Information Technology (IT)

EN010301 B Engineering Mathematics II

(CS, IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives

- *To know the importance of learning theories and strategies in Mathematics and graphs.*

MODULE 1 Mathematical logic (12 hours)

Basic concept of statement , logical connectives, Tautology and logical equivalence – Laws of algebra of propositions – equivalence formulas – Tautological implications (proof not expected for the above laws , formulas and implications). Theory of inference for statements – Predicate calculus – quantifiers – valid formulas and equivalences – free and bound variables – inference theory of predicate calculus

MODULE 2 Number theory and functions (12 hours)

Fundamental concepts – Divisibility – Prime numbers- relatively prime numbers – fundamental theorem of arithmetic – g.c.d - Euclidean algorithm - properties of gcd (no proof) – l c m – Modular Arithmetic – congruence – properties – congruence class modulo n – Fermat's theorem – Euler's Totient functions - Euler's theorem - Discrete logarithm

Function – types of functions – composite functions – inverse of a function – pigeon hole principles

MODULE 3 Relations (10 hours)

Relations – binary relation – types of relations – equivalence relation –partition – equivalence classes – partial ordering relation – Hasse diagram - poset

MODULE 4 Lattice (14 hours)

Lattice as a poset – some properties of lattice (no proof) – Algebraic system – general properties – lattice as algebraic system – sublattices – complete lattice – Bounded Lattice - complemented Lattice – distributive lattice – homomorphism - direct product

MODULE 5 Graph Theory (12 hours)

Basic concept of graph – simple graph – multigraph – directed graph- Basic theorems (no proof) . Definition of complete graph , regular graph, Bipartite graph, weighted graph – subgraph – Isomorphic graph –path – cycles – connected graph.- Basic concept of Eulergraph and Hamiltonian circuit – trees – properties of tree (no proof) - length of tree – spanning three – sub tree – Minimal spanning tree (Basic ideas only . Proof not excepted for theorems)

References

1. S.Lipschutz, M.L.Lipson – Discrete mathematics –Schaum's outlines – Mc Graw Hill
2. B.Satyanarayana and K.S. Prasad – Discrete mathematics & graph theory – PHI
3. Kenneth H Rosen - Discrete mathematics & its Application - Mc Graw Hill
4. H. Mittal , V.K.Goyal, D.K. Goyal – Text book of Discrete Mathematics - I.K. International Publication
5. T. Veerarajan - Discrete mathematics with graph theory and combinatorics - Mc Graw Hill
6. C.L.Lieu - Elements of Discrete Mathematics - Mc Graw Hill
7. J.P.Trembly,R.Manohar - Discrete mathematical structures with application to computer science - Mc Graw Hill
8. B.Kolman , R.C.Bushy, S.C.Ross - Discrete mathematical structures- PHI
9. R.Johnsonbough - Discrete mathematics – Pearson Edn Asia

EN010 302 Economics and Communication Skills

(Common to all branches)

Teaching scheme
2hours lecture and 2 hours tutorial per week **Credits: 4(3+1)**
Objectives

- To impart a sound knowledge of the fundamentals of Economics.

Economics

Module I (7 hours)
Reserve Bank of India-functions-credit control-quantitative and qualitative techniques
Commercial banks-functions- Role of Small Industries Development Bank of India and National Bank for Agriculture and Rural Development
The stock market-functions-problems faced by the stock market in India-mutual funds

Module II (6 hours)
Multinational corporations in India-impact of MNC's in the Indian economy
Globalisation-necessity-consequences
Privatisation-reasons-disinvestment of public sector undertakings
The information technology industry in India-future prospects
Module III (6 hours)
Direct and indirect taxes- impact and incidence- merits of direct and indirect taxes-progressive and regressive taxes-canons of taxation-functions of tax system-
tax evasion-reasons for tax evasion in India-consequences-steps to control tax evasion
Deficit financing-role-problems associated with deficit financing

Module IV (5 hours)
National income-concepts-GNP, NNP, NI, PI and DPI-methods of estimating national income-difficulties in estimating national income
Inflation-demand pull and cost push-effects of inflation-government measures to control inflation

Module V (6 hours)
International trade-case for free trade-case for protectionism
Balance of payments-causes of disequilibrium in India's BOP-General Agreement on Tariffs and Trade-effect of TRIPS and TRIMS in the Indian economy-impact of WTO decisions on Indian industry

Text Books

1. Ruddar Datt, Indian Economy, S.Chand and Company Ltd.
2. K.K.Dewett, Modern Economic Theory, S.Chand and Company Ltd.

References

1. Paul Samuelson, Economics, Tata McGraw Hill
2. Terence Byres, The Indian Economy, Oxford University Press
3. S.K.Ray, The Indian economy, Prentice Hall of India
4. Campbell McConnel, Economics, Tata McGraw Hill

Communication Skills

Objectives

- To improve Language Proficiency of the Engineering students
- To enable them to express themselves fluently and appropriately in social and professional contexts
- To equip them with the components of different forms of writing

MODULE – 1 (15 hours)

INTRODUCTION TO COMMUNICATION

Communication nature and process, Types of communication - Verbal and Non verbal, Communication Flow-Upward, Downward and Horizontal, Importance of communication skills in society, Listening skills, Reading comprehension, Presentation Techniques, Group Discussion, Interview skills, Soft skills

MODULE – II (15 hours)

TECHNICAL COMMUNICATION

Technical writing skills- Vocabulary enhancement-synonyms, Word Formation-suffix, affix, prefix, Business letters, Emails, Job Application, Curriculum Vitae, Report writing-Types of reports

Note: No university examination for communication skills. There will be internal evaluation for 1 credit.

REFERENCES

1. The functional aspects of communication skills, P.Prasad and Rajendra K. Sharma, S.K. Kataria and sons, 2007
2. Communication skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning private limited, 2010
3. Professional Communication, Kumkum Bhardwaj, I.K. International (P) House limited, 2008
4. English for technical Communication, Aysha Viswamohan, Tata Mc Graw Publishing company limited, 2008

Discrete and Integrated Electronic Circuits
IT010 303 (EC)

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- *To impart the basic concepts of discrete integrated electronics*
- *To develop understanding about the working and operation of various circuits using discrete and integrated components.*

Module I (12hours)
Power supplies: Half wave, full wave and bridge rectifiers- L, C, LC and π filters (working only)- Zener voltage regulator, transistor series and shunt voltage regulator, voltage regulator ICs, 78XX and 79XX series
Module II (12hours)
Transistor Amplifiers: Bipolar transistor models and characteristics, current and voltage characteristics, BJT as a switch, BJT circuits at DC, Need for biasing, Q point selection, Concepts of load line, Bias stability, Biasing in BJT amplifier circuits, Small signal operation and model, transconductance, single stage BJT amplifiers
Module III (12hours)
Integrated Circuits: Operational Amplifier, Simplified model, Ideal OP-Amp approximation and characteristics, Non inverting amplifier, Inverting amplifier, OP-Amp characteristics, Voltage follower, Difference Amplifier, Instrumentation amplifier, Summation amplifier
Module IV (12hours)
Feedback: Concept of feedback, positive and negative feedback, types of feedback, Effect of feedback on amplifier performance, Stability of feedback circuits
Oscillators: Condition for oscillators, General form of oscillator circuit, RC phase shift oscillators, Wein bridge oscillator using OP-Amp, Working of Hartley, Colpitt's and crystal oscillators
Module V (12hours)
RC circuits: Response of high pass and low pass RC circuits to sine, step, pulse and square inputs, clipping and clamping circuits, RC integrator and differentiator, Working of astable, mono-stable and bi-stable multivibraors using OP-Amp, Working of Schmitt trigger, 555 timer and its application.

Reference Books

1. Integrated Electronics – Milman , Halkias – TMH
2. Microelectronic circuits – Sedra , Smith – Oxford university press
3. Fundamentals of microelectronics – B Razavi - Wiley
4. Design with Op-Amp and analog integrated circuits – S Franco – TMH
5. Pulse, digital and switching waveforms – Milman, Taub - TMH

Mahatma Gandhi University

IT010 304 SWITCHING THEORY AND LOGIC DESIGN

(Common with CS010 305)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives:-

- *To introduce the principles of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Computer Architecture and Design.*

Module 1: (14 Hrs)

Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Switching Theory:- Boolean Algebra- Postulates and Theorems, De' Morgan's Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods.

Module 2: (12 Hrs)

Combinational Logic Circuits:- Review of Basic Gates- Universal Gates,Adders, Subtractors, Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Lookahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and Demultiplexer, PLA and PAL.

Module 3(12 Hrs)

Sequential Logic Circuits:- Latches and Flip Flops- SR, JK, D, T and MS Flip Flops, Asynchronous Inputs.

Clocked Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Module 4: (10 Hrs)

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters , Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

Module 5(12 Hrs)

Fault Tolerance and Diagnosis : Concepts of Fault and Hazards- Fault Tolerance in Combinational Circuits- Fault Table, Fault Detection methods-Boolean Difference and Path Sensitizing Methods-

Digital ICs- Digital Logic Families- Characteristics- Introduction to RTL, TTL,ECL, MOS and CMOS Logics.

Text Books

1. Zvi Kohavi ,*Switching and Finite Automat theory*, Tata McGrwHill
2. Morris Mano ,*Digital Logic and Computer Design* Prentice Hall of India

Reference Books

1. Floyd T.L. *Digital Fundamentals* , Universal Bookstall

IT 010 305: PRINCIPLES OF COMMUNICATION ENGINEERING

Teaching scheme **Credits: 4**

3 hours lecture and 1 hour tutorial per week

Objectives:

- *To impart the basic concepts of analog modulation schemes*
- *To understand the performance of analog communication system*

Module I (12 Hours)

Introduction-communication process, source of information, communication channels; Modulation - need, band width requirements - electromagnetic spectrum. frequency spectrum. Principles of Microwave and satellite communication systems. TRF receivers, Super heterodyne receiver, Double Super heterodyne receiver.

Module II (12 Hours)

Amplitude modulation - principles - modulation factor and percentage of modulation, mathematical relationship, frequency spectrum, band selection. DSB-SC Modulation. SSB and Vestigial SideBand (VSB) Modulation .

Module III (12 Hours)

Angle Modulation - mathematical analysis, principles, waveforms, frequency deviation, frequency analysis, bandwidth requirement, phasor representation-pre-emphasis, de-emphasis. Phase modulators, FM transmitters, FM receivers-block diagram. Comparison study of AM, FM and PM.

Module IV (12 Hours)

Noise - external, internal - noise calculations, multiple noise sources, equivalent noise band width - Noise figure - Effective noise temperature, noise figure in terms of available gain . Characteristics of receivers - sensitivity, selectivity, double spotting, SNR - AGC circuitry .

Module V (12 Hours)

Analog Pulse Modulation: Sampling theorem for base-band and pass-band signals, Pulse Amplitude modulation: PAM, PWM, PPM generation and demodulation. Spectra of Pulse modulated signals. Digital Pulse Code modulation (PCM).

References

1.Simon Haykin, "Communication Systems", 3rd Edition, John Wiley & Sons
2.George Kennedy, *Electronic communication systems*, McGraw Hill ,4th edition
3.Tomasi: Electronic communication: Fundamentals through advanced, Pearson Education
4.. R.E. Ziemer and W.H. Tranter, "Principles of Communication", JAICOP Publishing House
5. A.Bruce Calrson, " Communication systems", third edition, MGH,
6. Dennis Roddy, John Coolen, "Electronic Communications", PHI 1997
7 B.P.Lathi, *Communication Systems*, B.S Publication, 2001
8. Taub & Schilling, *Principles of Communication Systems* ,Tata McGraw Hill, 1991

IT010 306: PROBLEM SOLVING AND COMPUTER PROGRAMMING

(Common with CS010 303)

Teaching scheme

Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of problem solving using a computer.*
- *To learn about the structure of C programming language.*

Module I (10 hours)

Problem solving: Steps in Computer programming – Features of a good program – Problem solving using Algorithms and Flowcharts.

C fundamentals: Character set, Constants, Identifiers, keywords, basic data types, Variables, Operators, Expressions, Statements, Input and Output statements – Structure of a C program – simple programs.

Module II (13 hours)

Control statements: if, if-else, nested if , switch, while, do-while, for - break & continue – nested loops.

Single dimensional arrays – defining an array, array initialisation, accessing array elements – Programs for sequential search, bubble sort, binary search.

Multidimensional arrays – defining a two dimensional array, array initialisation, accessing elements – Programs for matrix processing.

Module III (12 hours)

Strings: declaring a string variable, reading and displaying strings, string related library functions – Programs for string matching and sorting.

Functions: Function definition, function call, function prototype, parameter passing, void function – Recursion – Passing array to function.

Macros: Defining and calling macros – Difference between macro & function.

Module IV (13 hours)

Structures: defining a structure variable, accessing members, array of structures, passing structure to function.

Unions: difference with structure, defining union variable, accessing members.

Pointers: declaration, operations on pointers, passing pointer to a function, accessing array elements using pointers, processing strings using pointers, pointer to pointer, array of pointers, pointer to array, pointer to function, pointer to structure, self referential structure.

Module V (12 hours)

Files: Different types of files in C – Opening & Closing a file – Writing to and Reading from a file – Processing files – Library functions related to file – fseek(), ftell(), ungetc(), fread(), fwrite() – Dynamic memory allocation.

Storage Class associated with variables: automatic, static, external and register.

Additional features: Enumerated data type, bitwise operators, typedef.

References

1. S. Gottfried ,Programming with C - Byron, Tata McGraw Hill.
2. Kerninghan & Ritchie, Computer Programming in C - PHI .
3. Stephen C. Kochan, Programming in C - CBS publishers.
4. E. Balaguruswamy ,Programming in C (5e) –, Mc Graw Hill
5. Yashwant Kanetkar, Let us C –BPB.
6. Al Kelley and Ira Pohl, A Book on C –Addison-Wesley
7. Stan Kelly Bootle, Mastering Turbo C - BPB Publications.
8. Programming and Problem Solving with PASCAL - Micheal Schneider, Wiley Eastern Ltd. (Module 1)
9. Yashwant Kanetkar, Pointers in C - BPB
10. Munish cooper,The Spirit of C- Jaico Books.

IT010 307 (EC)
Electronic Circuits and Communication Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To provide experience on design, and working of basic discrete electronic circuits*
- *To provide experience on design, and working of op amp based electronic circuits*

1. Rectifiers – Half wave, Full wave and Bridge
2. Rectifiers with filters - Half wave, Full wave and Bridge
3. BJT as amplifier
4. Integrator using RC and OP-Amp
5. Differentiator using RC and OP-Amp
6. Clipper circuits
7. Clamper circuits
8. OP-Amp as inverting and non inverting amplifier
9. OP-Amp as summer
10. Op-Amp based oscillators
11. 555 Timer based experiments

IT010 308: PROGRAMMING LAB

Teaching scheme **Credits:** 4

3 hours Practical hours

Objectives:

- *To familiarize computer components, peripherals, Operating Systems, Office Application Packages etc.*
- *To practice the programming language 'C'.*

1. Familiarization with computer system, Processor, Peripherals, Memory etc.
2. Familiarization of operating system-DOS, Windows etc. (use of files directories, internal commands, external commands, compilers, file manager, program manager, control panel etc.)
3. Familiarization with word processing packages like MS Excel, MS Access, MS PowerPoint and MS Word.
4. Programming experiments in C to cover
    1. Control structures
    2. Functions
    3. String manipulations
    4. Arrays
    5. Structures
    6. Pointers
    7. Files.

Internal Continuous Assessment *(Maximum Marks-50)*
50%-Laboratory practical and record 30%- Test/s 20%- Regularity in the class

End Semester Examination *(Maximum Marks-100)*
70% - Procedure, conducting experiment, results, tabulation, and inference 30% - Viva voce

EN010401 Engineering Mathematics III

(Common to all branches)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *Apply standard methods of mathematical &statistical analysis*

MODULE 1 Fourier series (12 hours)

Dirichlet conditions – Fourier series with period 2 π and 2l – Half range sine and cosine series – Harmonic Analysis – r.m.s Value

MODULE 2 Fourier Transform (12 hours)

Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity

MODULE 3 Partial differential equations (12 hours)

Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's equation – Charpits method –solution of Homogeneous partical differential equations with constant coefficients

MODULE 4 Probability distribution (12 hours)

Concept of random variable , probability distribution – Bernoulli's trial – Discrete distribution – Binomial distribution – its mean and variance- fitting of Binominal distribution – Poisson distribution as a limiting case of Binominal distribution – its mean and variance – fitting of Poisson distribution – continuous distribution- Uniform distribution – exponential distribution – its mean and variance – Normal distribution – Standard normal curve- its properties

MODULE 5 Testing of hypothesis (12 hours)

Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples

References

1. Bali& Iyengar – A text books of Engg. Mathematics – Laxmi Publications Ltd.
2. M.K. Venkataraman – Engg. Mathematics vol II 3rd year part A & B – National Publishing Co.
3. I.N. Sneddon – Elements of partial differential equations – Mc Graw Hill
4. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
5. Richard A Johnson – Miller Fread's probability & Statistics for Engineers- Pearson/ PHI

6. T. Veerarajan – Engg. Mathematics – Mc Graw Hill
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability ,Statistics and Queueing theory – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International
10. A.K.Mukhopadhyay-Mathematical Methods For Engineers and Physicists-I.K.International

EN010 402(ME): Principles of Management

(Common with EN010 502(ME))

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To develop an understanding of different functional areas of management.*
- *To understand the functions and duties an individual should perform in an organisation.*

Module I (12 hours)

Management Concepts: Vision, Mission, Goals and Objectives of management-MBO-Scientific management- Functions of management- Planning- Organizing- Staffing-Directing- Motivating- Communicating- Coordinating- Controlling- Authority and Responsibility- Delegation- Span of control- Organizational structure- Line, Line and staff and Functional relationship.

Module II (12 hours)

Personnel Management: Definition and concept- Objectives of personnel management-Manpower planning- Recruitment and Selection of manpower- Training and development of manpower- Labour welfare- Labour turnover- Quality circle- Industrial fatigue- Industrial disputes-Method of settling disputes- Trade unions.

Module III (12 hours)

Production management: Objectives and scope of production management- Functions of production department- production management frame work- product life cycle-Types of production- Production procedure- Project planning with CPM and PERT- Basic concepts in network.

Module IV (12 hours)

Financial Management: Objectives and Functions of Financial Management- Types of Capital- Factors affecting working capital- Methods of financing.

Cost Management: Elements of cost- Components of cost- Selling Price of a product.

Module V (12 hours)

Sales and Marketing Management: Sales management- Concept- Functions of sales department- Duties of sales engineer- Selling concept and Marketing concept- Marketing-Definition and principles of marketing- Marketing management and its functions- Sales forecasting- Pricing- Advertising- Sales promotion- Channels of distribution- Market research.

Text Books

1. Koontz and Weihrich, *Essentials of Management*, Tata McGraw Hill.
2. Mahajan M., *Industrial Engineering and Production Management*, Dhanpat Rai and Co.
3. Kemthose and Deepak, *Industrial Engineering an Management,* Prentice Hall of India.

Reference Books

1. Martand Telsang, *Industrial Engineering and Production Management.*
2. Khanna O.P., *Industrial Engineering and Management*, Dhanpat Rai and Co.
3. Philip Kotler, *Marketing Management*, Prentice Hall of India.
4. Sharma S. C. & Banga T. R., *Industrial Organisation and Engineering Economics,* Khanna Publishers.
5. Prasanna Chandra, *Financial Management,* Tata McGraw Hill.

IT010 403: Computer Organisation and Architecture

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To give an insight into the organisation of functional units of a computer system*
- *Also to give a fair idea of the architecture of a computer system*

Module I (9 hours)
Introduction- Function and structure of a computer, Functional components of a computer, Interconnection of components Performance of a computer Representation of Instructions- Machine instructions, Operands, Addressing modes, Instruction formats, Instruction sets, Instruction set architectures – CISC and RISC architectures Programming- Concepts of machine level programming, assembly level programming and high level programming.

Module II (12 hours)
Processing Unit- Organisation of a processor- Registers, ALU and Control unit, Data path in a CPU, Instruction cycle Arithmetic and Logic Unit- Arithmetic algorithms, Design of arithmetic unit, logic unit, status register, and accumulator Control Unit- Operations of a control unit, Design of Hardwired control unit and Microprogrammed control unit

Module III (12 hours)
Memory Subsystem- Semiconductor memories, Memory cells – SRAM and DRAM cells, Internal Organization of a memory chip, Organization of a memory unit, Error correction memories, Interleaved memories, Cache memory unit – Concept of cache memory, Mapping methods, Organization of a cache memory unit, Fetch and write mechanisms, Memory management unit – Concept of virtual memory, Address translation, Hardware support for memory management.

Module IV (12 hours)
Input/Output Subsystem- Access of I/O devices, I/O ports, I/O control mechanisms – Program controlled I/O, Interrupt controlled I/O and DMA controlled I/O, I/O interfaces – Serial port, Parallel port, PCI bus, SCSI bus, USB bus, Firewall and Infiniband, I/O peripherals – Input devices, Output devices, Secondary storage devices.

Module V (15 hours)
Parallel Organisations- Introduction to pipelining and pipeline hazards, Design issues of pipeline architecture , Instruction level parallelism, Introduction to Interconnection Network- Practical issues, Examples Multiprocessors- Characteristics, Memory organisation, Synchronization, Models of memory consistency, Issues of deadlock and scheduling, Cache and related problems, Parallel Processing Concepts.

Text Books

1. Hamacher, Vranesic & Zaky -Computer Organization, , McGraw Hill
2. M. Morris Mano -Digital Logic and Computer Design PHI Edition
3. William Stallings -Computer Organization and Architecture, Prentice Hall.

Reference Books

1. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
2. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004
3. P. Pal Chaudhuri, "Computer Organisation and Design", Third Edition, PHI,India, 2009
4. Linda Null and Julia Labour, "Computer Organisation and Architecture", 2nd edition, Jones and Bartlett Publishers,LLC, USA

IT 010 404: Theory of Computation
(Common with CS 010 406)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of theory of automata ,languages and computation.*
- *To develop understanding about machines for sequential computation, formal languages and grammars , and classification of feasible and intractable problems.*

Module I (10 hours)
Proving techniques-Mathematical induction -Diagonalization principle –Pigeonhole principle-Functions – Primitive recursive and partial recursive functions – Computable and non computable functions—Formal representation of languages – Chomsky Classification.

Module II (13 hours)
Introduction to Automata theory – Definition of Automation – Finite Automata –Language acceptability by Finite Automata –Deterministic and Nondeterministic finite automation-Regular Expressions – Finite Automation with $\in$-Transitions –Conversion of NFA to DFA - Minimisation of DFA-DFA to Regular Expressions conversion-pumping lemma for regular languages – Applications of finite automata-NFA with o/p (moore /mealy)

Module III (12 hours)
Context Free Grammar –Simplification of CFG-Normal forms-Chomsky Normal form and Greibach Normal form- pumping lemma for Context free languages- Applications of PDA - Pushdown Automata – Formal definition – Language acceptability by PDA through empty stack and final state – Deterministic and nondeterministic PDA – designing of PDA-

Module IV (13 hours)
Turing Machines – Formal definition – Language acceptability by TM –TM as acceptors, Transducers - designing of TM- Two way infinite TM- Multi tape TM - Universal Turing Machines- Church's Thesis-Godelization.- - Time complexity of TM - Halting Problem - Rice theorem - Post correspondence problem-Linear Bounded Automata.

Module V (12 hours)
Complexity classes- Tractable problems– Class P –P Complete-Reduction problem-Context grammar nonempty-Intractable problems- Class NP – NP Complete- Cooks theorem-Reduction problems-SAT-Clique-Hamiltonian-TSP-Vertex Cover-NP Hard problems.

Reference Books

1. K.L.P. Mishra, N. Chandrashekharan , *Theory of Computer Science* , Prentice Hall of India
2. Michael Sipser, *Introduction to the Theory of Computation*, Cengage Learning,New Delhi,2007
3. Harry R Lewis, Christos H Papadimitriou, *Elements of the theory of computation*, Pearson Education Asia,
4. Rajendra Kumar,*Theory of Automata Language & Computation*,Tata McGraw Hill,New Delhi,2010
5. Wayne Goddard, *Introducing Theory of Computation*, Jones & Bartlett India,New Delhi2010
6. Bernard M Moret: *The Theory of Computation,* Pearson Education
7. John Hopcroft, Rajeev Motwani & Jeffry Ullman: *Introduction to Automata Theory Languages & Computation* , Pearson Edn
8. Raymond Greenlaw,H. James Hoover, *Fundamentals of Theory of Computation*,Elsevier,Gurgaon,Haryana,2009
9. John C Martin, *Introducing to languages and The Theory of Computation*, 3rd Edition, Tata McGraw Hill,New Delhi,2010
10. Kamala Krithivasan, Rama R, *Introduction to Formal Languages,Automata Theory and Computation*, Pearson Education Asia,2009
11. Rajesh K. Shukla, *Theory of Computation*, Cengage Learning, New Delhi,2009
12. K V N Sunitha, N Kalyani: *Formal Languages and Automata Theory*, Tata McGraw Hill,New Delhi,2010
13. S. P. Eugene Xavier, *Theory of Automata Formal Language & Computation,*New Age International, New Delhi ,2004

IT010 405: DATA STRUCTURES AND ALGORITHMS

(Common with CS010 403)

Teaching scheme **Credits: 4**

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of data structures and algorithms*
- *To develop understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.*

Module I (10 hours)

Principles of programming – System Life Cycle - Performance Analysis and Measurements- Time and Space complexity-Complexity calculation of simple algorithms. Hashing:- Static Hashing-Hash Tables-Different Hash Functions-Mid Square-Division-Folding-Digit Analysis, Collision-Collision Resolution Techniques.

Module II (12hours)

Study of basic data structures – Arrays- Structures-Sparse matrix – Stacks – Queues-Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Module III (12hours)

Linked Lists - Linked stacks and queues - Doubly linked lists – Polynomial representation using linked lists, Garbage collection and Compaction.

Module IV (14 hours)

Trees - Binary Trees – Tree Traversal – Inorder - Preorder and Postorder,
Search trees - AVL Trees, height balanced trees, Multiway search Trees- B Trees-B+ Trees.
Graphs – Depth first and breadth first search.

Module V (12 hours)

Sorting methods: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods.

Reference Books

1. *Sahni Sartaj*, Data Structures, Algorithms and Applications in C++ (Second Edition), Universities Press, Hyderabad, 2009
2. Rajesh K Shukla, *Data Structures Using C & C++* ,Wiley India, New Delhi, 2009
3. Yedidyah Langsam, Moshe J Augenstein, Aron M Tenenbaum, Data Stuctures using C and C++, 2nd ed., PHI Learning Private Limited, New Delhi, 1996
4. G. A. V Pai, *Data Structures and Algorithms Concepts, Techniques and Applications*, Tata McGraw Hill , New Delhi, 2008
5. Sartaj Sahni , *Data Structures, Algorithms and Applications in JAVA* , 2nd ed., Universities Press, Hyderabad, 2009
6. Michael T Goodrich, Roberto Tamassia, David Mount, *Data Structures and Algorithms in C++*, Wiley India Edition, New Delhi, 2009
7. B.M. Harwani, *Data Structures and Algorithms in C++*, Dreamtech Press, New Delhi, 2010
8. Brijendra Kumar Joshi, *Data Structures and Algorithms in C*, McGraw Hill , New Delhi, 2010
9. K R Venugopal, K G Srinivasa, P M Krishnaraj, *File Structures using C++*, McGraw Hill , New Delhi, 2009
10. ISRD Group, *Data Structures using C*, McGraw Hill , New Delhi, 2010
11. Sudipta Mukherjee, , *Data Structures using C 1000 Problems and Solutions*, Tata McGraw Hill , New Delhi, 2010
12. Seymour Lipschutz, *Data Structures with C*, Schaum's Outlines, McGraw Hill , New Delhi, 2010
13. R Krishnamoorthy & G Indirani Kumaravel, *Data Structures using C*, McGraw Hill , New Delhi, 2008
14. John R Hubbard, *Data Structures with C++*, Schaum's Outlines, Tata McGraw Hill , New Delhi, 2010
15. Jean Paul Tremblay & Paul G Sorenson, *An Introduction to Data Structures with Applications*, 2nd ed., Tata McGraw Hill , New Delhi, 2010
16. Seymour Lipschutz, *Data Structures* , Schaum's Outlines, Tata McGraw Hill , New Delhi, 2006

IT 010 406: OBJECT ORIENTED TECHNIQUES

Teaching scheme
3 hours lecture and 1 hours tutorial per week

Credits: 4

Objectives:

- *To present the concept of object oriented programming and discuss the important elements of C++ and Java.*
- *Write simple applications using C++ and Java.*

Module I **10**

Object-oriented paradigm, elements of object oriented programming – Merits and demerits of OO methodology – C++ fundamentals – data types, operators and expressions, control flow, arrays, strings, pointers and functions.

Module II **14**

Classes and objects – constructors and destructors, operator overloading – inheritance, virtual functions and polymorphism, namespaces, Templates, Standard Template Library

Module III **12**

An overview of Java, data types, variables and arrays, operators, control statements, classes, objects, methods – Inheritance. Inner Classes, Anonymous inner classes.

Module IV **12**

Packages and Interfaces, Exception handling, Multithreaded programming, Strings and collections, Streams and I/O programming

Module V **12**

JAVA applets-life cycle, devolepment and execution, applet tag. AWT- components, containers, layout, event handling, Event listeners, Adapter classes.
Comparison of C++ and Java

References :

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003
2. Herbert Schildt, "The Java 2 : Complete Reference", Fourth edition, TMH, 2002
3. Rajkumar Buyya,Selvi,Chu. "Object oriented programming with JAVA essentials and applications" Mc Graw Hill
4. Ira Pohl, " Object oriented programming using C++", Pearson Education Asia, 2003
5. Bjarne Stroustrup, "The C++ programming language" Addison Wesley, 2000
6. John R.Hubbard, "Programming with C++", Schaums outline series, TMH, 2003
7. H.M.Deitel, P.J.Deitel, "Java : how to program", Fifthe edition, Prentice Hall of India private limited.
8. E.Balagurusamy " Object Oriented Programming with C++", TMH 2/e

IT 010 407 LOGIC DESIGN LAB

Teaching scheme **Credits: 2**

3 hours Practical per week

Objectives:-

- *To provide an introduction to Logic Systems Design thereby giving a hands on experience on working with digital ICS ,which enable the study Computer System Architecture.*

1. Familiarization of Logic Gates and Realization of Logic Circuits using basic Gates.
2. Design and implementation of Arithmetic Circuits:- Half Adder, Full Adder, n bit Ripple Carry Adder, Carry Look ahead Adder, BCD Adder
3. Study of Flip Flops:- implementation of RS, JK, D, T and MS Flip Flops
4. Design and implementation of Synchronous and Asynchronous Counters, UP/DOWN Counters
5. Design and Implementation of Shift Registers, Counters using Shift Registers – Ring Counter and Johnson Counter
6. Study of Multiplexers , Demultiplexers, Encoder and Decoder
7. Design of Comparators and Parity Generators.

Reference Books:-

1. Morris Mano - *Digital Logic and Computer Design* ,Prentice Hall of India
2. Floyd T. L. – *Digital Fundamentals*- Universal Book Stall

IT 010 408: DATA STRUCTURES AND PROGRAMMING LAB

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To provide experience on design, testing, and analysis of Algorithms and Data Structures.*
- *To acquaint the students with the Data Structures used in the Computer Science field.*

I. Simple experiments to get familiarisation with C++ and Java.

II. Data structure implementations and applications like,

1) Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2) Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3) Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4) Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5) Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6) Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7) Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8) Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9) Infix, Postfix and Prefix conversions.
10) Different Sorting and Searching methods.
11) String representation using Arrays and Linked List and different pattern matching algorithms
12) Implementation and operations on B-Tree and B+Tree

Any experiment according to the syllabus of IT010 405 can be substituted.

Internal Continuous Assessment *(Maximum Marks-50)*

50%-Laboratory practical and record
30%- Test/s
20%- Regularity in the class

End Semester Examination *(Maximum Marks-100)*

70% - Procedure, conducting experiment, results, tabulation, and inference
30% - Viva voce

EN010501 B Engineering Mathematics IV

(CS, IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *To use basic numerical techniques for solving problems and to know the importance of learning theories in mathmatics and in queueing system.*

MODULE 1 Finite differences (12 hours)

Finite difference operators Δ, ∇, E, μ δ - interpolation using Newtons forward and backward formula – Newton's divided difference formula - Numerical differentiation using Newtons forward and backward formula – Numerical integration – Trapezoidal rule – Simpsons $1/3^{rd}$ and $3/8^{th}$ rule

MODULE 2 Z transforms (12 hours)

Definition of Z transforms – transform of polynomial function and trignometric functions – shifting property , convolution property - inverse transformation – solution of 1^{st} and 2^{nd} order difference equations with constant coifficients using Z transforms.

MODULE 3 Discrete numeric functions (12 hours)

Discrete numeric functions – Manipulations of numeric functions- generating functions – Recurrence relations – Linear recurrence relations with constant coefficients – Homogeneous solutions – Particular solutions – Total solution – solution by the method of generating functions.

MODULE 4 Complex integration (12 hours)

Functions of complex variable – analytic function - Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series- Laurent's series – Zeros and singularities – types of singularities – Residues – Residue theorem – evaluation of real integrals in unit circle – contour integral in semi circle when poles lie on imaginary axis.

MODULE 5 Queueing Theory (12 hours)

General concepts – Arrival pattern – service pattern – Queue disciplines – The Markovian model $M/M/1/\infty$, M/M/1/N – steady state solutions – Little's formula.

References

1. C.L.Liu and D.P. Mohapatra – Elements of Discrete Mathematics - Mc Graw Hill
2. S.Lipschutz, M.L.Lipson – Discrete mathematics –Schaum's outlines – Mc Graw Hill
3. B.V. Ramana - Higher Engg. Mathematics – McGraw Hill
4. Babu Ram – Engg. Mathematics -Pearson.
5. K Venkataraman- Numerical methods in science and Engg -National publishing co

6. V. Sundarapandian - probability ,Statistics and Queueing theory - PHI
7. S.Bathul – text book of Engg.Mathematics – Special functions and complex variables –PHI
8. H. Weif HSU – probability, random variables & Random processes – Schaum's out lines - Mc Graw Hill
9. T.Veerarajan - probability ,Statistics & Random processes - Mc Graw Hill
10. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International

IT 010 IT 502:MICROPROCESSORS AND MICROCONTROLLERS

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objective:

- *To have an in depth knowledge of the architecture and programming of 8-bit and 16-bit Microprocessors, Microcontrollers and to study how to interface various peripheral devices with them*

Module 1: (10 hrs)

Intel 8086 Microprocessor:- Architecture, Pin Diagram, Register Organization, Memory Organization- Memory Banks- Concept of Segmentation and Physical Address Calculation, Operating Modes- Minimum and Maximum Modes, Timing Diagram- Concepts of T-State, Machine Cycle and Instruction Cycle- Memory Read/ Write Cycles, I/O Read/ Write Cycles.

Module 2: (10 Hrs)

Programming with 8086 Microprocessor:- Instruction Set, Assembler Directives, Addressing Modes, Programming Examples, 8086 Interrupts- Hardware and Software Interrupts.

Module 3: (14 Hrs)

Microprocessor Interfacing:- Memory and I/O Addressing- Memory and I/O Mapped I/O, USART 8251A, Programmable Peripheral Interface 8255, Programmable Interval Timer 8254, Programmable Keyboard./ Display Interface 8279, Programmable Interrupt Controller 8259, Programmable DMA Controller 8257, Hard-disk Interface- SCSI, IDE.

Module 4:(13 Hrs)

Introduction to Microcontrollers:- Comparison of Microcontroller with Microprocessor, Features of 8051 Microcontroller, Architecture, Pin Diagram, I/O Ports, Addressing Modes, Instruction Set, Programming Examples.

Module 5:(13 Hrs)

Memory Organization- External Memory Interfacing, Interrupts and Timers/ Counters- Applications- Interfacing 8051 with Switches, LEDs, Matrix Keyboards, Seven Segment Display, LCDs, Stepper Motor

Text Books:-

1. Douglas V.Hall *Microprocessors and Interfacing* Tata MCGraw Hill
2. Muhammad Ali Mazidi, *The 8051 Microcontroller* Pearson Education.

Reference:

1. Brey B.B., *The Intel Microprocessors - Architecture, Programming & Interfacing*, Prentice Hall
2. Badri RAM *Advanced Microprocessors and Interfacing* Tata MCGraw hill
3. V Udayashankar and M.S. Mallikarajunaswamy *8051 Microcontroller Hardware Software and Applications*- Tata McGraw Hill
4. Ajay Deshmukh *Microcontrollers(theory and Applications)* Tata McGraw Hill.
5. Kenneth J Ayala, *The 8051 Microcontroller* Penram International

IT010 503: DATA COMMUNICATION

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Module 1 **(12 Hours)**
Introduction to Data Communication-Components, Data Representation, Data Flow. Networks, Network Topologies, Protocols and Standards, Network Models, OSI Model, Layers in OSI Model, IEEE Standards – Ethernet – Token Ring – FDDI – Token Bus – Wireless LAN

Module 2 **(13 Hours)**
Multiplexing - Frequency Division Multiplexing (FDM) – Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing –Statistical time Division multiplexing – Key Techniques - ASK, FSK, PSK, DPSK - Channel capacity - Shannon`s Theorem.

Module 3 **(13 Hours)**
Digital data transmission – Serial, Parallel, Synchronous, Asynchronous and Isochronous transmission. Transmission mode- Simplex - Half duplex – Full duplex, Noise- different types of noise – Basic Principles of Switching (circuit, packet, message switching)

Module 4 **(10 Hours)**
Terminal handling – Point to point, Multidrop lines. Components of computer communication – Transmission media – Guided media – Twisted pair cable, coaxial cable, fiber optic cable. Digital Subscriber Line, Cable TV Networks.

Module 5 **(12 Hours)**
Media Access Control – SDMA, FDMA, TDMA, CDMA – GSM – Architecture, Protocols, Connection Establishment, Frequency Allocation , Localization, Handover, Security – GPRS.

References

1. Kennedy,Electronic communication system - Mc Graw Hill.
2. Taub & Schilling Principles of Communication System - Mc Graw Hill.
3. Behurouz & Forozan Introduction to Data Communications & Networking – Mc Graw Hill.
4. Jochen Schiller, Mobile Communications, 2nd edition, Person Education
5. Fred Halsall Data Communication, Computer Networks & Open Systems - Pearson Education Asia
6. Vijay K. Garg Principles & Application of GSM - Pearson Education Asia
7. A.S. Tanenbaum, Computer Networks - PHI
8. William Stallings,Data and Computer Communication - Pearson Education Asia

IT010 504: Operating Systems
(Common with CS010 505)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the fundamental concepts and techniques of Operating Systems.*
- *To study the basic structure of Linux system.*

Module I (8 hours)
Introduction: Operating System – Batch, Multiprogrammed, Time-sharing and Real time systems – Operating system structure – Operating system operations
System Structures: Operating system service – System calls – System Programs – System structure – Simple structure, Layered approach – Kernel, Shell.

Module II (12 hours)
Process Management: Process concept – Process state, PCB – Process scheduling – Operations on processes – Interprocess communication – Multithreading –Benefits, Models
Process Scheduling: Basic concepts – Preemptive scheduling, Dispatcher – Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling.

Module III (16 hours)
Process Synchronization: The Critical-Section problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of synchronization – Monitors
Deadlocks: System model – Deadlock characterization – Methods for handling deadlocks – Prevention, Avoidance and Detection – Recovery from deadlock.

Module IV (14 hours)
Memory Management: Resident Monitor – Dynamic loading – Swapping – Contiguous memory allocation – Paging – Basic, Multi-level Paging – Segmentation
Virtual Memory – Demand Paging – Page Replacement algorithms – Allocation of Frames – Thrashing – Cause of thrashing.

Module V (10 hours)
File System: File concept – Access methods – Directory structure – Directory implementation – Linear list, Hash table – Disk scheduling
Case study: Linux system.

Reference Books

1. Abraham Silberschatz, Peter B.Galvin and Greg Gagne, "*Operating System Concepts*", John Wiley & Sons Inc, 8th Edition 2010.
2. D M Dhamdhere, "*Operating Systems A Concept-based Approach*", Tata McGraw Hill, New Delhi, 2nd Edition, 2010.
3. Achyut S Godbole, "*Operating Systems*", Tata McGraw Hill , New Delhi, 2nd Edition, 2009.
4. Elmasri, Carrick, Levine, "*Operating Systems A Spiral Approach*", Tata McGraw Hill, New Delhi, First Edition 2010.
5. Gary Nutt, "Operating Systems", Second Edition, Addison Wesley, 2003.
6. Andew S. Tanenbaum, "*Modern Operating*", Pearson Education, Second Edition, 2001.
7. Promod Chandra P.Bhatt, "*An introduction to Operating Systems Concepts and Practice*", PHI, New Delhi, Third Edition, 2010
8. B Prasanalakshmi, "*Computer Operating System*", CBS Publishers, New Delhi, First Edition, 2010
9. D P Sharma, "Foundation of *Operating Systems*", EXCEL BOOKS, New Delhi, First Edition 2008
10. Brian L Stuart, "*Operating Systems Principles, Design and Applications*", Cengage Learning, New Delhi, First Edition 2009.
11. Charles Crowley, "*Operating Systems A Design Oriented Approach*", Tata McGraw Hill, New Delhi, First Edition 2009.
12. Pabitra Pal Choudhaury, " *Operating Systems Principles and, Design*", PHI, New Delhi, First Edition, 2009

IT010 505: Language Translators

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the different stages of the process of programming language translation*

Module I (10 hours)
Introduction to programming language translation - Design of Interpreters, Incremental Compilers, assemblers, macro processors, linkers and loaders (Basic Concepts Only) Structure of a compiler- Analysis/Synthesis model of compilation, phases of a compiler, compiler construction tools Lexical Analysis- Interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting and implementation, Specification and recognition of tokens- Regular Expressions, Regular definitions, Transition diagrams- LEX.

Module II (12 hours)
Syntax Analysis- Compile time error handling- Error detection, reporting, recovery and repair Context free grammars-ambiguity, associativity, precedence Top down parsing- Recursive descent parsing , transformation on the grammars Predictive parsing-simple LL(1) grammar Bottom up parsing- Operator precedence grammars, LR parsers - LR(0), SLR(1), LALR(1) YACC.

Module III (14 hours)
Syntax Directed Translation- Syntax directed definitions, Inherited and synthesized attribute, dependency graph, e valuation order, bottom up and top down evaluation of attributes, L- and S- attributed definitions Type Checking-Type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions Run Time Environments- Storage organisation, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation

Module IV (12 hours)
Intermediate Code Generation- Intermediate representations, translation of declarations, assignments, intermediate code generation for control flow, boolean expressions and procedure calls, implementation issues Code Generation and Instruction Selection- Issues, basic blocks and flow graphs, register allocation, code generation DAG representation of programs- Code generation from DAGs, peephole optimization, code generator generators, specifications of machine

Module V (12 hours)
Code Optimization- Sources of optimizations, Optimization of basic blocks, Loops in flow graphs, global dataflow analysis, Iterative solution of data-flow equations, Code improving transformations, dealing with aliases, dataflow analysis of structured flow graphs.

Text Books

1. Aho A.V.,Sethi R, and Ullman J.D. *Compilers: Principles, Techniques, and Tools*, Addison-Wesley

Reference Books

1. V Raghavan, "*Priniples of Compiler Design*",Tata McGraw Hill, India, 2010
2. Allen Holub, "*Compiler Design in C*", Prentice Hall of India, 1993
3. Arthur B. Pyster, "*Compiler design and construction*: tools and techniques with C and Pascal", 2nd Edition, Van Nostrand Reinhold Co. New York, NY, USA
4. Steven S. Muchnick, "*Advanced Compiler Design & Implementation*", Morgan Kaufmann Pulishers, 2000
5. Dhamdhere, "*System Programming & Operating Systems*", 2nd edition, Tata McGraw Hill, India

IT010 506: Database Management Systems
(Common with CS010 503)

Teaching scheme **Credits: 4**
3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart an introduction to the theory and practice of database systems.*
- *To develop basic knowledge on data modelling and design of efficient relations.*
- *To provide exposure to oracle database programming.*

Module I (10 hours)
Basic Concepts - Purpose of Database Systems- 3 Schema Architecture and Data Independence- Components of DBMS –Data Models, Schemas and Instances-Data Modeling using the Entity Relationship Model-Entity types, Relationship Types, Weak Entity Types .

Module II (14 hours)
Relational Model Concepts –Constraints – Entity Integrity and Referential Integrity, Relational Algebra -Select, Project, Operations from Set Theory, Join, OuterJoin and Division - Tuple Relational Calculus.
SQL- Data Definition with SQL - Insert, Delete and Update Statements in SQL, Defining Domains, Schemas and Constraints, Constraint Violations - Basic Queries in SQL - Select Statement, Use of Aggregate functions and Group Retrieval, Nested Queries, Correlated Queries – Views.

Module III (12 hours)
Oracle Case Study : The Basic Structure of the Oracle System – Database Structure and its Manipulation in Oracle- Storage Organization in Oracle.- Programming in PL/SQL- Cursor in PL/SQL - Assertions – Triggers.
Indexing and Hashing Concepts -: Ordered Indices, Hash Indices, Dense and Sparse Indices, Multi Level Indices, Cluster Index, Dynamic Hashing.

Module IV (11 hours)
Database Design– Design Guidelines– Relational Database Design – Functional Dependency- Determination of Candidate Keys, Super Key, Foreign Key, Normalization using Functional Dependencies, Normal Forms based on Primary keys- General Definitions of First, Second and Third Normal Forms. Boyce Codd Normal Form– Multi-valued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

Module V (13 hours)
Introduction to Transaction Processing- Transactions- ACID Properties of Transactions- Schedules- Serializability of Schedules- Precedence Graph- Concurrency Control – Locks and Timestamps-Database Recovery
Query processing and Optimization- Translating SQL Queries into a Relational Algebra Computing Select, Project and Join
Object Relational Databases-Distributed Databases-Different Types-Fragmentation and Replication Techniques-Functions of DDBMS.

Reference Books

1. Elmsari and Navathe, *Fundamentals of Database System,* Pearson Education Asia, 5th Edition, New Delhi, 2008.
2. Henry F Korth, Abraham Silbershatz , *Database System Concepts*, Mc Graw Hill 6td Edition, Singapore, 2011.
3. Elmsari and Navathe, *Fundamentals of Database System,* Pearson Education Asia, 3rd Edition, New Delhi- for oracle
4. Alexis Leon and Mathews Leon, *Database Management Systems*, Leon vikas Publishers, New Delhi.
5. Narayanan S, Umanath and Richard W.Scamell, *Data Modelling and Database Design,Ce*ngage Learning, New Delhi, 2009.
6. S.K Singh,*Database Systems Concepts,Design and Applications,* Pearson Education Asia, New Delhi, 2006.
7. Pranab Kumar Das Gupta, *Datbase management System Oracle SQL And PL/SQL,* Easter Economy Edition, New Delhi, 2009
8. C.J.Date , *An Introduction to Database Systems,* Pearson Education Asia, 7th Edition, New Delhi.
9. Rajesh Narang, *Database Management Systems,* Asoke K ghosh , PHI Learning, New Delhi, 2009.
10. Ramakrishnan and Gehrke, *Database Management Systems*, Mc Graw Hill, 3rd Edition , 2003.
11. Peter Rob and Carlos Coronel, *Database Systems,* Thomson Course Technology, 7th Edition, 2007.
12. Satinder Bal Guptha and Adithya Mittal, *Introduction to Database Management System,* University Science Publishers, New Delhi, 2010.
13. Patrick O'Neil and Elizabeth O'Neil, *Database Principles, Programming and Performance*, Morgan Kaufmann, 2nd Edition, New Delhi,2010 .
14. Ramon A Mata-Toledo and Pauline K Cushman, Schaum's OUTlines *Database Management Systems,* Tata Mc Graw Hill , New Delhi, 2007.
15. Michel Kifer, Philip M. Lewis, Prabin K .Panigrahi and Arthur Bernstein, *Database Systems An Application Oriented Approach*, Pearson Education Asia, 2nd Edition, New Delhi, 2008.

IT010 507: PC HARDWARE AND MICROPROCESSORS LAB

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To provide experience on assembling and troubleshooting of PC hardware*
- *To be able to write microprocessor based programs and to understand the interfacing of peripheral devices with the microprocessors*

1. Study of SMPS, TTL and composite type monitor circuits, Emulator, Logic state analyser, Serial port, Parallel port, Mother board, Display adapter card, Hard disk controller, Printer Interface, Keyboard Interface
2. Identification of components/cards and PC assembling from components.
3. Trouble shooting and maintenance -Common maintenance problems, Diagnostic software, Diagnostic cards, Designing and Programming add on cards.
4. Programming with 8086 (Any 3 Experiments including BIOS/DOS Calls, Keyboard Control, Display, File Manipulation).
5. Interfacing with 8086-8255,8253.
6. Interfacing with 8086-8279,8251.
7. ADC interface, Stepper Motor interface using DAC, Parallel Interface- Printer and HEX keyboard, Serial Interface- PC to PC serial interface using MODEM. (Any 2 Experiments)
8. 8051 Micro controller based experiments – Simple assembly language programs (optional).
9. 8051 Micro controller based experiments – Simple control applications (optional).

Internal Continuous Assessment *(Maximum Marks-50)*

50%-Laboratory practical and record
30%- Test/s
20%- Regularity in the class

End Semester Examination *(Maximum Marks-100)*

70% - Procedure, conducting experiment, results, tabulation, and inference
30% - Viva voce

IT010 508: SYSTEMS LAB

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To understand operating system structures and the implementation aspects of various OS functions and schedulers.*
- *To be able to design databases, write queries and develop applications.*

Part 1: Operating systems

1. Basic UNIX commands and shell programming
2. Introduction to the tools providing GUI based human computer interaction (for example Qt.) Automatic generation of code for interaction using visual programming (for example Qt Designer).
3. Exercises involving the system calls fork(),exec(),create() etc.
4. Implementation of typical problems such as bounded buffer, dining philosophers etc. by multiprogramming using threads, semaphores and shared memory
5. Inter-process communication using mailboxes and pipes

Part 2: Database management systems

1. Familiarization of MySQL database- creation and manipulation of tables.
2. Analyze a given situation such as Banking, Electricity Billing, Library Management, Payroll, Insurance ,Inventory, Health Care, Cricket Board Database, College Admission, Question Paper Bank, Hostel Management etc. Design and implement the database. Manipulate the tables using SQL commands.
3. Develop a 2 tier application for the above situation using a suitable front end.

Internal Continuous Assessment *(Maximum Marks-50)*

50%-Laboratory practical and record
30%- Test/s
20%- Regularity in the class

End Semester Examination *(Maximum Marks-100)*

70% - Procedure, conducting experiment, results, tabulation, and inference
30% - Viva voce

IT010 601: Computer Networks

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

To teach the mode of operation of different types of computer networks that are used to interconnect a distributed community of computers and various interfacing standards and protocols.

Module I (10 hours)

Introduction: - ISO-OSI Reference Model – TCP/IP Reference Model – Comparison Network hardware-Repeaters, Routers, Bridges, Gateways, Hub, Cable Modem.
Physical Layer: - Transmission Media– ISDN system Architecture – Communication Satellites – geostationary satellites - Medium Earth Orbit Satellites- Low earth orbit satellites– Satellite v/s Fiber

Module 2 (12 hours)

Data Link Layer: - Design issues-Error Detection and correction – Elementary Data link protocols- Sliding window protocols. .
LAN Protocols: - Static & Dynamic channel allocation in LAN's and WAN's, Multiple access protocols – ALOHA – Pure ALOHA – Slotted ALOHA – Carrier Sense Multiple Access protocols – persistent and non-persistent CSMA – CSMA with collision detection – IEEE 802.3 standards for LAN

Module 3 (14 hours)

Network layer: -Virtual Circuits, Datagrams, Routing Algorithm – Optimality principle - Flooding - Flow Based Routing - Link state routing – Distance vector routing – Multicasting – Link state multicasting – Distance vector multicasting - Congestion Control Algorithms – General principles – Packet discarding – Choke packets - Congestion prevention policies – Traffic shaping – Leaky bucket algorithm – Flow specifications – jitter control

Module 4 (12 hours)

Transport Layer: - Transport Service - Elements of transport protocols – Internet Transfer Protocols UDP and TCP – ATM – Principle characteristics.

Module 5 (12 hours)

Application Layer: -Domain name system – DNS name space – Resource records – Name servers – operation of DNS - Electronic Mail – MIME
Mobile networks: - Mobile telephone systems, Bluetooth - Components – Error correction – Network topology – Piconet and scatternet – L2CAP layers – Communication in Bluetooth networks

References

1. Computer Networks (Fourth Edition): Andrew S.Tanenbaum, Pearson Education Asia/ PHI
2. An Introduction to computer networking: Kenneth C. Mansfield Jr., James L. Antonakos, Prentice-Hall India
3. Communication Networks: Leon, Garcia, Widjaja Tata McGraw Hill.
4. Computer Networks (Second Edition): Larry L Peterson & Bruce S Davie, (Harcourt India)
5. Computer Networking: James F Kurose & Keith W Ross, Pearson Education
6. Introduction to Data Communications and Networking: Behrouz, Forouzan, McGraw Hill

IT 602:DIGITAL SIGNAL PROCESSING

Teaching scheme **Credits:** 4
2hours lecture and 2 hour tutorial per week

Objectives:

- *To study the fundamentals of discrete-time signals and system analysis, digital filter design and the DFT*

Module 1 **(12 Hours)**

Introduction: Elements of a Digital Processing System - Advantages of Digital over Analog Signal Processing - Applications of DSP.

Discrete-Time Signals and Systems: Basic Discrete-Time sequences and sequence operations: unit sample, unit step, exponential, sinusoidal – periodic and aperiodic discrete time sinusoids - Discrete time systems: Properties of Systems: Stability, Memory, Causality, Time invariance, Linearity

Module 2 **(12 Hours)**

LTI Systems: Representation of Signals in terms of impulses – Impulse response – Convolution sum– Cascade and Parallel interconnections – Memory, Causality and Stability of LTI systems – Systems described by linear constant coefficient difference equations

Frequency Domain representation of discrete-time signals: Fourier transform of a sequence - Properties of Fourier Transforms – Frequency response of systems

Module 3 **(12 Hours)**

Z transform: Definition - ROC – Common Z transforms - Inverse z-transform by partial fraction expansion- Properties of z- transforms - Analysis and characterization of LTI systems using Z-Transform

Sampling of continuous time signals: The sampling theorem - Aliasing

Module 4 **(12 Hours)**

Structures for discrete time systems – IIR and FIR systems – Block diagram representation of difference equations – Basic structures for IIR systems – Direct form - Cascade form - Parallel form – Structures for FIR systems – Direct and Cascade forms – Overview of finite precision numerical effects in implementing systems

Module 5 **(12 Hours)**

Digital filter design: Filter specification –Comparison of IIR and FIR filters – Design of low pass FIR filters by windowing

The Discrete Fourier Transform: Relation with DTFT - Computation of the DFT – Decimation in time and decimation in frequency FFT - Reduction of computational complexity

References

1. Alan V. Oppenheim and Ronald W. Schafer, Digital Signal Processing – Pearson Education Asia, LPE
2. Sanjit K Mitra, Digital Signal Processing, 3e, Tata McGraw - Hill Education, New Delhi, 2007.
3. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing - Pearson Education, 4th edition
4. L C Ludeman ,Fundamentals of Digital Signal Processing –, Wiley
5. Johny R. Johnson, An Introduction to Digital Signal Processing: Prentice Hall
6. S.Salivahanan, A.Vallavaraj, C.Gnanapriya, Digital Signal Processing, 2e, Tata McGraw - Hill Education, New Delhi, 2009
7. Emmanuel C. Ifeachor and Barrie W. Jervis,Digital Signal Processing: A Practical Approach –Pearson Education Asia, LPE

IT 010 603INFORMATION THEORY AND CODING

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives:

- *To provide basic concepts of Information Theory*
- *To understand the design and analysis of coding/decoding scheme for digital communication application*

Module 1 **(12 Hours)**

Information theory: - Concept of amount of information -units, Entropy -marginal, conditional and joint entropies -relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.

Module 2 **(12 Hours)**

Discrete channels: - Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, Shannon theorem. **Continuous channels**: - Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

Module 3 **(12 Hours)**

Source coding: - Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes: - Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.

Module 4 **(12 Hours)**

Codes for error detection and correction: - Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes: - Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

Module 5 **(12 Hours)**

Convolutional codes: - Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes -Viterby algorithm, Sequential decoding -Stack algorithm. **Interleaving techniques**: - Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system -CIRC encoding and decoding, interpolation and muting. **ARQ**: - Types of ARQ, Performance of ARQ, Probability of error and throughput.

References

1. Ranjan Bose ,Information Theory, Coding and Cryptography 2nd Edition:, Tata McGraw-Hill, New Delhi, 2008
2. Simon Haykin,Communication Systems: John Wiley & Sons. Pvt. Ltd.
3. Taub & Schilling, Principles of Communication Systems: Tata McGraw-Hill
4. Das, Mullick & Chatterjee, Principles of Digital Communication: Wiley Eastern Ltd.
5. Error Control Coding Fundamentals and Applications: Prentice Hall Inc.
6. Shu Lin & Daniel J. Costello Jr.,Digital Communications Fundamentals and Applications: Bernard Sklar, Person Education Asia

IT 010 604 SOFTWARE ENGINEERING

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objective:

- *To help students to develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain.*
- *To foster an understanding of why these skills are important*

Module 1 **(10 Hours)**

Introduction: The Nature of Software, Software Process, Software Engineering Practice, A Generic Process Model, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Agile Process, Extreme Programming, Agile Process Models.

Module 2 **(14 Hours)**

Requirements Modelling: Requirement Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Requirements Analysis, Scenario-Based Modelling, UML Models, Data Modelling Concepts, Class Based Modelling, Flow Oriented Modelling, Behaviour Model, Patterns for Requirements Modelling, Requirements Modelling for Web Applications.

Module 3 **(12 Hours)**

Design: The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Styles, Architectural Design, Architectural Mapping, Designing Class-Based Components, Component-Level Design, Component Based Development, User Interface Analysis and Design.

Module 4 **(12 Hours)**

Testing and Quality Assurance: A Strategic Approach to Software Testing, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for Web Applications, Validation Testing, System Testing, Debugging, White-Box Testing, Control Structure Testing, Black-Box Testing, Model-Based Testing, Statistical Software Quality Assurance, Software Reliability.

Module 5 **(12 Hours)**

Managing Software Project: The Management Spectrum, Process Metrics and Product Metrics, Software Measurement, Software Quality Metric, Integration of Metrics, Project Planning Process, Decomposition Techniques, Empirical Estimation Models, Project Scheduling, Risk Management.

Text Books:

1. Roger S. Pressman ," Software Engineering- A Practitioner's Approach", Seventh Edition, Mc GrawHill Higher Education, 2010.
2. Pankaj Jalote ," Software Engineering", Narosa Publications.
3. Rajib Mall, "Fundamentals of Software Engineering", PHI learning Private Limited New Delhi, 2009.

References:

1. Ian Somerville, "Software Engineering ", Pearson Education Asia, 2000.
2. Richard Fairly," Software Engineering Concepts", Tata McGraw Hill.
3. Waaman S Jawadekar," Software Engineering- A Primer", Tata McGraw Hill.
4. Ali Behforooz and Frederick J. Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.
5. Edward Kit, "Software Testing in the Real World", Addition Wesley, 2000.
6. Shari Lawrence Pfleeger, "Software Engineering theory and practice", Second edition, Pearson Education Asia, 2001.

IT010 605: DESIGN AND ANALYSIS OF ALGORITHMS
(Common with CS010 601)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To develop an understanding about basic algorithms and different problem solving strategies.*
- *To improve creativeness and the confidence to solve non-conventional problems and expertise for analysing existing solutions.*

Module I (13 hours)
Introduction and Complexity
What is an algorithm – Properties of an Algorithm, Development of an algorithm, Pseudo-code Conventions, Recursive Algorithms – Performance Analysis - Space and Time Complexity –Asymptotic Notations – 'Oh', 'Omega', 'Theta', Worst, Best and Average Case Complexity, Running Time Comparison, Common Complexity Functions -Recurrence Relations – Solving Recurrences using Iteration and Recurrence Trees – Example Problems – Profiling - Amortized Complexity.

Module II (11 hours)
Divide and Conquer - Control Abstraction, Finding Maximum and Minimum, Costs associated element comparisons and index comparisons, Binary Search, Divide and Conquer Matrix Multiplication, Stressen's Matrix Multiplication, Quick Sort, Merge Sort. – Refinements.

Module III (14 hours)
Greedy Strategy - Control Abstraction, General Knapsack Problem, Minimum Cost Spanning Trees – PRIM's Algorithm, Kruskal's Algorithm, Job sequencing with deadlines.
Dynamic Programming - Principle of Optimality, Multistage Graph Problem, Forward Approach, Backward Approach, All-Pairs Shortest Paths, Traveling Salesman Problem.

Module IV (11 hours)
Backtracking – State Space Tree - Fixed Tuple and Variable Tuple Formulation - Control Abstraction – Generating Function and Bounding Function - Efficiency of the method - Monte Carlo Method – N-Queens Problem, Sum of Subsets.
Branch and Bound Techniques – FIFO, LIFO, and LC Control Abstractions, 15-puzzle.

Module V (11 hours)
Sophisticated Algorithms - Approximation Algorithms – Planar Graph Coloring, Vertex cover - String Matching Algorithms – Rabin Karp algorithm - Topological Sort - Deterministic and Non-Deterministic Algorithms.
Lower Bound Theory - Comparison Trees for Searching and Sorting, lower bound on comparison based algorithms, Sorting, Selection & Merging; Oracles and Adversary Arguments –Merging,Basic concepts of randomized algorithm-Las Vagas algorithm for search.

Reference Books

1. *Horowitz, Ellis, Sahni, Sartaj & Rajasekaran, Sanguthevar, Fundamentals of Computer Algorithms,* , 2nd Edition, Universities Press, Hyderabad .
2. Thomas Coremen, Charles, Ronald Rives, *Introduction to algorithm*, PHI Learning
3. Sara Baase & Allen Van Gelder , *Computer Algorithms – Introduction to Design and Analysis*, Pearson Education..
4. Anany Levitin, *Introduction to The Design & Analysis of Algorithms,* Pearson Education, 2nd Edition, New Delhi, 2008.
5. Berman and Paul, *Algorithms*, Cenage Learning India Edition, New Delhi, 2008.
6. S.K.Basu , *Design Methods And Analysis Of Algorithms* ,PHI Learning Private Limited, New Delhi,2008.
7. Jon Kleinberg and Eva Tardos, *Algorithm Design*, Pearson Education, New Delhi, 2006.
8. Hari Mohan Pandey, *Design Analysis And Algorithms*, University Science Press, 2008.
9. R. Panneerselvam, D*esign and Analysis of Algorithms*, PHI Learning Private Limited, New Delhi, 2009.
10. Udit Agarwal, *Algorithms Design And Analysis*, Dhanapat Rai & Co, New Delhi, 2009.
11. Aho, Hopcroft and ullman, *The Design And Analysis of Computer Algorithms*, Pearson Education, New Delhi, 2007.
12. S.E.Goodman and S. T. Hedetmiemi, *Introduction To The Design And Analysis Of Algorithms*, McGraw-Hill International Editions, Singapore 2000.
13. Richard Neapolitan, Kumarss N, *Foundations of Algorithms*, DC Hearth &company.
14. Sanjay Dasgupta, Christos Papadimitriou, Umesh Vazirani, Algorithms, Tata McGraw-Hill Edition.

IT010 606 L01 SIMULATION AND MODELLING

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives:

- *To build knowledge on system modelling and system study on various applications.*
- *To design simulation models for various case studies like inventory, Telephone system, etc.*
- *To practice on simulation tools and impart knowledge on building simulation systems.*

Module 1 **(10 Hours)**

The Concepts of a System, Continuous and Discrete Systems, System Modeling, Types of Models, Physical Models, Mathematical Models, Principal Used in Modeling, Corporate Model, Environment Segment, Production Segment, Management Segment, The Full Corporate Model, System Analysis, System Design, System Postulation.

Module 2 **(13 Hours)**

The Monte Carlo Method, Types of System Simulation, Numerical Computation Technique for Continuous Models, Numerical Computation Technique for Discrete Models, Distributed Lag Models, Cobweb Models. Continuous System Models, Differential Equations, Analog Computers, Hybrid Computers, Digital-Analog Simulators, Continuous System Simulation Lanuages, CSMP III, Hybrid Simulation, Feedback Systems, Interactive Systems, Real- Time Simulation.

Module 3 **(13 Hours)**

Exponential Growth and Decay Models, Modified Exponential Growth Models, Logic Curves, System Dynamics Diagrams, Multi-Segment Models, Representation of Time Models, The DYNAMO Language. Stochastic Variables, Discrete and Continuous Probability Functions, Continuous Uniformly Distributed Random Numbers, Uniform Random Number Generator, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

Module 4 **(12 Hours)**

Congestion in Systems, Arrival Patterns, Exponential Distribution, Erlang Distribution, Hyper-Exponential Distribution, Normal Distributions, Queing Disciplines, Simulation of a Telephone System, Simulation Programming Tasks, Discrete Simulation Languages. GPSS Programs, Succession of Events, Simulation of a Manufacturing Shop, Facilities and Storages, Gathering Statistics, Conditional Transfers, Program Control statements, GPSS Examples.

Module 5 **(12 Hours)**

SIMSCRIPT Programs, SIMSCRIPT System Concepts, Organization of SIMSCRIPT Programs, SIMSCRIPT Statements, Management of Sets in SIMSCRIPT, Telephone System Model, Simulation Programming Techniques.

Text Books

1. Geofferry Gordan, " System Simulation", Prentice Hall of India, New Delhi,2004.

Reference Books

1. H. James Harrington and Kerim Tumay, "Simulation Modeling Methods", Tata McGraw Hill New Delhi.

2. Averill M. Law , "Simulation Modeling and Analysis", 4th Ed., Tata McGraw Hill New Delhi.
3. Greenlaw, simulation modeling and analysis, Tata McGraw-Hill Education

IT010 606L02 Management Information Systems

Teaching scheme **Credits:** 4

2 hours lecture and 2 hour tutorial per week

Objective:

- *To provide information needed to manage organizations effectively*

Module 1 **(12 Hours)**

Information System and Organization: Matching the Information System Plan to the Organizational Strategic Plan, Identifying Key Organizational Objective and Processes and Developing an Information System Development, User role in Systems Development Process, Maintainability and Recoverability in System Design.

Module 2 **(12 Hours)**

Representation and Analysis of System Structure: Models for Representing Systems Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram), Information Flow, Process Flow, Methods and Heuristics, Decomposition and Aggregation, Information Architecture, Application of System Representation to Case Studies.

Module 3 **(12 Hours)**

Systems, Information and Decision Theory: Information Theory, Information Content and Redundancy, Classification and Compression, Summarizing and Filtering, Inferences and Uncertainty, Identifying Information needed to Support Decision Making, Human Factors, Problem characteristics and Information System Capabilities in Decision Making.

Module 4 **(12 Hours)**

Information System Application: Transaction Processing Applications, Basic Accounting Application, Applications for Budgeting and Planning, Other use of Information Technology: Automation, Word Processing, Electronic Mail, Evaluation Remote Conferencing and Graphics, System and Selection, Cost Benefit, Centralized vs. Decentralized Allocation Mechanism.

Module 5 **(12 Hours)**

Development and Maintenance Of Information Systems: Systems analysis and design, System development life cycle, Limitation, End User Development, Managing End Users, off-the shelf software packages, Outsourcing, Comparison of different methodologies.

Text Books

1. Ken Laudon, Jame Laudon, Rajanish Dass, "Management Information Systems: Managing the digital firm",11th edition, Pearson Education, 2010.
2. K.C.Laudon J.P.Laudon, "Management Information Systems - Organization and Technology in the Networked Enterprise", Sixth Edition, Prentice Hall, 2000.

References

1. E.F. Turban, R.K. Turban, R.E. Potter, "Introduction to Information Technology", John Wiley and Sons, 3rd Edition, 2004.
2. Wiley and M.E. Brabston, "Management Information Systems: Managing the digital firm", Pearson Education, 2002.
3. Jeffrey A. Hoffer, Joey F. George and Joseph S. Valachich, "Modern Systems Analysis and Design", Third Edition, Prentice Hall, 2002.
4. Robert Schulthesis and Mary Sumner, " Management Information System-The Manager's View, Tata Mc Graw Hill New Delhi.
5. Waman S Jawadekar, " Management Information Systems-Text and Cases", Tata Mc Graw Hill New Delhi.
6. O'Brien, Management Information Systems, 9e, Tata McGraw-Hill Education

IT010 606L03 : UNIX Shell Programming
(Common with CS010 606L04)

Teaching scheme **Credits:** 4
3 hours lecture and 2 hour tutorial per week

Objectives

- *To provide a fair knowledge of Unix concepts and gain sharp skills in Unix Shell programming*

Pre-requisites: *IT010 504 level of Operating Systems knowledge*

Module 1. (8 hours)
Introduction to Unix:- Architecture of Unix, Features of Unix , Basic Unix Commands - Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands - Text processing utilities and backup

Module 2. (13 hours)
Introduction to Shells:-Unix Session, Standard Streams, Redirection, Pipes, tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Regular expressions, Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, words or lines, Comparing Files.

Module 3. (12 hours)
grep:-Operation, grep Family, Searching for File Content. sed:-Scripts, Operation, Addresses, commands, Applications, grep and sed. awk:-Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, Mathematical Functions, User Defined Functions, Using System commands in awk, Applications of awk, grep and sed

Module 4. (15 hours)
Interactive Shells - Korn Shell, C Shell and BASH - Shell Features, Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

Shell Programming - Korn Shell, C Shell and BASH -
Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Module 5. (12 hours)
Process management:- Creation, Hierarchies, Sending signals to processes, exec, termination, Zombie, waitpid etc - Network management:- tools, Client server mechanism, address resolution, ping, telnet, ftp, dns and squid – X Window System:- Overview, Architecture, starting and stopping X, X clients and display

Reference Books

1. Behrouz A. Forouzan, Richard F. Gilberg," Unix and shell Programming.", Cengage Learning
2. Sumitabha Das , "Unix the ultimate guide", TMH. 2nd Edition.
3. Kernighan and Pike, "Unix programming environment", PHI. / Pearson Education
4. Graham Glass, King Ables," Unix for programmers and users", 3rd edition, Pearson Education
5. Maurice J. Bach, "The Design of the Unix Operating System", First Edition, Pearson Education, 1999

IT010 606 L04 : Advanced Database Systems

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- *Be able to design high-quality relational databases and database*
- *applications.*
- *Have developed skills in advanced visual & conceptual modelling and*
- *database design..*
- *Have developed an appreciation of emerging database trends as they*
- *apply to semi-structured data, the internet, and object-oriented databases.*

Pre-requisites: *IT010 506 Database Management Systems level of database knowledge*

Module 1. Distributed Databases 8
Distributed Databases Vs Conventional Databases – Architecture – Fragmentation – Query Processing – Transaction Processing – Concurrency Control – Recovery.

Module 2. Object Oriented Databases 15
Introduction to Object Oriented Data Bases - Approaches - Modelling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks - Recovery.

Module 3. Emerging Systems 12
Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

Module 4. Database Design Issues 13
ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

Module 5. Current Issues 12
Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases – Multimedia Databases – Image Databases – Text Database

Reference Books

1. Elisa Bertino, Barbara Catania, Gian Piero Zarri, "*Intelligent Database Systems*", *Addison*-Wesley, 2001.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, "*Advanced Database Systems*", Morgan Kaufman, 1997.
3. N.Tamer Ozsu, Patrick Valduriez, "*Principles Of Distributed Database Systems*", Prentice Hal International Inc., 1999.
4. C.S.R Prabhu, "*Object-Oriented Database Systems*", Prentice Hall Of India, 1998.
5. Abdullah Uz Tansel Et Al, "Temporal Databases: Theory, *Design And Principles*", Benjamin Cummings Publishers, 1993.
6. Raghu Ramakrishnan, Johannes Gehrke, "*Database Management Systems*", Mcgraw Hill, Third Edition 2004.
7. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "*Database System Concepts*", Fourth Ediion, Mcgraw Hill, 2002.
8. R. Elmasri, S.B. Navathe, "*Fundamentals Of Database Systems*", Pearson Education, 2004

IT010 606L05: Parallel Computing

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- *To give an introduction to parallel computing that studies problem solving using a large number of inter connected processors.*
- *To develop understanding about the various models of parallel computation and also gives knowledge about the algorithms for merging, sorting, searching and FFT.*

Pre-requisites: IT010 403 Computer Organisation and Architecture

Module I (10 hours)
Parallel processing - Control-Parallel approach - Data-Parallel approach - Data-Parallel approach with I/O - PRAM Model - PRAM Algorithms - Parallel Reduction - Prefix Sums - List Ranking - Preorder Tree Traversal - Merging Two Sorted Lists - Graph Coloring - Reducing Number of Processors

Module II (12 hours)
Processor Organizations- Processor arrays- UMA and NUMA multiprocessors – Multicomputers – nCUBE2 – Connection Machine CM5 – Paragon XP/S- Flynn's Txonamy – Speed up and scaled speed up – Parallelizability- Mapping – Dynamic load balancing on multicomputers-Scheduling

Module III (14 hours)
Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model
– 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcast – Prefix Sums. Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort – Bitonic Merge – Parallel Quick Sort

Module IV (14 hours)
Complexity of Parallel Search – Searching on Multiprocessors - P-Depth Search – Breadth Death Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost
Spanning Tree.

Module V (10 hours)
Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers – Row oriented algorithm and block oriented algorithm.

Reference Books

1. Michael J. Quinn, *Parallel Computing – The Theory and Practice,* McGraw-Hill, INC
2. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, Introduction to Parallel Computing, 2nd Edition, Addison Wesley, 2003
3. Selim G. Akl, *The Design and Analysis of Parallel algorithms,* PHI,
4. V. Rajaraman and C. Siva Ram Murthy, *Parallel Computers – Architecture and Programming*, PHI,
5. Michael J. Quinn, *Parallel Computing – Parallel Programming In C With Mpi And Openmp*, McGraw-Hill,INC,

IT010 606L06: Optimization Techniques

Teaching scheme **Credits: 4**
2 hours lecture and 2 hour tutorial per week

Objectives

-
- *To provide graduate students with a systematic training in the use of nonlinear optimization techniques in research and applications*

Pre-requisites: *EN010 101, EN010 301, EN010 401, EN010 501B level knowledge*

Module1 Classical optimization techniques (12 Hours)
Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method – Multivariable optimization with inequality constrains – Kuhn- Tucker conditions.

Module 2 Constrained multivariable optimization (12 Hours)
Elimination methods – unrestricted search method – Fibonacci method – Interpolation methods – Quadratic interpolation and cubic interpolation methods.

Module 3 One-dimensional unconstrained minimization (12 Hours)
Gradient of a function – Steepest descent method – Newton's method – Powells method – Hook and Jeeve's method.

Module 4 Integer – Linear programming problem (12 Hours)
Gomory's cutting plane method – Gomory's method for all integer programming problems, mixed integer programming problems.

Module 5 Network Technique (12 Hours)
Shortest path model – Dijkstra's Algorithm – Floyd's Algorithm – minimum spanning tree problem – PRIM algorithm – Maximal Flow Problem algorithm.

Reference Books

1. Optimization theory and application - S.S. Rao, New Age International P. Ltd.
2. Optimization Concepts and applications in Engineering - A. D. Belegundu, T.R. Chandrupatla, Pearson Education Asia.
3. Principles of Operations Research for Management - F. S. Budnick, D. McLeavey, R. Mojena, Richard D. Irwin, INC.
4. Operation Research an introduction - H. A. Taha, Eastern Economy Edition.
5. Operation Research – R. Pannerselvam, PHI

IT010 607 NETWORK PROGRAMMING LAB

Teaching scheme **Credits:** 2
3 hours practical per week

Objective:

- To impart a solid foundation of the state of the art trends in computer networking and to provide a hands on experience of the same. The lab aims to give an overarching insight to all arenas of networking. The experiments may be taken up with the intention to solidify the foundations of the basic networking course. The simulation experiments are included to have familiarization of the architecture and internal working of the tool and to equip the students with a free to use mindset afterwards.

1 Java network programming –
  - 1.1 Processing Internet Addressing
  - 1.2 Applications with UDP datagram and sockets
  - 1.3 implementation of TCP/IP client and server

2 Unix Network Programming
  - 2.1 TCP and UDP Socket programming and applications
  - 2.2 Client-server using RPC
  - 2.3 Concurrent Server using Threads or Process
  - 2.4 Implementations of PC-to-PC file transfer using serial port and MODEM.

3 Simulation of ARP/RARP.

4 Simulation of GoBackN, Selective Repeat or Sliding Window protocol.

5 Remote Procedure Call (RPC) programming.

6 Study of Network Simulators (NS2 / Glomosim)
  - 6.1 Simulation of different network topologies
  - 6.2 Performance analysis of routing protocols both for wired, wireless networks

References

1. W.R. Stevens, "Unix Network Programming, Vol 1", 2nd ed., Prentice-Hall Inc., 1998.

2. Using Java2 Platform – Weber (AWL)
3. Douglas E.Comer, Hands on Networking with Internet Technologies, Pearson Education

4. http://www.isi.edu/nsnam/ns/doc/
5. http://pcl.cs.ucla.edu/projects/glomosim/

Internal Continuous Assessment *(Maximum Marks-50)*

50%-Laboratory practical and record
30%- Test/s
20%- Regularity in the class

End Semester Examination *(Maximum Marks-100)*

70% - Procedure, conducting experiment, results, tabulation, and inference
30% - Viva voce

IT010 608 MINI PROJECT

Teaching scheme **Credits:** 2

3 hours practical per week

Objectives

- *To estimate the ability of the student in transforming the theoretical knowledge studied so far into application software.*
- *For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project in the final year.*
- *To understand and gain the knowledge of software engineering practices, so as to participate and manage large software engineering projects in future.*

In this practical course, each group consisting of two/three members (four in special cases) is expected to design and develop practical solutions to real life problems related to industry, institutions and computer science research. Software life cycle should be followed during the development. The theoretical knowledge, principles and practices gained from various subjects should be applied to develop effective solutions to various computing problems. The knowledge gained during various practical subjects to work with various software tools, Designing tools, programming languages, operating systems, etc. should be utilized in various stages of development. Structured/ Object Oriented design techniques may be used for the project. Software Requirements Specification (SRS), Modeling Techniques, Design and Testing strategies should be documented properly.

A committee consisting of minimum three faculty members will perform the internal assessment of the mini project. A report on mini project should be submitted for evaluation and project work should be presented and demonstrated before the panel of examiners.

Internal Continuous Assessment *(50 marks)*

40% - Design and development (30% by guide and 10% by committee)
30% - Final result and Demonstration (15% by guide and 15% by committee)
20% - Report (10% by guide and 10% by committee)
10% - Regularity in the class (by guide)

End Semester Examination *(Maximum Marks-100)*

20% - Demonstration of mini project
50% - Practical test connected with mini project
20% - Viva voce
10% - Project report

IT010 701 FINANCIAL MANAGEMENT AND E-BANKING

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objective

- *To understand the basic concepts of Accounting, book keeping, costing, fund flow and e- banking*

MODULE I **(12 hours)**

The basic concepts of Accounting: The separation of ownership and control, The users of accounts, Computers and users of accounts, Accounting concepts and conventions, Accounting equation, Balance sheet, Classifying items, The processing function.

MODULE II **(12 hours)**

Book-Keeping: The double-entry system, Double-entry of expenses, Asset of stock, Capital and revenue expenditure, Balancing accounts on computers, The trial balance, The final accounts, Depreciation, Bad debts and provision for bad debts, Division of the ledger, Books of original entry, Source documents, Accounting systems, Interpretation of accounts.

MODULE III **(12 hours)**

Costing: Cost Accounting, Classifying costs, The implications for programming, The operating statement, the cost of raw materials, the cost of direct labour, the cost of overheads, job costing, Break-even analysis, Break-even graphs, Budgeting, Standard costing, Variance analysis, Marginal costing. Ratio Analysis: Ratio meaning, profitability ratios, profit in relation to sales, profit in relation to investments, Liquid ratios, Solvency ratios, other ratios, Activity ratios, Eps, DuPont Financial analysis, ratios for predicating bankruptcy, Inter-fim comparison, ratios limitations.

MODULE IV **(12 hours)**

Fund Flow Statement: Meaning, Importance, Definition of terms, Funds and Flow, Sources and use of funds, Changes in working capital, Preparation of funds flow statements, cash flow statements, Sources and uses, preparation. Cost Reduction: Difference between cost control and cost reduction, Prequisites for an effective cost reduction, Concept of value analysis- crux of the cost reduction, steps involved in introducing a cost reduction program, some examples of cost reduction, Common limitations.

MODULE V **(12 hours)**

E-Banking: Changing Dynamics in the Banking Industry, Changing Consumer Needs, Cost Reduction, Demographic Trends, Regulatory Reform, Technology Based Financial services products. Home Banking Implementation Approaches, Home Banking Using Bank's Proprietary Software, Banking via the PC Using Dial-Up Software, Banking via Online Services, Banking via the Web: Security First Network Bank. Open versus Closed Models, Management Issues in Online Banking, Differentiating Products and Services, Managing Financial Supply Chains, Pricing Issues in Online Banking, Marketing Issues:

Attracting Customers, Keeping Customers, Back-Office Support for Online Banking, Integrating Telephone Call Centers with the Web.

Reference Book

1. R K Sharma and Shasi K Gupta "Management Accounting Principles And Practice", Kalyani Publishers.
2. Khan and Jain, " Theory and Problems in Financial Management", Tata Mc Graw Hill
3. Eugene .F. Brigham & Joel F Houston," Fundamentals of Financial Management", Thomson Learning.
4. P.H. Basset,t " Computerised Accounting", NCC Blackwell Ltd. , Oxford, 1994
5. M.C Shukla & T.S.Grewal," Advanced Accounts", S.Chand & Co. , New Delhi
6. Ravi Kalkota,Andrew B. Whinston,"Electronic Commerc A Manager's Guide", Pearson Education 2006.
7. Nand Dharmeja & K.S. Sastry, "Finance & Accounting for ,Managerial Competiveness", Weeler Publishing, Allahabad

IT 010 702 : Object Oriented Modeling and Design

Teaching scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week

Objective

- *To impart ideas on building systems through the object oriented modelling approach using the Unified Modelling Language.*

Module 1 (10 hours)

Introduction: object oriented development-modeling concepts – object oriented methodology – models – object oriented themes-Object Modeling– links and associations – advanced links and association concepts – generalization and inheritance - grouping constructs – a sample object model

Advanced Object Modeling: aggregation – abstract classes – generalization as extension and restriction – multiple inheritance – metadata – candidate keys – constraints.

Module 2 (10 hours)

Dynamic modeling: Events and states – Operations – Nested state diagrams – Concurrency – Advanced dynamic modeling concepts – A sample dynamic model – Relationship of Object and Dynamic models.

Functional modeling: Functional models – Data Flow Diagrams - Specifying operations – Constraints – A sample functional model – Relation of functional to Object and Dynamic models.

Module 3 (10 hours)

Analysis: Analysis in object modeling, dynamic modeling and functional modeling, Adding operations- Iterating the analysis

System Design: Breaking system into subsystems - Identifying concurrency-allocating subsystems to processors and tasks, managing of data stores. Handling of global resources- handling boundary conditions-Common Architectural Frameworks

Module 4 (8 hours)

Object Design: Overview of Object design – Combining the three models – Designing algorithms – Design optimization – Implementation of control – Adjustment of inheritance - Design of association – Object representation – Physical packaging – Documenting design decisions-Comparison of methodologies

Module 5 (7 hours)

Unified Modeling language: Introduction, UML Diagrams – Class diagrams, Sequence diagrams, Object diagrams, Deployment diagrams, Use case diagrams, State diagrams, Activity diagram, Component diagrams – Case Study.

Reference Book

1. Object Oriented Modeling and Design -James Rumbaugh, Prentice Hall India
2. UML Distilled – Martin Fowler, Addison Wesley
3. Object- oriented Systems analysis and design using UML- 4th ed., Simon Bennet,Stephen McRobb, Ray Farmer. TMH.
4. Object Oriented Analysis and Design with Applications - Grady Booch, Pearson Education Asia

IT010 703 COMPUTER GRAPHICS & MULTIMEDIA SYSTEMS

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objective

- *To understand the basic concepts of Computer Graphics & multimedia techniques.*

Module 1: (13 hours)

Introduction to Computer Graphics : Uses of Computer Graphics, Display Devices, Input Devices, Output Devices, Computer Graphics Software, Graphical User Interface, Line Drawing Algorithms – DDA, Bresenham's Line Algorithm, Bresenham's Circle Algorithm. Polygon Filling Algorithm – Scan Conversion, Seed Filling Algorithm

Module 2: (13 hours)

Geometrical Transformations: Transformation of Points, Straight Lines, Midpoint, Parallel Lines, Rotation, Reflection and Scaling of Straight Lines, Homogeneous Coordinates, Cohen Sutherland Line Clipping.

Module 3: (12 hours)

Rendering: Hidden surface Removal Algorithm- Z Buffer Algorithm, A- Buffer Algorithm, Hidden Line Removal Algorithm, Colour Models, Z-Flat Shading, Gouraud Shading.

Module 4: (11 hours)

Multimedia: Media and Data Streams, Properties of Multimedia, Traditional Data Stream Characteristics, Music, Speech, Images and Graphics, Computer Image Processing

Module 5: (11 hours)

Data Compression: Storage space, Coding Requirement, JPEG, H.261, MPEG, DVI, Multimedia Operating Systems – Real Time, Resource Management, Process Management

Reference Book

1. Amarendra N' Sinha and Arun D Udai, "Computer Graphics",The McGraw-Hill Companies.
2. Ralf Steinmetz and Klara Nahrstedt, "Multimedia: Computing, Communications & Applications", Person Education Asia.
3. Donald Hearn & Pauline Baker, "Computer Graphics", Prentice Hall India.
4. Foley, VanDam, Feiner, Hughes, "Computer Graphics Principles & Practice", Second Edition, Addison Wesley.
5. Ranjan Parekh, "Principles of Multimedia", The McGraw-Hill Companies.

IT010 704: INTERNETWORKING

Teaching scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week

Objective

- *to familiarize with the TCp/IP protocol suite, the different protocols used in each layer, and their implementation*

Module 1 (9 hours)

Internet Architecture, Classful Internet Addresses, Mapping Internet Addresses to Physical addresses (ARP), Determining an Internet address at start-up (RARP), Connectionless Datagram Delivery (IPV4) , Forwarding IP datagrams.

Module 2 (9 hours)

Error and Control Messages (ICMP),Classless and Subnet Address Extensions (CIDR), Protocol Layering, User datagram Protocol, Reliable Stream Transport Service.

Module 3 (9 hours)

Routing Architecture : Cores, Peers, and Algorithms, Routing Between Peers (BGP), Routing Within an Autonomous System (RIP, OSPF).

Module 4 (9 hours)

Internet Multi casting, IP Switching and MPLS, Private Network Interconnection (NAT, VPN), Bootstrap and Auto configuration (DHCP).Applications - DNS, Remote Login and Desktop (TELNET, SSH)

Module 5 (9 hours)

File Transfer and Access (FTP, TFTP, NFS) , Electronic Mail (SMTP, POP, IMAP, MIME), WWW (HTTP), Voice and Video Over IP (RTP, RSVP, QoS).

Reference Book

1. Internetworking with TCP/IP - Volume I, Principles, Protocols and Architecture (5th Edition), Douglas E.Comer, PHI 2009
2. The Internet and Its Protocols, Adrian Farrel, Elsevier 2005.

IT010 705 WEB APPLICATIONS DEVELOPMENT

Teaching scheme **Credits:** 3

2 hours lecture and 1 hour tutorial per week

Objective

- *to familiarize with the technologies used for the devolepment of Web applications*

Module 1 (9 hours)

Introduction - Web architecture - web application lifecycle - XML and J2EE. Design and development of a J2EE application - J2EE Layers, Application Components, J2EE Architecture, Development methodology - Task list for building J2EE Applications - database design - defining the application - creating the interface, building pages, creating data access objects, validating the code..

Module 2 (10 hours)

JDBC: Architecture - JDBC API, Retrieving and updating Data, SQL-to-Java Data Types, JDBC Execution Types, Metadata, Scrollable Resultsets, transaction support, Batch Statements. Servlets: Introduction to Servlets, Benefits of Servlets, use as controller in MVC, basic HTTP, servlet container, Servlets API, javax.servelet Package, Reading Servlet parameters, service method detail, HTML clients, servlet lifecycle, HTTP response header, session management, dispatching requests, Servlets with JDBC, web applications.

Module 3 (10 hours)

Java Server Pages: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Setting attributes, Error Handling and Debugging, Using JavaBeans Components in JSP Pages, Sharing Data Between JSP pages -Passing Control and Data between Pages – Sharing Session and Application Data – Application Models - MVC Design.

Module 4 (7 hours)

Enterprise JavaBeans : Overview, distributed programming, EJB framework, Session and entity beans, Stateless and tateful session bean, Bean attributes, Parts of a Bean, container-managed persistence (CMP) and bean managed - lifecycle of EJB

Module 5 (9 hours)

java message service (JMS) and message driven beans (MDB), distributed programming services, CORBA and RMI - Transaction management, Security, deployment, personal roles for EJB Development, building session beans - creating session beans - Entity beans.

Reference Book

1. J2EE UNLEASHED – Joseph J. Bambara, Paul R.Allen, Mark Ashnault, Ziyad Dean, Thomas Garben, Sherry Smith – SAMS Techmedia
2. Java Servlet Programming, Second Edition,Jason Hunter, William Crawford,O'Reilly Media
3. Mastering EJB(2nd Edition) – Ed Roman, Scott Ambler, Tyler Jewell – John Wiley Publications 2003.
4. The J2EE Tutorial- Stepahnie Bodoff, Dale Green, Kim Hasse, Eric Jendrock, Monica Pawlan, Beth Stearns-Pearson Education –Asia.
5. Java Server Pages –Hans Bergsten, SPD O'Reilly

IT010 706L01 SOFTWARE PROJECT MANAGEMENT

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives
Pre-requisites: *IT 010 604 Software Engineering*

Module 1 (12 hours)

Software Project, Contract Management and Technical Project Management, Activities of Software Project Management, Categorizing Software Projects, Problems with Software Projects, Management Control, Step Wise Project Planning, Programme Management, Managing the Allocation of Resources within Programmes, Strategic Programme Management, Aids to Programme Management, Benefits Management, Cost-Benefit Analysis, Cash Flow forecasting, Cost-Benefit Evaluation Techniques, Risk Evaluation.

Module 2 (12 hours)

Technical Plan Contents List, Structure Versus Speed of Delivery, The Waterfall Model, The V-Process Model, The Spiral Model, Software Prototyping, Incremental Delivery, Dynamic Systems Development Method, Extreme Programming, Software Effort Estimation Techniques, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, COSMIC Full Function Points, COCOMO.

Module 3 (12 hours)

Objectives of Activity Planning, Project Schedules, Sequencing ad Scheduling Activities, Network Planning Models, The Forward Pass, The Backward Pass, Identifying the Critical Path, Activity Float, Activity-on-arrow Networks, Categories of Risk, Risk Identification, Risk Assessment, Risk Planning, Risk Management, PERT, Monte Carlo Simulation, Critical Chain Concepts.

Module 4 (12 hours)

Resource Requirements, Scheduling Resources, Creating Critical Paths, Resource Schedule, Cost Schedules, The Scheduling Sequence, Project Control Cycle, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Change Control.

Module 5 (12 hours)

ISO 12207, The Supply Process, Types of Contract, Stages in Contract Placement, Contract Management, Organizational Behaviour, Motivation, The Oldham-Hackman Job Characteristics Model, Decision Making, Leadership, Organizational structures, Dispersed and Virtual Teams, Software Quality, ISO 9126, Software Quality Measures, Product Versus Process Quality Management, Quality Pans.

Reference Books

1. Bob Hughes and Mike Cotterell, "Software Project Management", Fourth Edition, Tata McGraw-Hill, New Delhi, 2006.
2. Richard H Thayer, "Software Engineering Project Management", Second Edition, Wiley India, 2004.
3. Cleland D.L & King W.R, "System Analysis And Project Management", Tata Mcgraw Hill
4. Meredith J.R, "Project Management-A Management Approach", Wiley-NY.
5. Charles.S.Parker, "Management Information Systems – Strategy and Action", Tata Mcgraw Hill

IT010 706L02 OPTICAL COMMUNICATION NETWORKS

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- *To understand applications of Optical fiber communication.*
- *To understand working of Optical Fiber Networks .*
- *To provide an insight into the working, analysis and design of basic Optical communication networks*

Module 1 (12 hours)

Introduction-Need for Fiber Optic Communications System, Role of Fiber Optic communication technology, Basic Block Diagram, Advantages & Disadvantages of Optical Fiber Communication, Ray Theory, Total internal reflection-Acceptance angle – Numerical aperture – Skew rays –Electromagnetic mode theory of optical propagation – EM waves – Step Index Fiber, Graded Index Fiber, Attenuation-Bending Losses, Scattering, Absorption- modes in Planar guide – phase and group velocity – cylindrical fibers – SM ,MM fibers.

Module 2 (12 hours)

Optical sources: Light Emitting Diodes - LED structures – LASER Diodes, Principle of action, characteristics, efficiency. **Detectors**: PIN Photo detectors, Avalanche photo diodes, characteristics and properties, Photo detector noise -Noise sources, Signal to Noise ratio.

Module 3 (12 hours)

Fiber optic receiver and measurements:- Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration – Probability of Error – Quantum limit.OTDR- Fiber Attenuation measurements- Dispersion measurements – Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements – Fiber diameter measurements

Module 4 (12 hours)

Optical fiber connectors:- Splicing, Connectors, components of Fiber Optic Networks, Transceivers, Semiconductor, optical amplifiers – Principle of operation, gain, Bandwidth, Cross talk, Noise, Applications, Advantages& Disadvantages.

Module 5 (12 hours)

Optical networks :- Basic Networks – SONET / SDH – WDM-Broadcast and select WDM Networks –Wavelength Routed Networks – Non linear effects on Network performance – Erbium Doped Fiber Amplifiers (EDFAs) – Operation, gain, noise-Components of EDFA module- Performance of WDM + EDFA system – Optical CDMA – Ultra High Capacity Networks.

Reference Books

1. Optical Fiber Communication – John M. Senior – Pearson Education – Second Edition. 2007
2. Optical Fiber Communication – Gerd Keiser – Mc Graw Hill – Third Edition. 2000
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001
4. Rajiv Ramaswami, "Optical Networks " , Second Edition, Elsevier , 2004.
5. Govind P. Agrawal, " Fiber-optic communication systems", third edition, John Wiley & sons, 2004.

IT010 706L03 DIGITAL SPEECH AND IMAGE PROCESSING

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives
Pre-requisites: *IT 010 602 Digital Signal Processing*

Module 1 (12 hours)

Speech Analysis: Speech processing model, Speech analysis, Estimation frequency, Spectrum of speech using DFT, Linear predictive Analysis.

Module 2 (12 hours)

Speech Recognizer and Production: Speech synthesizer, Linear predictive synthesizer, Different methods of speech recognition and speech encoding.

Module 3 (12 hours)

Mathematical Transform and Enhancement: Image Transforms, Image enhancement, Restoration

Module 4 (12 hours)

Image Compression and Segmentation: Compression Models, Lossy compression, Image Segmentation, Boundary detection, Detection of Discontinuities, Thresholding Boundary representation, Description, Introduction to Classifiers, Introduction to Colour image processing.

Module 5 (12 hours)

Image Analysis: Morphology, Automated Image Analysis, Semantic Networks, Production (expert system).

Reference Books

1. R. Gonzalez and R.E.Woods, "Digital Image Processing", Addison Wesley, 1993.
2. Rabiner, "Speech Recognition", Prentice Hall, 1993.
3. S Jayaraman, S. Essakirajan, T Veerakumar, "Digital Image Processing", First Edition, TMH,2009.
4. Rabiner and Schaeffeer, " Digital Processing of Speech Signals", Prentice Hall, 1995.
5. Anil Jain K. "Fundamentals of Digital Image Processing", Prentice Hall India, 1999.

IT010 706L04 Real Time Systems

(Common to **CS010 706L01 : Real Time Systems)**

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

- *to learn , real-time operating systems, task scheduling, communication, fault tolerant techniques and , programming languages*

Module 1 (12 hours)

Introduction to Real Time Systems: Structure of real time systems, real time computer, task classes – Periodic, Aperiodic, critical, Non-critical, definition of real time systems – real time systems, embedded systems - Hard real time systems, soft real time systems, real time design issues.

Module 2 (12 hours)

Task Assignment and Scheduling: Uniprocessor scheduling algorithms –Rate monotonic Scheduling, Preemptive Earliest Deadline First (EDF), IRIS Tasks. Scheduling Aperiodic and Sporadic jobs in Priority Driven Sytems, Task Assignment-Utilization Balancing algorithm, Next Fit Algorithm for RM scheduling, Bin Packing for EDF, Myopic Offline Scheduling(MOS), Focused Addressing and Bidding, Buddy strategy. Fault Tolerant scheduling.

Module 3 (12 hours)

Communication – Communication Media and message sending topologies, network architecture issues, protocols – contention - based, token - based, stop and go multi loop, polled bus, hierarchal round robin, fault tolerant routing – clocks and synchronization– fault tolerant synchronization in hardware, synchronization in software.

Module 4 (12 hours)

Fault tolerance – definition, cause of failure, fault types, fault detection and containment, redundancy – hardware, software, time, information, integrated failure handling. Reliability Evaluation techniques- Obtaining parameter values, Reliability models for Hardware redundancy, software error models.

Module 5 (12 hours)

Programming Languages and Real Time databases – Desired language characteristics, Data Typing, Control Structures. Real time databases, characteristics, main memory databases, Transaction, Disk schedule algorithms, Databases for hard real time systems, maintaining serialization constituency.

References

1. Real Time Systems - C.M Krishna, Kang G. Shini (Tata McGraw Hill)
2. Real Time Systems- Jane W.S. Liu(Pearson)

IT010 706L05 Operating System Kernel Design
(common to CS010 706L03: Operating System Kernel Design)

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To provide knowledge about the operating system working principles.*
- *To discuss most of the significant data structures and algorithms used in the kernel.*

Module I (13 hours)

Basic Operating System Concepts – Kernel – Types: monolithic, microkernel – An Overview of Unix Kernels-The Process/Kernel Model, Reentrant Kernels – Signals sending and receiving – System calls – System Call Handler and Service Routines - Interrupts and Exceptions - Interrupt Handling - The Timer Interrupt Handler.

Module II (13 hours)

Processes - Process Descriptor - Process State, Process relationship – Creating Processes - Process Termination - Process Scheduling – Scheduling algorithm – SMP Scheduler.
Kernel Synchronization - Synchronization Techniques - Process Communication - System V IPC.

Module III (10 hours)

Paging in Linux - Memory Management - Page Frame Management - The Buddy System Algorithm - The Process's Address Space - The Memory Descriptor - Memory Regions - Page Fault Exception Handler.

Module IV (14 hours)

Overview of the Unix File System - The Virtual File System - role of the VFS - VFS Data Structures – File system Mounting.
The Ext2 File system - Disk Data Structures - Creating the File system - Data Blocks Addressing - Allocating a Data Block.

Module V (10 hours)

Managing I/O Devices - Associating Files with I/O Devices - Device Drivers - Character Device - Block Device.
Disk Caches - Buffer Cache - Writing Dirty Buffers to Disk - Page Cache.

Reference Books

1) Daniel P. Bovet, Marco Cesati, *Understanding the Linux Kernel*, First ed., O'Reilly, 2000
2) M Bech et al., *Linux Kernel Internals*, 2nd ed., Addison-Wesley, 1998
3) Maurice J. Bach, *The Design of the Unix Operating System*, First Edition, Pearson Education, 1999.
4) Abraham Silberschatz, Peter B.Galvin and Greg Gagne, "*Operating System Concepts*", John Wiley & Sons Inc, 8th Edition 2010.

IT010 706 L06 Data Mining and Data Warehousing

Teaching scheme **Credits: 4**
2 hours lecture and 2 hour tutorial per week

Objectives

- This course deals with the representation of multidimensional data for Data warehouses
- It covers basics of data mining, clustering and classification and applications of data mining

Pre-requisites: *IT 506 Database Management Systems*

Module 1. **(11 hours)**

Evolution of Decision Support Systems- Data warehousing Components –Data warehouse, Data Warehouse and DBMS, Data marts, Metadata, Multidimensional data model, OLAP ,OLTP, Data cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations

Module 2. **(12 hours)**

Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation, tuning and testing of data warehouse. Data Staging (ETL) Design and Development, data warehouse visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications- tools-SAS

Module 3. **(12 hours)**

Data mining-KDD versus data mining, Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data cleaning, Data transformation, Feature selection, Dimensionality reduction, Discretization and generating - Mining frequent patterns-association and correlation.

Module 4. **(13 hours)**

Decision Tree Induction - Bayesian Classification – Rule Based Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Clustering techniques – , Partitioning methods- k-means- Hierarchical Methods - distance- based agglomerative and divisible clustering, Density-Based Methods – expectation maximization -Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis

Module 5. **(12 hours)**

Multidimensional analysis and descriptive mining of complex data objects - Spatial mining - Multimedia mining - Text mining - Web mining - Temporal mining.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, third edition2011, ISBN: 1558604898.
2. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", TataMc Graw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Min Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. MargaretH. Dunham, S.Sridhar, "Data Mining : Introductory and Advanced Topics", Pearson Education

REFERENCES:

1. Mehmed kantardzic, "Datamining concepts,models,methods, and algorithms", Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, "Data Mining; Practical Machine Learning Tools and Techniques", third edition, Morgan Kaufmann, 2011.
3. George M Marakas, "Modern Data Warehousing, Mining and Visualization", Prentice Hall, 2003

IT010 707 INTERNETWORKING LAB

Teaching scheme
3 hours practical per week

Credits: 2

- Familiarization of Network hardware such as NIC, Hub, Bridge, Switch, Router etc
- Familiarization of different Network Cables- Color coding - Crimping.
- Familiarization of Wireless Access Point.
- LAN Configuration – IP Addressing – Host name - Domain Name – Setting up – Configuring – testing and troubleshooting
- Wireless LAN Configuration
- Experiments using Router and Switch
  - Basic router configuration.
  - Implementing static routing.
  - Implementing dynamic routing using RIP
  - Implementing dynamic routing using OSPF
  - Implementing dynamic routing using EIGRP
  - Basic switch configuration
  - VLAN configuration
  - VTP, VTP pruning.
  - Implement inter-VLAN routing
  - Backup and recovery of configuration files of a router using TFTP server.
  - Access Control List (Standard and Extended)
  - Configuring PPP.
- Design, Configure and implement a WAN scenario which explains all concepts discussed above.

IT010 708 COMPUTER AIDED SOFTWARE ENGINEERING LAB

Teaching scheme
3 hours practical per week

Credits: 2

1. Study of case tools such as rational rose or equivalent tools
2. Requirements
   Implementation of requirements engineering activities such as elicitation, validation, management using case tools
3. Analysis and design
   Implementation of analysis and design using case tools.
4. Study and usage of software project management tools such cost estimates and scheduling
5. Documentation generators - Study and practice of Documentation generators.
6. Data modeling using automated tools.
7. Practice reverse engineering and re engineering using tools.
8. Exposure towards test plan generators, test case generators, test coverage and software metrics.
9. Meta modeling and software life cycle management.

IT 010 709 Seminar

Teaching scheme **credits: 2**

2 hours practical per week

The seminar power point presentation shall be fundamentals oriented and advanced topics in the appropriate branch of engineering with references of minimum seven latest international journal papers having high impact factor.

Each presentation is to be planned for duration of 25 minutes including a question answer session of five to ten minutes.

The student's internal marks for seminar will be out of 50. The marks will be awarded based on the presentation of the seminar by the students before an evaluation committee consists of a minimum of 4 faculty members. Apportioning of the marks towards various aspects of seminar (extent of literature survey, presentation skill, communication skill, etc.) may be decided by the seminar evaluation committee.

A bona fide report on seminar shall be submitted at the end of the semester. This report shall include, in addition to the presentation materials, all relevant supplementary materials along with detailed answers to all the questions asked/clarifications sought during presentation. All references must be given toward the end of the report. The seminar report should also be submitted for the viva-voce examination at the end of eighth semester.

For Seminar, the minimum for a pass shall be 50% of the total marks assigned to the seminar.

IT 010 710 Project Work

Teaching scheme **credits: 1**

1 hour practical per week

Project work, in general, means design and development of a system with clearly specified objectives. The project is intended to be a challenge to intellectual and innovative abilities and to give students the opportunity to synthesize and apply the knowledge and analytical skills learned in the different disciplines.

The project shall be a prototype; backed by analysis and simulation etc. No project can be deemed to be complete without having an assessment of the extent to which the objectives are met. This is to be done through proper test and evaluation, in the case of developmental work, or through proper reviews in the case of experimental investigations.

- The project work has to be started in the seventh semester and to be continued on to eighth semester.
- Project work is to be done by student groups. Maximum of four students only are permitted in any one group.
- Projects are expected to be proposed by the students. They may also be proposed by faculty member (Guide) or jointly by student and faculty member.
- Students are expected to finalise project themes/titles with the assistance of an identified faculty member as project guide during the first week of the seventh semester.

The progress from concept to final implementation and testing, through problem definition and the selection of alternative solutions is monitored. Students build self confidence, demonstrate independence, and develop professionalism by successfully completing the project.

Each student shall maintain a project work book. At the beginning of the project, students are required to submit a project plan in the project book. The plan should not exceed 600 words but should cover the following matters.

- ❖ Relevance of the project proposed
- ❖ Literature survey
- ❖ Objectives
- ❖ Statement of how the objectives are to be tackled

- Time schedule
- Cost estimate

These proposals are to be screened by the evaluation committee (EC- minimum of 3 faculty members including the guide) constituted by the head of department, which will include a Chairman and the EC will evaluates the suitability and feasibility of the project proposal. The EC can accept, accept with modification, request a resubmission, or reject a project proposal.

Every activity done as part of project work is to be recorded in the project book, as and when it is done. Project guide shall go through these records periodically, and give suggestions/comments in writing in the same book.

The students have to submit an interim report, along with project work book showing details of the work carried out by him/her and a power point presentation at the end of the 7th semester to EC. The EC can accept, accept with modification, request a resubmission, or extension of the project.

The student's internal marks for project will be out of 50, in which 30 marks will be based on day to day performance assessed by the guide. Balance 20 marks will be awarded based on the presentation of the project by the students before an evaluation committee consists of a minimum of 3 faculty members including the guide.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.

IT010 801 WIRELESS COMMUNICATION

Teaching scheme
3 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

- To introduce the underlying technologies of wireless communication.
- To explain the benefits and limitations of various techniques for providing multiple users access to scarce radio spectrum resources.
- To provide a detailed study of the four generations of wireless cellular and mobile telephony, technologies, applications and other issues.

Module 1 (15 Hours)

Overview-Principles of CDMA-Radio channel access- Spread Spectrum-Power control-Handovers-Wideband CDMA Air interface- Physical layer-FEC encoding/decoding-Error detection-Frequency and time synchronization-Channels- Spreading and scrambling codes- Diversity.

Module 2 (15 Hours)

Modulation techniques and spread spectrum- Spreading techniques- Codes-Channel coding – Wideband CDMA air interface- Protocol stack- Media Access Control (MAC)- Radio Link control (RLC)- Radio Resource Control (RRC) – User plane – PDC protocol- Data protocols

Module 3 (15 Hours)

UMTS network structure- Core network- UMTS Radio access network – GSM Radio access network- Interfaces – Network Protocols.New concepts in UMTS Network – Location services-Opportunity driven multiple access – Multimedia Messaging services– Gateway location register – Support of localized service area.

Module 4 (15 Hours)

3G services – Service categories – Tele services Bearer services Supplementary services – Service capabilities – QoS classes – 3G Applications.Introduction to IMS, Architecture – CSCF – Media gateway – Application Servers – IMS Protocols: SIP, RTP/RTCP and other IMS protocols – IMS Services.

Module 5 (15 Hours)

Introduction to 4G networks - DVB-H - Wireless Local Loop (WLL) WLL Architecture, WLL Technologies and frequency spectrum, WLL products, LMDS

References:

1. Juha Korhonen, "Introduction to 3G Mobile communications", Artech House, 2001,
2. Miikka Poikselka, Aki Niemi, Hisham Khartabil, Georg Mayer, The IMS: IP Multimedia Concepts and Services, 2nd Edition John Wiley & Sons 2006
3. Jeffrey G. Andrews Fundamentals of WiMAX: Understanding Broadband Wireless Networking, Prentice Hall, 2007
4. Clint Smith, Daniel Collins, Daniel Collins, 3G Wireless Networks, McGraw-Hill Companies, 2006
5. Garg.V.K "IS-95 CDMA and cdma 2000", first Indian reprint 2002, Pearson Education
6. Heikki Kaaranen, Siamäk Naghian, Lauri Laitinen, Ari Ahtiainen , Valtteri Niemi, "UMTS Networks: Architecture, Mobility and Services", John Wiley & Sons; 1st edition 2001
7. Frank Ohrtman, "WiMAX Handbook", McGraw-Hill Professional; 1 edition 2005

IT010 802 CRYPTOGRAPHY AND NETWORK SECURITY

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

- To understand the mathematics behind Cryptography
- To understand the standard algorithms used to provide confidentiality provide integrity and authenticity.

Module 1 (12 Hours)

Basics of Algebra and Number Theory: Integer Arithmatic, Modular Arithmatic, Algebraic structures, GF(2^n) Fields, Matrices, Prime Numbers, Fermat's and Eulers's Theorem, Primality Testing, Factorization, Chinese Remainder Theorem, Linear and Quadratic Congruence, Discrete Logarithms.

Module 2 (13 Hours)

Symmetric Ciphers: Classical Encryption Techniques, Symmetric Cipher Model, Substitution and Transposition Ciphers, Stream and Block Ciphers, Data Encryption Standard, Advanced Encryption Standard, Triple DES, Confidentiality Using Symmetric Encryption.

Module 3 (13 Hours)

Public-Key Encryption and Hash Functions : Public-Key Cryptography, RSA Algorithm, ElGamal Cryptosystem, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication Codes, Hash Functions ,Secure Hash Algorithm, Digital Signature schemes.

Module 4 (11 Hours)

Network Security Practice Applications: Authentication Applications, Kerberos, X.509 Authentication Service, Electronic Mail Security, Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload.

Module 5 (11 Hours)

System Security: Intruders, Intrusion Detection, Password Management, Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service attacks, Firewalls, Firewall Design Principles, Trusted Systems.

References:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fourth Edition, 2006.
2. Behrouz A. Forouzan,Dedeep Mukhopadhyay "Cryptography & Network Security", Second Edition,Tata McGraw Hill, New Delhi, 2010
3. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill, 2003.
4. Wenbo Mao, " Modern Cryptography- Theory & Practice", Pearson Education, 2006.
5. .Bruce Schneier, "Applied Cryptography", John Wiley and Sons Inc, 2001.

IT010 803: ARTIFICIAL INTELLIGENCE

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- *To provide introduction to the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.*
- *To familiarize with Fuzzy Logic and knowledge processing in expert systems*
- *To give exposure to problem solving in AI using Python*

Module 1 (14 hours)

Problems- problem spaces and search, production systems, Problem characteristics, Searching strategies – Generate and Test, Heuristic Search Techniques- Hill climbing– issues in hill climbing, General Example Problems.
Python-Introduction to Python- Lists Dictionaries & Tuples in Python- Python implementation of Hill Climbing

Module 2 (12 hours)
Search Methods- Best First Search- Implementation in Python- OR Graphs, The A * Algorithm, Problem Reduction- AND-OR Graphs, The AO* algorithm, Constraint Satisfaction. Games as search problem, MINIMAX search procedure, Alpha–Beta pruning.

Module3 (12 hours)
Knowledge representation -Using Predicate logic- representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification, Question Answering, forward and backward chaining.

Module 4 (12 hours)
Learning- Rote Learning – Learning by Advice- Learning in Problem Solving - By Parameter Adjustment with Macro Operators, Chunking, Learning from Examples- Winston's Learning Program, Version Spaces- Positive & Negative Examples – Candidate Elimination- Decision Trees- ID3 Decision Tree Induction Algorithm.

Module 5 (10 hours)
Fuzzy Sets – Concept of a Fuzzy number- Operations on Fuzzy Sets – Typical Membership Functions – Discrete Fuzzy Sets.
Expert System –Representing and using Domain Knowledge – Reasoning with knowledge– Expert System Shells –Support for explanation- examples –Knowledge acquisition-examples.

References

1. Elaine Rich, Kevin Knight, Shivashankar B Nair
Tata McGraw Hill- Artificial Intelligence, 3rd Edn ,2004.
2. Stuart Russell – Peter Narang, Pearson Education Asia - Artificial Intelligence- A modern approach.
3. George F Luger - Artificial Intelligence, Pearson Education Asia
4. Allen B. Downey – (Think Python) Python for software design- How to think like a computer scientist, Cambridge University press, 2009 .

Web Reference

1. http://code.google.com/p/aima-python/ - Website for search strategy implementation in python

IT010 804L01 SOFTWARE TESTING

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- To determine software testing objectives and criteria
- To develop and validate a test plan
- To prepare testing policies and standards
- To study and use testing aids and tools
- To measure the success of testing efforts

Module 1 (12 Hours)

Fundamentals of Software Testing: Definitions of Testing, Essentials of Software Testing, Workbench, Test planning, Test Team Approach, Cost Aspect of Testing, Defect, Testing Methodologies, Testing Process, Configuration Management Process, Baselining, Storage of Configurable Items in Library, Configuration Management Planning, Risk Analysis.

Module 2 (12 Hours)

Software Verification and Validation: Methods of Verification, Types of Review, Test Designing, Validation Process, Levels of Validation, Management of Verification and Validation, V Model for Software, VV Model.
Defect Management: Defect classification, Defect Management Process, Defect Life Cycle, Defect Template, Defect Management Process, Estimate Expected Impact of a Defect.

Module 3 (12 Hours)

Testing Techniques and Tools: Levels of Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, System Testing, Sandwich Testing, Acceptance Testing Criteria, Alpha Testing, Beta Testing, Gamma Testing, Factors Affecting Criticality of the Requirement, Software Acceptance Plan, Testing Tools.

Module 4 (12 Hours)

Test Planning: Test Policy, Test Plan, Quality Plan, Test Estimation, Test standards, Test Scenario, Test Cases, Test Scripts, Test File, Building Test Data, Tools to Build Test Data, Roles and Responsibilities in Testing Life Cycle, Test Progress Monitoring.

Module 5 (12 Hours)

Test Metrics and Test Reports: Testing Related Data, Efficiency/Productivity Data, Categories of Product/Project Test Metrics, Effectiveness of Testing, Defect Density, Defect Life, Residual Defect Density, Test Team Efficiency, Test Case Efficiency, Implementing Measurement Reporting System in an organization, Test Reports, Test Status Report, Bench Marking, Qualitative and Quantitative Data.

REFERENCES

1. M.G Limaye, "Software Testing: Principles, Techniques and Tools", Tata McGraw Hill, New Delhi, 2009.
2. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices, Pearson Education, 2006.
3. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
4. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
5. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
6. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.
7. Tanres, "Introducing Software Testing", First Edition, Pearson Education, 2003. Volume 1 and 2, 2003

IT010 804L02 INFORMATION RETRIEVAL

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- It focus on information retrieval techniques and its applications

Module 1 (12 Hours)

Introduction – Information versus Data Retrieval. Modeling of Information retrieval. Formal characterization of Information retrieval – Alternate set theoretic models. Alternate algebraic models. Alternate probabilistic models. Structured text retrieval models. Models for Browsing. Retrieval Evaluation

Module 2 (12 Hours)

Query languages. Text Operations- Document pre processing. Text compression. Indexing and searching. Inverted files. Suffix trees and suffix arrays. Boolean queries. Sequential searching. Pattern matching. Structural queries. User interface and visualization.

Module 3 (12 Hours)

Parallel and Distributed Information Retrieval. Implementation of inverted files, suffix arrays and signature files in MIMD architecture. Implementation of Inverted files, suffix arrays and signature files in SIMD architecture.

Module 4 (12 Hours)

Searhing the web – modeling the web . Search engines –architecture, user interfaces, ranking, crawling, indices. Web Directories-Metadata- Metasearchers- Web as graph- Hubs and Authorities- Case study - google search engine

Module 5 (12 Hours)

Advanced Topics in Web IR-Duplicate detection and computing similarities-Link analysis-connectivity servers- PageRank and Hyperlink Induced Topic Search (HITS)-Web Mining and N-grams -Evaluation in information retrieval using user studies

REFERENCES

1. Ricardo Baexa-Yates & Berthier Ribeiro-Neto Modern Information Retrieval,Addison Wesley Longman,1999
2. Introduction to Information Retrieval by Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze Cambridge University Press in 2008

http://nlp.stanford.edu/IR-book/

3. Sergey Brin and Lawrence page, The anatomy of large scale hyper textual(Web) search engine, Computer Networks and ISDN systems, Vol 30,No 1-7

4. J Kleinberg, et. Al, The Web as a graph: Measurements, models and methods

IT010 804L03: HIGH SPEED NETWORKS

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- To highlight the features of different technologies involved in High Speed Networking and their performance.
- Students will get an introduction about ATM and Frame relay.
- Students will be provided with an up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.
- Students will be provided with different levels of quality of service (Q.S) to different applications.

Pre-requisites: *IT010 601 Computer Networks and IT010 704 Internetworking*

Module 1 (14 hours)
Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

Module 2 (10 hours)
Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

Module 3 (16 hours)
TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

Module 4 (12 hours)
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

Module 5 (8 hours)
RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

REFERENCES

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.
2. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003

IT010 804L04 NETWORK ADMINISTRATION AND MANAGEMENT

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objective:

- *To understand major functional areas of network management and various network administration methods.*
- *The various topics in this course material covers the extend breadth and depth of a complete network management plan for a moderate to large network enterprise.*

Module 1 (11 Hours)

Introduction to Network administration, Network administration VS Network management, TCP/IP overview, Addressing, Routing, Host tables, Address and names, ARP, DNS, Mail Server, Configuration Servers, NIS, Bootstrap Protocol, File and Print servers

Module 2 (13 Hours)

Network Configuration fundamentals, assigning IP addresses and subnet mask, planning routing and naming, Linux system configuration, Configuring the interface, Configuring Routing, DNS configuration, Configuration of network Services like NFS. NIS, BOOTP, DHCP, POP etc.

Module 3 (12 Hours)

Network Management Overview - Management Perspective: Dimensions of the Management: Management Interoperability, Management Life cycle, Management Layers – Management functions and reference models.

Module 4 (12 Hours)

Management Information – Management Communication Patterns: Rules of conversation. Common Management Protocols – Management organization

Module 5 (12 Hours)

Applied Network Management: Management Integration – Service Level Management – Management Metrics: Assessing Management Impact and Effectiveness – Case Study: NMS, Organization Network.

Reference Books

1. Craig Hunt, "TCP/IP Network Administration", 2nd Edition, O'Reilly Media
2. Alexander Clemm, Network Management Fundamentals, 1st Edition, Cisco Press, 2006.
3. Evi Nemeth, *Linux Administration Handbook*, Prentice Hall 2002
4. William Stallings, *SNMP, SNMP v2, SNMP v3 and RMON1*", 2 and 3rd Edition, Pearson Education Asia 1999.
5. Mani Subramanian, *Network Management, Principles and Practice*, Addison Wesley, 2000.

IT010 804L05 ENTERPRISE RESOURCE PLANNING

Teaching scheme **Credits: 4**
2 hours lecture and 2 hours tutorial per week

Objective:

- *To understand the basics and the strategic importance of ERP.*
- *To understand the key implementation issues of ERP*
- *To know the business modules of ERP*
- *To be aware of some popular products in the area of ERP*
- *To appreciate the current and future trends in ERP*

Module 1 (12 Hours)
Introduction to ERP, Its Evolution, Its Growth, Its Advantages, Its need, Integrated Management Information, Business Modelling, Integrated Data Model.
ERP and Related Technologies: BPR, MIS, DSS,EIS, Data Warehousing, Data Mining, OLTP, Supply Chain Management.

Module 2 (12 Hours)
MRP, BOM, Closed loop MRP, MRP-11, DRP,JIT and Kanban, CAD/CAM, PDM, Data Management, Benefits of PDM, MTO and MTS , ATO , ERP Modules – Finance, Plant Maintenance, Quality Management, Materials Management.

Module 3 (12 Hours)
Reduction of load-time-On-time shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Market, SAP AG, Baan, Oracle, Peoplesoft, JD Edwards, SSA, QAD.

Module 4 (12 Hours)
ERP Implementation Lifecycle – Pro-evaluation Screening, Package Evaluation, Project Planning Phase, GapAnalysis, Re-engineering, Configuration, Implementation Team Training, Testing, Going, Live, End-User Training. Faster Implementation Methodologies, Business Models and BAPIs. Convergence on Windows NT, Application Platforms, New Business Segment and Features.

Module 5 (12 Hours)
INTEGRATION: ERP Integration - Component based ERP - Extended ERP - ERP and Return on Investments DYNAMICS OF OPERATION MANAGEMENT: An information system for operation management – Establishing Performance measures Developing policies and actions - Teaching & - Integrated production and order management - Case Studies.

Reference Books

1. Alexin Leon, "Enterprise Resource Planning", Tata McGraw Hill, 1999.
2. Erin Callaway, "ERP - Integrating applications and Business processes across the Enterprise", 1999.
3. Avraham Shtub, "ERP - The Dynamics of operations Management", Kluwer Academic publishers, 2003

IT010 804L06: GRID COMPUTING
(Common to CS010 804L02:Grid Computing)

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an introduction to Grid Computing.*
- *To develop basic knowledge about the Open Grid Service Architecture.*

Module I (12 hours)
Grid Computing – Introduction- Grid Activities- Overview of Grid Business Areas- Grid Applications- Grid Infrastructure.

Module II (12 hours)
Grid Computing Organizations and their roles- Grid Computing Anatomy- Grid Problem- Concept of Virtual Organizations- Grid Architecture- Autonomic Computing- Business on Demand and Infrastructure Virtualization- Semantic Grids.
Module III (12 hours)
Merging the Grid Services Architecture- Service Oriented Architecture- Web Service Architecture- XML relevance to Web Services- Service Message Description Mechanisms- Relationship between Web Service and Grid Service.

Module IV (12 hours)
Open Grid Services Architecture- OGSA Platform Components- Open Grid Services Infrastructure- Introduction to Service Data Concepts- Grid Service- OGSA Basic Services- Common Management Model- Policy Architecture- Security Architecture.

Module V (12 hours)
Grid Computing Toolkits- GLOBAS GT3 Toolkit Architecture- GLOBAS GT3 Toolkit Programming Model- GLOBAS GT3 Toolkit High Level Services.

Reference Books

1) Joshy Joseph, Craig Fellenstein, Grid Computing, Pearson Education Inc, New Delhi 2004.
2) D Janakiram, Grid Computing A research Monograph, Tata McGraw-Hill Publishing Company Limited New Delhi, 2005.

IT010 805G01 SOFTWARE ARCHITECTURE
(Common to CS010 805G04 Software Architecture)

Teaching scheme **Credits: 4**
2 hours lecture and 2 hour tutorial per week

Objectives

- *To understand the role of a software architecture in the development of an enterprise application system.*
- *To develop the ability to understand the models that are used to document a software architecture.*

Module I (13 hours)
Software Architecture—Software Architecture, Software Design Levels, The status of Software Engineering and Architecture
Architecture Styles—Use of Patterns and Styles in Software Design, Common Architectural Styles -Pipes and Filters, Data Abstraction and Object Orientation, Event Based Implicit Invocation, Layered Systems, Repositories, Interpreters, **Process Control Paradigms**—Case Studies to Illustrate the use of Architectural Principles.

Module II (11 hours)
Architectural Design—Guidelines for User Interface Architectures, Design Space and Rules, Applying Design Space with an Example, A Validation Experiment. **The Quantified Design Space** — Background, Quantified Design Space

Module III (11 hours)
Formal models and Specifications— Formalizing the Architecture of a Specific System-Architectural Formalism and its Applications, Formalizing Various Architectural Styles, Filters, Pipes, Pipe-and-Filter System, Formalizing Architectural Design Space.

Module IV (14 hours)
Architectural Description Languages—Requirements for Architectural Description Languages, The Linguistic Character of Architectural Description, Desiderata for Architecture Description Languages, Problems.
First - Class Connectors — Current practice, Software System Composition, Adding Implicit Invocation to Traditional Programming Languages

Module V (11 hours)
Architectural Design Tools— UniCon A Universal Connecting Language, Components, Abstraction and Encapsulation, Types and Type checking.
Architectural Design - Exploiting Styles, Architectural Interconnection

References

1. Mary Shaw & David Garlan," *Software Architecture*", Prentice Hall India Private Limited, Third Edition, New Delhi, 2000.
2. Len Bass, Paul Clements, & Rick Kazman, "*Software Architecture in Practice*", Pearson Education.

IT010 805G02 ADVANCED MATHEMATICS
(common to CS010 805G03 Advanced Mathematics)

Teaching Schedule: **Credits: 4**

2 hour Lecturer and 2 hour Tutorial per week

Objectives

- *To provide an understanding of Green's Function, Integral Equations, Gamma, Beta functions, Power Series solution of differential equation, Numerical solution of partial differential equations*

Module 1 (12 Hours)
Green's Function
Heavisides, unit step function – Derivative of unit step function – Dirac delta function – properties of delta function – Derivatives of delta function – testing functions – symbolic function – symbolic derivatives – inverse of differential operator – Green's function – initial value problems – boundary value problems – simple cases only

Module 2 (12 Hours)
Integral Equations
Definition of Volterra and Fredholm Integral equations – conversion of a linear differential equation into an integral equation – conversion of boundary value problem into an integral equation using Green's function – solution of Fredhlom integral equation with separable Kernels – Integral equations of convolution type – Neumann series solution.

Module 3 (12 Hours)
Gamma, Beta functions
Gamma function, Beta function – Relation between them – their transformations – use of them in the evaluation certain integrals – Dirichlet's integral – Liouville's extension of Dirichlet's theorem – Elliptic integral – Error function.

Module 4 (12 Hours)
Power Series solution of differential equation
The power series method – Legendre's Equation – Legendre's polynomial – Rodrigues formula – generating function – Bessel's equation – Bessel's function of the first kind – Orthogonality of Legendre's Polynomials and Bessel's functions.

Module 5 (12 Hours)
Numerical solution of partial differential equations
Classification of second order equations- Finite difference approximations to partial derivatives – solution of Laplace and Poisson's equations by finite difference method – solution of one dimensional heat equation by Crank – Nicolson method – solution one dimensional wave equation.

References

1. S.S Sasthri, "Introductory methods of Numerical Analysis",Prentice Hall of India.
2. Ram P.Kanwal, Linear Integral Equation, Academic Press, New York.
3. Allen C.Pipkin, Springer, A Course on Integral Equations, Verlag.
4. H.K.Dass, Advanced Engg. Mathematics, S.Chand.
5. Michael D.Greenberge, Advanced Engg. Mathematics, Pearson Edn. Asia.
6. B.S.Grewal, Numrical methods in Engg.&science, Khanna Publishers.
7. R.F. Hoskins, Generalized functions, John Wiley and Sons.
8. Bernard Friedman, Principles and Techniques of Applied Mathematics, John Wiley and sons
9. James P.Keener, Principles of Applied Mathematics, Addison Wesley.
10. P.Kandasamy, K.Thilagavathy, K.Gunavathy Numerical methods, S.Chand & co

IT010 805G03: AD HOC AND SENSOR NETWORKS

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

- To provide a strong foundation in wireless adhoc networks and specialized adhoc networks like sensor networks
- To understand the issues of MAC layer and routing protocols
- To study about the different types of adhoc routing protocols
- To learn about the QoS aware adhoc routing protocols
- To study about power and energy management in adhoc networks
- To understand the routing and models of mesh networks.
- To study about the architecture and protocols of wireless sensor networks

Pre-requisites: *IT010 601 Computer Networks and/or IT010 704 Internetworking*

Module 1 -AD-HOC MAC (10 hours)
Introduction – Issues in Ad-Hoc Wireless Networks. Commercial Application – Technical and Market factors affecting Ad Hoc Networking. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

Module 2 -AD-HOC NETWORK ROUTING & TCP (12 hours)
Issues – Classifications of routing protocols – Hierarchical and Power aware. Unicast and Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, Ad Hoc TCP, and Split TCP.

Module 3 -WSN –MAC (12 hours)
Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

Module 4 -WSN ROUTING, LOCALIZATION & QOS (14 hours)
Issues in WSN routing – OLSR, AODV. Routing Protocols- Proactive, Reactive and Hybrid Routing protocols-issues in design of protocols-classifications-Energy aware protocols-Protocols like SPIN,LEACH etc. Localization – Indoor and Sensor Network Localization. QoS in WSN. Clustering.

Module 5 -MESH NETWORKS (12 hours)
Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

References:

1. C.Siva Ram Murthy and B.Smanoj, " Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

IT010 805G04 ELECTRONIC BUSINESS AND SERVICES

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- The syllabus is intended to give an comprehensive understanding of e-businesses, along with related technologies like cryptography, technical challenges like Credit Card Fraud Detection and legal perspective of e-commerce.

Module 1 (13 hours)

Overview of Electronic Commerce,E-Commerce Business Models - Various types of classification , B2B, B2C, C2C, C2B, Peer to Peer networks, M-Commerce, Advantages and Pitfalls, Layered Architecture
Electronic Data Interchange Standards – EDI (Electronic Data Interchange: an ANSI standard) and EDIFACT (Electronic Data Interchange for Administration Commerce and Transport Other representations – XML Formats for B2C, C2C E-Commerce

Module 2 (13 hours)

Introduction to Cryptography, Symmetric Data Encryption with Private Key, DES, Triple DES, AES. Public Key Cryptography-RSA, Diffie-Hellman Key Exchange, Public Key Certification, Digital Signature.

Module 3 (11 hours)

E-Payment Systems, Credit Card Payment, SET Protocol, Electronic Funds Transfer ,Electronic Cheque Payment, Electronic Cash, Payment Gateways, Mobile Payment Methods, Mobile Banking

Module 4 (12 hours)

Credit Card Fraud Detection – Defining the Problem, Traditional Approaches, Recent Advances, Computational Intelligence Techniques in Credit Card Fraud Detection (CCFD),Two Stage CCFD using Sequence Alignment, BLAST-SAHA Hybridization in CCFD,CCFD using Dempster-Shafer theory and Bayesian Inferencing.

Module 5 (11 hours)

E-Commerce of Multimedia - Ebooks, Music, Videos. Intellectual Property Issues, Information Technology Act 2000-Objectives, Highlights, Shortcomings, 2008 Amendments

References:

1. E-Commerce – An Indian Perspective, Second Edition, P. T. Joseph, S.J., Prentice Hall India Eastern Economy Edition, 2006
2. E-Commerce – Business, Technology, Society, Fourth Edition, K. C. Laudon and C. G. Traver, Pearson Education, 2008
3. Essentials of E-Commerce Technology, V. Rajaraman, Prentice Hall India Eastern Economy Edition, 2010

IT010 805G05 NEURAL NETWORKS
(Common to CS010 805G02 Neural networks)

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

To understand the fundamental building blocks of Neural networks

Module 1 (14 hours)

Biological Neurons and Neural Networks, Basic Structures and Properties of Artificial Neural Networks, Basic Neuron Models-McCulloch-Pitts -Nearest Neighbour- Radial Basis Function, Activation Functions ,Singe Layer Perceptrons-Linear Seperability, Learning and Generalization in Single Layer Perceptron-Hebbian Learning-Gradient Descent Learning-Widrow-Hoff Learning-The Generalized Delta rule, Practical Considerations

Module 2 (12 hours)

Multi Layer Perceptron Learning,Back Propogation Algorithim -Applications – Limitations– Network Paralysis – Local Minima – Temporal Instability, Pattern Analysis Tasks- Classification- Regression- Clustering, Pattern Classification and Regression using Multilayer Perceptron.

Module 3 (10 hours)

Radial Basis Function Networks: Fundamentals, Algorithms and Applications, Learning with Momentum, Conjugate Gradient Learning, Bias and Variance. Under-Fitting and Over-Fitting, Stochastic neural networks, Boltzmann machine.

Module 4 (12 hours)

Network based on competition:- Fixed weight competitive Network-Maxnet, Mexican Hat and Hamming Net, Counter Propagation Networks- Kohonen's self-organizing map – Training the Kohonen layer – Training the Grossberg layer – Full counter propagation network – Application, Adaptive resonance theory – classification- Architecture – Learning and generalization.

Module 5 (12 hours)

Pattern Association: - training algorithm for pattern association - Hetro Associative Network, Auto Associative Network, Architecture of Hopfield nets – stability analysis ,General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM training algorithms.

References

1. B. Yegnanarayana, "Artificial Neural Networks", PHI.
2. Simon Haykin, Neural Networks, 2/e, Prentice Hall
3. Neural Computing & Practice – Philip D. Wasserman
4. Neural Networks in Computer Intelligence-Limin Fu,Tata Mc.Hill Edition

IT010 805G06 SOFT COMPUTING

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To give the students an overall knowledge of soft computing theories and Fundamentals*
- *Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms.*
- *Use of ANN, Fuzzy sets to solve hard real-world problems*
- *To given an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems*

Module 1 (14 hours)

Introduction to Soft Computing Models: Artificial Neural Networks- Defiintion, Advantages, ANN Terminologies- Weights, Biasing, Threshold, Learning Rate- Learning methods- Supervised and Unsupervised Learning

Different ANN Models- Perceptron Networks- Single Layer and Multilayer Perceptrons - Perceptron Learning Rule , Back Propagation Networks- Architecture - Back Propagation Learning Algorithm.

Module 2 (12 hours)

Advanced ANN Models:- Associative Memory Networks- Architecture- Training Algorithm, Counter Propagation Networks- Architecture, Training Algorithm, Adaptive Resonance Theory Network-Architecture-Training, Hopfield Networks , Bidirectional Assocative Networks(Architecture only).

Module 3 (10 hours)

Fuzzy Systems:- Crisp Sets and Fuzzy sets- Operations on Crisp Sets and Fuzzy Sets- Crisp and Fuzzy Relations- Member Function- Features ,Defuzzification- Lamda Cut for Fuzzy sets and Fuzzy Relations-Defuzzification methods(Centroid Method and Weighted Average Method).

Module 4 (12 hours)

Fuzzy Systems Application:- Fuzzy systems and Neural Networks- Fuzzy Neural networks- Fuzzy Clustering-Fuzzy Pattern Recognition- Fuzzy Image Processing- Fuzzy Data bases- fuzzy Information retrieval.

Module 5 (12 hours)

Genetic Algorithms:- Genetic Algorithm vs. Traditional Algorithm, Basic Terminology of Genetic Algorithm- Individuals- Genes- Fitness- Populations, General Genetic Algorithm- Operators in Genetic Algorithms- Encoding, Selection, Mutation, Crossover (Basic idea only) –Problem Solving using Genetic Algorithm- Maximising a Function, Advantages and Disadvantages of Genetic Algorithms, Applications

References

1. S.N. Sivanandan, S.N. Deepa- Principles of Soft Computing Second Edition – Wiley Publications
2. Simon Haykin- Artificial Neural Networks- Person Education
3. B.Yegnanarayana- Artificial Neural Networks- Prentice Hall of India.
4. T.J. Ross,Fuzzy Logic with Engineering applications-TMH
5. G.J. Klir and B.Yuan,Fuzzy Sets and Fuzzy Logic:- Theory and Applications- Prentice Hall of India.

IT010 806 WEB APPLICATIONS LAB

Teaching scheme
3 hours practical per week

Credits: 2

1. Implementing and deploying web applications using Servlets, HTML and JSPs.
2. Testing the applications on an Application Server.
3. Debugging Web applications locally and remotely.
4. Developing applications in a team environment.
5. Retrieval of data from database using SQL and exchange of information in XML format.

IT010 807 Project Work

Teaching scheme **credits: 4**

6 hours practical per week

The progress in the project work is to be presented by the middle of eighth semester before the evaluation committee. By this time, the students will be in a position to publish a paper in international/ national journals/conferences. The EC can accept, accept with modification, and request a resubmission.

The progress of project work is found unsatisfactory by the EC during the middle of the eighth semester presentation, such students has to present again to the EC at the end of the semester and if it is also found unsatisfactory an extension of the project work can be given to the students.

Project report: To be prepared in proper format decided by the concerned department. The report shall record all aspects of the work, highlighting all the problems faced and the approach/method employed to solve such problems. Members of a project group shall prepare and submit **separate** reports. Report of each member shall give details of the work carried out by him/her, and only summarise other members' work.

The student's sessional marks for project will be out of 100, in which 60 marks will be based on day to day performance assessed by the guide. Balance 40 marks will be awarded based on the presentation of the project by the students before an evaluation committee.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.

IT010 808 Viva -Voce

Teaching scheme **credits: 2**

A comprehensive oral Viva-voce examination will be conducted to assess the student's intellectual achievement, depth of understanding in the specified field of engineering and papers published / accepted for publication etc. At the time of viva-voce, certified bound reports of seminar and project work are to be presented for evaluation. The certified bound report(s) of educational tour/industrial training/ industrial visit shall also be brought during the final Viva-Voce.

An internal and external examiner is appointed by the University for the Conduct of viva voce University examination.

For Viva-voce, the minimum for a pass shall be 50% of the total marks assigned to the Viva-voce.

Note: If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this 'Save a Semester examination' within one week after the publication of eighth semester results.