus, finfplus, fplus, implies, equiv, superkey, candkey, mincover.

OBJECT-ORIENTED DATABASE MANAGEMENT SYSTEM (db4o): db4o Installation & Introduction; Simple database creation exercise; Database updates & deletes; Database Querying (queryByExample, Native Queries, SODA Queries); Company database application exercise; Web application exercise (client-server configuration).

XML DATABASE: XML basics; Creating a company database in XML; XML Editor (EditiX); XPath; XQuery; FLWOR expressions; XML Schema

Reference: Fundamentals of Database Systems: Laboratory Manual, R. Sunderraman (http://tinman.cs.gsu.edu/~raj/elna-lab-2010/lab-manual.pdf)

Operating Systems (3-0-0: 3)

Course Contents:

Unit -I
Introduction: Operating system concepts, function, structure/layer of OS; evolution of OS, types of OS, system protection.

Unit - II
Introduction to processes, concurrent processes, principle of concurrency, producer-consumer problem, semaphores, classical problems in concurrency, inter processes communication, process generation, synchronization, process scheduling, threads.

Unit - III
CPU scheduling: scheduling concept, performance criteria, scheduling algorithm evolution, multiprocessor scheduling, deadlock- system model, deadlock characterization, prevention, recovery, avoidance and detection.

Unit - IV
Memory Management- single contiguous allocation; partitioned allocation; resident monitor, multiprogramming with fixed partition, multiprogramming with variable partition, paging; virtual memory concepts; swapping; demand paging; page replacement algorithms; segmentation; segmentation with paging; allocation of frames, thrashing, cache memory organization.

Unit - V
I/O Management and Disk Scheduling - Principles of I/O hardware; I/O Devices, organization of I/O function, I/O software, I/O buffering, disk I/O, disk scheduling algorithms. File System – files and directories, file organization and access mechanism, file sharing, security; protection mechanism.
CASE STUDY: Linux – design principles; kernel modules; process management; scheduling; memory management; file systems; input and output; IPC.

TEXT BOOK:
Operating Systems Concepts, 6th Ed, Silberschatz A, Galvin P, Gagne G, John Wiley & Sons, Singapore, 2006.

REFERENCE BOOK:
1) Operating Systems, 3rd Ed, Deitel H M, Pearson Education, New Delhi, 2004.
2) Modern Operating System, 2nd Ed, Andrew S Tanenbaum, PHI, New Delhi, 2004.
3) Operating System Concepts (2/e), J. L. Peterson, Addison-Wesley, 1985.

Operating Systems Lab (0-1-4: 3)

Lab and take home assignments based on the course “Operating Systems”.

Operations Research (3-1-0: 4)

Course Contents:

- Introduction to Operations Research (OR)
- Linear Programming (LP)
- Nonlinear programming
- Queuing
- Time-series analysis
- Dynamic programming
- Stochastic modeling and simulation

The course will discuss various theories and techniques for modeling real-world problems and methods to find their optimal solutions.

TEXT BOOK:
1) Introduction to Operations Research, 7th. Ed. Frederick Hillier. McGraw-Hill, 2000.
2) Simulation Model Design and Execution, P. Fishwick. Prentice Hall, 1995.

REFERENCE BOOK:
1) Operations Research: An Introduction (8/e). H. A. Taha, Prentice Hall, 2006.
2) Discrete-Event Simulation: Modeling, Programming and Analysis, George S. Fishman. Springer-Verlag, New York, Inc., 2001.

Science, Technology, Society (3-0-0: 3)

Course Contents:

Module 1:
- Introduction to STS as a field of study and research in the twentieth century
- Philosophical, Historical and Sociological Approaches to Science and Technology and Society
- The growth and identity of Modern Science and Technology in India

Module 2: Science Communication- Institutions, ideologies, practices
- The diversity of science communication in colonial India
- Science communication and the Nehruvian Agenda
- The ideology and image of developmental science
- The agenda of People's Science
- Liberalization and the commoditization of science and technology

TEXT BOOK:
1) Science, Technology and Medicine in Colonial India – David Arnold (Cambridge,2004)
2) Western Science in Modern India, Metropolitan Methods, Colonial Practices – Pratik Chakrabarti, (Permanent Black, 2004)

REFERENCE BOOK:
A Concise History of Science in India – D. M. Bose, S. N. Sen, and B.V. Subarayappa (Universities Press, 2009)

Technical Writing (1-0-4: 3)

Course Contents:
Structure of sentences, paragraphs, and documents. using stress for emphasis, and sequencing topics to create forward flow, writing for the reader; Formats of technical documents; the experimental report; the technical report, the proposal; workshop on published documents; Discussion and workshop on term paper proposals; Graphics; emphasis without distortion; visual illusions; a minimalist approach to data representation; univariate and multivariate displays; Discussion and workshop on term papers; elements of oral presentations; oral presentations. The term-paper presentation and seminar would be essential components of this course.

TEXT BOOK:
1) The Elements of Style, W. Strunk, E B White, New York: Macmillan, 1972.
2) The Mayfield Handbook of Technical and Scientific Writing, L. Perelman, Mayfield Publishing Company, 1998.
3) The Science of Scientific Writing, G. D. Gopen, J. A. Swan, American Scientist, 78(6):550-558, Nov-Dec 1990.

Semester V

Computer Networks (3-0-0: 3)

Course Contents:

Unit -I
Introduction: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design, Back Bone Design, Switching methods, ISDN, Terminal Handling. Physical Layer - Transmission Media, transmission media; coaxial cable; fiber optics; line coding; modems; RS232 interfacing sequences.

Unit-II
Data Link layer - Error detection and correction; parity; LRC; CRC; Hamming code; low control and error control; stop and wait; go back-N ARQ; selective repeat ARQ; sliding window; HDLC; LAN; Ethernet; IEEE 802.3; IEEE 802.4; IEEE 802.5; IEEE 802.11; FDDI; SONET; Bridges.

Unit - III
Network layer - Internetworks; packet switching and datagram approach; IP addressing methods; subnetting; routing - distance vector routing; link state routing; congestion control internetworking; security, IPv6.

Unit - IV
Transport layer - Basics of transport layer; multiplexing; demultiplexing; sockets; user datagram protocol (UDP); transmission control protocol (TCP); congestion control; quality of services; integrated services, data compression techniques, window management.

Unit-V
Application layer - Domain Name Space (DNS), File Transfer protocols, Electronic mail, SMTP, HTTP

TEXT BOOK:
1) Computer Networks, Andrew S. Tanenbaum, PHI, 2003.
2) Data and Computer Communication, W. Stallings, Pearson Education, 2000.

REFERENCE BOOK:
1) Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose and Keith W. Ross, Pearson Education, 2003.
2) Computer Networks, Larry L. Peterson and Peter S. Davie, Elsevier.

Computer Networks Lab (0-1-4: 3)

Lab assignments based on the course “Computer Networks”.

Software Engineering (3-0-2: 4)

Course Contents:

INTRODUCTION: The evolving role of software; software characteristics; software process - software process models; linear sequential model; prototyping model; The RAD model; evolutionary software process models; The incremental model; The spiral model.

SYSTEM ENGINEERING: Requirements analysis and negotiation; Requirements validation; Requirements management.

ANALYSIS MODELING: Data modeling; data objects, attributes and relationships; cardinality and modality; entity-relationship diagram; data flow diagrams; data dictionary.

DESIGN CONCEPTS AND PRINCIPLES: Software architecture; control hierarchy; structural partitioning; functional Independence; cohesion, coupling; design documentation; architectural design; transform centered architecture; transaction centered architecture; user Interface design models, user interface design process.

TESTING TECHNIQUES: Software testing fundamentals; test case design; White box testing; basis path testing; control structure testing; Black box testing, testing for specialized environments, testing strategies; verification and validation - unit testing, integration testing, validation testing, system testing, debugging.

SOFTWARE QUALITY ASSURANCE: Quality concepts; cost of quality, Software Quality Assurance (SQA) Group - roles and responsibilities, formal technical reviews, quality standards.

TEXT BOOK:

Software Engineering – A Practitioner's Approach, R. S. Pressman, McGraw Hill, 2006.

REFERENCE BOOK:
1) Software Engineering, I. Sommerville, Pearson Education, New Delhi, 2001.
2) An Integrated Approach to Software Engineering, P. Jalote, Narosa Publishers, New Delhi, 2005.

Web Technology (3-0-2: 4)

Course Contents:

INTRODUCTION WEB SERVICES: Web services architecture; overview of web services; service oriented roles and architecture; architectural process; three tier web based architecture.

XML: Introduction to XML; XML fundamentals; well-formed XML documents; components of XML document; XML tools; XML style sheets; XSL; CSS; XML namespaces; EDI fact; message definition; segments; message structure and electronic enveloping.

JAVA WEBSERVICES ARCHITECTURE: J2EE and web services-Introduction to JSP and java servlets; servlets; overview of Java server pages.

ACTIVE SERVER PAGES: HTML and VBScript fundamentals; ASP concepts, using request, response, application, session, server objects; cookies.

.NET FRAMEWORK: Overview of .NET framework; building blocks of .NET platform; role of .NET class libraries; understanding CTS, CLR, CLS; deploying .NET; building C# applications.

Lab: web technology tools, XML, SOAP, CORBA, RMI with emphasis on following:

PROJECT/ASSIGNMENT 1 (INFORMATION FLOW): Implementation of complete website; PHP backend; MySQL Database; front-end Form development (text, email, radio, checkbox, select/data list)
PROJECT/ASSIGNMENT 2 (VALIDATION AND STRUCTURE): Client-side validation of project/assignment 1; Server-side validation of project/assignment 1; Object-oriented designing of PHP backend (following MVC architecture); Unit testing; Using Git; Using GitHub.

PROJECT/ASSIGNMENT 3 (SESSION MANAGEMENT): Session Management addition to project/assignment 2; User login addition to project/assignment 2; Styling & Layout addition project/assignment 2.

TEXT BOOK:

Web Application Architecture: Principles, Protocols, & Practices, L. Shklar, R. Rosen

REFERENCE BOOK:
1) Web Technologies: A Computer Science Perspective, Jeffrey Jackson
2) Web Technology: Theory and Practice, M. Srinivasan
3) Java Servlet Programming, J. Hunter, W. Crawford, O'Reilly Publications, USA, 1998.

Information Security (3-0-0: 3)

Course Contents:

INTRODUCTION: Computer Security, Threats to security, System Security; Viruses ,worms , Trojan horse, Intruders, Malicious software, Firewalls,
CRYPTOGRAPHY BASICS: Classical, Symmetric and Asymmetric Cryptography, Modern ciphers, Hash functions, Digital signature algorithms, Key management.
NETWORK SECURITY: Kerberos, SSL/TLS, E-Mail Security, IP security, Web security.
SECURITY CONTROLS & POLICIES: IDS/IPS, Access controls, Security policies, Standards, Ethics.

TEXT BOOK:
Computer Security: Art and Science, M. Bishop, Pearson Education, 2004.

REFERENCE BOOK:
1) Network security, Kaufman, Perlman and Speciner, Pearson Education, 2002.
2) Cryptography and Network Security, W. Stallings, Prentice Hall, 2010.

Environmental Science (3-0-0: 3)

Course Contents and Books: Same as CS discipline.

Science Elective 1 (3-0-0: 3)

Semester VI

Software Project Management (3-0-2: 4)

Course Contents:

INTRODUCTION: Introduction to project management; Open source tools, merits and limitations.
SOFTWARE MEASUREMENT: software metrics, cyclomatic complexity, class cohesion metrics.
SOFTWARE ESTIMATION: Cost estimation, effort estimation, schedule estimation, duration estimation.
SOFTWARE MANAGEMENT: Software planning; configuration management; software tendering and contracting processes; risk management.
PROJECT EXECUTION AND QUALITY: Project execution; quality insurance, deadline management, configuration management.
STANDARDS AND METHODOLOGIES: RFPs, IETF, ISO, IEEE standards.
WEB BASED OPEN SOURCE PROJECT MANAGEMENT TOOLS: Simulation/emulation, performance measures, applications.

TEXT BOOK:
Software Project Management: A Process-Driven Approach -- A. Ahmed: Auerbach Publications, 2011

REFERENCE BOOK:
Applied Software Project Management -- A. Stellman and J. Greene: O'Reilly Media, 2005.

Human Computer Interaction (3-0-0: 3)

Course Contents:
HCI foundation and history; Usability life cycle and methods; Design rules and guidelines; Empirical research methods; Models in HCI - GOMS, Fitts' law and Hick-Hyman's law; Task analysis; Dialogue design; Cognitive architecture and HCI ; Graphic User Interfaces & aesthetics; Usability Testing; UML,OOP,OOM; Design Case Studies.

TEXT BOOK:
Human Computer Interaction, A. Dix, J. Finlay, G. D. Abowd, R. Beale, Pearson Education, 2005.

REFERENCE BOOK:
1) Human Computer Interaction, J. Preece, Y. Rogers, H. Sharp, D. Baniyon, S. Holland, T. Carey, Addison-Wesley, 1994.
2) Designing the User Interface, B. Shneiderman, Addison Wesley, 2000.

Human Computer Interaction Lab (0-1-2: 2)

Course contents:

Lab assignments based on the course "HCI". Following topics/assignments should get consideration:

Explain technology in interface Design; explain the user interface design process; coloring guidelines; Speech Recognition and speech generation; Types of windows; Components of UI, such as Text Boxes, List Boxes, Messages, Icons, Multimedia; Mental models; Importance of the mental models in UI design.

A project with a team of minimum 2 and maximum 3 students. The purpose of the project is focused on User interaction and NOT on the implementation of the entire project. The partial list of projects could be:

- Online shopping website.
- e learning web site
- Video/ Audio on demand web site
- ATM interface
- Travel reservation system
- Students' Kiosk for institute's information

- Online trading on Stock market
- University web site
- Hospital Management
- Placement agency
- …

Introduction Information Retrieval (3-0-2: 4)

Course Contents:

Goals and history of IR, Vector-space retrieval model, Language model, Text tokenization, Stemming, Relevance feedback, Query expansion; Ontology,
Text entities, Part of Speech tagging, Named Entity Recognition, Word Sense Disambiguation, Language dependent modules for Indexing, IR in linguistic resource constrained situation, Statistical stemming, Dictionary construction, Document alignment, Passage retrieval, Question Answering, Domain specific QA, Text categorization, clustering, summarization, Creation of test cases, Performance metrics: recall, precision, bpref, Evaluations on benchmark text collections form TREC, CLEF, NTCIR, FIRE

TEXT BOOK:
1) Introduction to Information Retrieval, C. D. Manning, P. Raghavan and H. Schütze, Cambridge University Press. 2008.
2) Modern Information Retrieval, R. Baeza-Yates, and B. Ribeiro-Neto, Addison Wesley Longman Publishing Co. Inc. 1999

E-Commerce (3-0-0: 3)

Course Contents:

Introduction to Electronic Commerce; WWW; Buyer-seller model; Marketing on the web; B2B strategies; B2C strategies; M2M business; Web portals; Online auctions; EC software, hardware; Payment systems; Web 2.0; EC security.

TEXT BOOK:
1) Electronic Commerce (9/e). G. Schneider, Cengage Learning, 2010.
2) eBusiness & eCommerce - How to Program. Deitel, Deitel & Nieto, Prentice Hall, 2001.

Humanities Elective – 1 (3-0-0: 3)
Technical Elective – 1 (3-0-0: 3)

Semester VII

Professional Ethics (2-0-0: 2)

Course Contents:

HUMAN VALUES: Morals, values and ethics, integrity; service learning; civic virtue; respect for others; sharing; honesty; courage; valuing time; cooperation; commitment; empathy; self-confidence; spirituality.

ENGINEERING ETHICS: Senses of Engineering Ethics; moral dilemmas, moral autonomy; Kohlberg's theory; Gilligan's theory; consensus and controversy; models of professional roles; theories about right action; self-interest; customs and religion; uses of ethical theories.

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineers as responsible experimenters; codes of ethics; case study.

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk; assessment of safety and risk; risk benefit analysis and reducing risk; the three mile island and chernobyl case studies.

COLLEGIALITY AND LOYALTY: Respect for authority; collective bargaining; confidentiality; conflicts of interest; occupational crime; professional rights; employee rights; Intellectual Property Rights (IPR); discrimination.

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 ethics like ASME, ASCE, IEEE, IE (India), IETE (India).

TEXT BOOK:
Engineering Ethics, C. D. Fleddermann, Pearson Education/ Prentice Hall, New Jersey, 2004.

REFERENCE:
1) Ethics in engineering, M. Martin, R. Schinzinger, McGraw-Hill, New York1996.
2) Engineering Ethics – Concepts and Cases, C. E. Harris, M. S. Pritchard, M. J Rabins, Thomson Learning, United States, 2000.

Management Information Systems (2-1-0: 3)

Course Contents:

INTRODUCTION: Technology of Information Systems, concepts, definition; role and impact of MIS; role and importance of management; approaches to management; functions of the manager; management as a control system; concepts of data models; database design; client-server architecture.

PROCESS OF MANAGEMENT: Planning, organization, staffing, coordination and controlling; management by exception; MIS as a support to management; organization structure and theory; basic model and organization structure; organizational behavior.

DECSION MAKING AND INFORMATION: Decision making concepts, methods, tools and procedures; behavioral concepts in decision making; organizational decision making; information concepts as a quality product; classification of the information; methods of data and information collection; value of the information; organization and information system concepts, control types; handling system complexity; post implementation problems in systems.

SYSTEM ANALYSIS AND DESIGN: Need for system analysis; system analysis of existing system; new requirement; system development model; structured system analysis and design; computer system design; development of MIS; development of long range plans of the MIS; ascertaining the class of the information; determining the information requirement; development and implementation of the MIS; management of quality; MIS factors of success and failure.

DECISION SUPPORT SYSTEMS: Deterministic systems; artificial intelligence; knowledge based systems; MIS and the role of DSS; enterprise management systems; enterprise resource planning (ERP); ERP features and benefits; implementation factors of ERP; Internet and Web based information system; Electronic Commerce.

TEXT BOOK:
Management Information Systems, K. C Landon, J. P..Laudon, Prentice Hall, 2000.

REFERENCE BOOK:
Management Information Systems, G. B. Davis, M. H. Olson, McGraw Hill,1998.

System Administration and Maintenance (2-0-4: 4)

Course Contents:

Desktops, servers, Operating System Installation & Configuration; booting; hardening; processes (Server Processes, Client Processes); File System Organization; Network Services (HTTP, LPR, NFS, SMTP, SSH, etc.); System Support and Maintenance; Application Installation & Configuration; Application Support & Maintenance; Server Administration & Management; User and Group Management; Backup & Disaster Recovery; Security Management; Job Scheduling & Automation; Resource and Site Management; Performance Monitoring; User Support and Education; helpdesk; policies; ethics.

TEXT BOOK:
UNIX and Linux System Administration Handbook, Nemeth, Snyder, Hein and Whaley, Prentice Hall, 2010.

REFERENCE BOOK:
The Practice of System and Network Administration, Limoncelli, Hogan and Chalup, Addison Wesley, 2007.

Science Elective – 2 (3-0-0: 3)
Technical Elective – 2 (3-0-2: 4)
Technical Elective – 3 (3-0-0: 3)
Technical Elective – 4 (3-0-0: 3)

Semester VIII

Project (0-0-36: 18)

Final semester project is a guided project. Students can take individual project or group project. In case it is a group project the size of the group would be restricted to not more than two students. Students would be allowed to undertake their final semester project outside the Institute. Students can undertake such projects in any other educational institute or in a research lab. Students would also be allowed to join industry for this final semester project in case the nature of the project is based on some research.