

**Post Graduate Department of Computer Sciences,
The University of Kashmir,
Srinagar - 190006**



**Proposed Curriculum
for**

**Master of Computer Applications
(MCA) Programme
2011 – 2013**

Structure of Curriculum

1st Semester

- i. 100* Computer Fundamentals and Applications
- ii. 101 Microprocessor , ALP and its Applications
- iii. 102 Technical Communication
- iv. 103 Advanced Programming Concepts in C / C++
- v. 104 Advanced Database Management Systems
- vi. 105 Discrete Mathematics
- vii. 106 Lab for 103
- viii. 107 Lab for 101/104

* Course No. 100 is Compulsory for those students who have not studied computer fundamentals in their Bachelor's Degree, however the marks scored will not be accounted for totaling purposes.

2nd Semester

- i. 201 Advance Computer Systems
- ii. 202 Data and File Structures
- iii. 203 Numerical and Statistical Computing
- iv. 204 Design and Analysis of Algorithms
- v. 205 Advanced Data Communication
- vi. 206 Lab for 202
- vii. 207 Lab for 203

3rd Semester

- i. 301 Advanced Operating Systems
- ii. 302 Optimization Techniques
- iii. 303 Computer Graphics
- iv. 304 Computer Networks , Protocols and Programming
- v. 305 Software Engineering & Management
- vi. 306 Lab for 303
- vii. 307 Lab for 304

4th Semester

- i. 401 Organization Behaviour and Personal Management
- ii. 402 Object Oriented Modeling Analysis and Design
- iii. 403 Data Warehousing and Data Mining
- iv. 404 System Software Design
- v. Elective I
- vi. 406 Lab for 403/Elective I
- vii. 407 Lab for 404

Elective's for 4th Semester

- viii. 408 Windows Programming using C#
- ix. 409 Pervasive Computing
- x. 410 Programming Language Paradigm
- xi. 411 Management Information Systems
- xii. 412 Theory of Computation & Formal Languages
- xiii. 413 Advanced Unix/Linux Programming

5th Semester

- i. 501 Java Programming
- ii. 502 Modeling & Simulation
- viii. 503 Artificial Intelligence & Neural Networks
- iii. 504 Web Programming
- iv. Elective II
- v. 506 Lab for 501/502
- vi. 507 Lab for 504

Elective's for 5th Semester

- vii. 508 Wireless and Mobile Communication
- viii. 509 Bio-Informatics
- ix. 510 Digital Image Processing
- x. 511 Quality Assurance and Testing
- xi. 512 Design & Development of Embedded Systems
- xii. 513 Network Security & Cryptography

6th Semester

- i. Project seminar
- ii. Project Work with Dissertation

Note : This revised syllabus shall be implemented from the academic session 2011 as follows :-

- **1st and 2nd Semester** - **Academic Session 2011**
- **3rd and 4th Semester** - **Academic Session 2012**
- **5th and 6th Semester** - **Academic Session 2013**

Semester - I

Course No: 100

Course Title: Computer Fundamentals and Applications

Unit-I

Generations of Computers, PC Family of Computers, Different I/O devices; Introduction to Operating System, Overview of Different Operating Systems, Functions of Operating System; Fundamentals of Disk Operating System (DOS), Understanding DOS prompt, Working with DOS commands, Config.sys and Autoexec.bat files.

Unit II

Introduction to Windows, Working with Accessories (Notepad, WordPad and Paint); Personalizing Windows, Installing and Removing Applications; Boot Options & Concept of Registry.

Unit III

Introduction to Office Tools: Word Processing, Advantages of Word Processing, Fundamentals of MS-Word, Working with Menus and Toolbars, Introduction to Macros. Overview of Excel, Working with Cells, Creating Worksheets, Working with Formulae Bar. Introduction to PowerPoint, Creating and Designing Slides, Working with Hyperlinks & Animation.

Unit IV

PC Management: Disc Management Tools, PC tools, Norton utilities, Disk Doctor; Introduction to Computer Security, Viruses, Virus Detection, Prevention & Cure Utilities. Using Internet: Shared Folders; Browsers, E-Mails, Attachments; Search Engines,

Suggested Readings:

1. **Taxali**, PC Software, 2005, **Tata McGraw Hills, New Delhi.**
2. **Suresh K. Basandra** , Computers Today, 2005, **Galgotia Publications.**
3. **P. K. Sinha** , Computer Fundamentals,2005, **BPB, New Delhi.**
4. **Peter Norton**, **Inside the PC, 2001, SAMS Tech Media.**
5. **Sanjay Saxena**, **MS Office for Everyone, 2005, Vikas Publications.**
6. **Peter Dyson**, Understanding PC Tools, **AET Publications.**
7. **Peter Dyson**, Understanding Norton Utilities, **AET Publications.**

Course No: 101

Course Title : Microprocessor , ALP and its applications.

Unit I

IBM-compatible Personal Computer , Re-programmable. Microcomputers, General Architecture of Micro-computer, System Evaluation of Intel Microprocessor Architecture , Software Model of 8088 / 8086 Microprocessor , Memory Add. Space and Data Organization, Data Types, Segment Registers, Memory Segmentation Dedicated, reserved and General use of Memory, generating an Memory Address, Pin-out diagram of 8086 Microprocessor.

Unit II

The Microcomputer Organization, Assembly Language Programming Development on PC, Instruction Set, Addressing Modes, 8086 Instruction set, Using Trace & Go Commands. Integer Instructions and Computations, Data Transfer, Arithmetic, Logic Shift, Rotate Instruction, Flag Control, Compare, Control Flow & Jump, Subroutine & Subroutine Handling Instructions, Loop & Loop Handling, String & String Handling Instructions. Statement Syntax for a source Program, Assembler Directives, Assembling, Linking, Loading & executing a run Module.

Unit III

Core-Special purpose I / O Interfaces, Byte-only Input / Output ports using Isolated I / O, Input / Output handshaking & Parallel Printer Interfaces, Memory Mapped I/O, DMA Controller, Serial Communication Interface, Programming Communication Interfaces Controller. Interfacing I/O devices to microprocessor, programmable peripheral interface, programmable interrupt controller, Development of Monitor program. Sensors and transducers, analogue signal processing, multiplexes and demultiplexers, sample-and-hold circuits, ACD and DAC devices

Unit IV

Interrupt, Mechanism, Types & Priority, Interrupt Vector table, Interrupt Instruction, Enabling/Disabling of Interrupts, External Hardware-Interrupt Interface Signals/Interrupt Sequence. Software Interrupts, Non-Maskable Interrupts, Reset, Internal Interrupt, Real Mode.

8086 / 8088 Microprocessors & their I/P & O/P Interfaces, 8086 / 8088 Microprocessor's Minimum Mode, Maximum Mode Systems and Interface Signals, Electrical Characteristics, System Clock, Bus Cycle & Unit States, Hardware Organization of the memory address space, Address Bus Codes, Memory Control Signals, Read & Write Bus Cycles, Memory Interface Circuits, Transfers Types of I/O, Isolated I/O interfaces, I/O Data Transfers & Instruction, I/O Bus Cycles.

Reference Books:

1. DOUGLAS HALL "Microprocessors and Interfacing" Tata McGrawHill.
2. LIU, GIBSON et al "Microcomputer system The 8086/8088 Family" PHI.
3. PAL CHAUDHURI "Computer Organization and Designing" PHI.
4. MORRIS MANO "Computer System Architecture" Pearson Education.
5. GILMORE "Microprocessors" Wiley/ Tata McGraw Hill.

Course No: – 102

Course Title: Technical Communication

Unit I

Basics of Technical Communication, Barriers to Communication, Technology in Communication. Communicating in the Workplace: Problem Solving in Workplace Communication, Guidelines for writing with a computer, Human factors in the communication failure, , Solving the persuasion problem. Guidelines for ethical communication. Guidelines for organizing a collaborative team , Peer reviewing and editing.

Unit II

Active Listening : Introduction , types of listening, Traits of a good listener , Active versus Passive listening , Implications of a good listening .Introduction to Effective Presentation strategies , Defining purpose , analyzing audience and locale , organizing contents , preparing outline , visual aids , understanding nuances of delivery ,kinesics , proxemics , paralinguistics ,chronemics ,sample speech. Interviews : introduction , Objectives , types of interviews , Job interviews . Group Communication : Introduction , Group discussion , Organizational Group discussions , meetings conferences

Unit III

Words and Phrases , Dictionary and Thesaurus , Elements of style , Sentence construction , guidelines for effectiveness, Paragraph development , Central components of a paragraph , length and techniques for paragraph development. The art of condensation , steps for effective précis writing , samples and guidelines , Reading comprehension , purpose and reading rate , reading comprehension, reasons for poor comprehension, improving comprehension skills , techniques for good comprehension.

Unit IV

Visual Design and usability elements ,Designing Pages and Documents, Adding a document supplements, testing the usability of your document. Memo reports and Electronic Mail : Purpose of memo reports , Elements of a usable memo Interpersonal considerations in writing a Memo , Common types of memo report. E-mail , Guidelines for using electronic mail, Letters and Employment correspondence , How applicants are screened for personal qualities , electronic job hunting , guidelines for surviving a job interview , Technical definitions : Purpose , level of detail , expansion methods , Purpose and general model of Technical description ,Elements of usable description .Procedure and processes , Proposal and analytical reports, Recording and documenting research findings.

Reference Books:

1. Meenakshi Raman and Sangeeta Sharma, “Technical Communication”, Oxford University Press
2. William Pfeiffer , Padmaja ”Technical Communication A Practical Approach” , Pearson Education.

Course No: – 103

Course Title: Advanced Programming Concepts Using C / C++

Unit I

Arrays: Declaration; initialization; 2-dimensional and 3-dimensional array, passing array to function, strings and string functions, and character arrays.

Pointers: variables, swapping data, swapping address v/s data, misuse of address operators, pointers and arrays, pointers to pointers, strings, pointer arithmetic, additional operators, portability, pointers to functions, using pointers with arrays, void pointers.

Structures and unions: syntax and use, members, structures as function arguments, structure pointers, array of structures as arguments, passing array of structure members, call by reference.

Unit II:

Functions; prototype, passing parameters, storage classes, identifier visibility, Recursive functions. Command-line arguments. Scope rules, Multi-file programming, Introduction to macros.

File processing in C and C++.

Introduction to graphics, graphic initialization, graphic modes, drivers, basic drawing functions, Animations- concept and implementation, Building graphical user interface.

Unit III

Introduction to classes and objects; Constructor; destructor; Operator overloading; Function overloading; function overriding; friend function; copy constructor;

Inheritance: Single, Multiple, and Multilevel Inheritance;

Virtual function and Polymorphism: Dynamic binding, Static binding; Virtual functions; Pure virtual function; concrete implementation of virtual functions; Dynamic binding call mechanism; Implementation of polymorphism; virtual destructors.

Unit IV

Templates: Function Templates, Class Templates, Member Function Template and Template Arguments, Exception Handling, Standard Template Library

Reference Books:1.

1. FOSTER AND FOSTER “C by discovery” RRI penram.
2. YASHWANT KANETKAR “ Let us C ” PHI.
3. E. BALAGURUSWAMI “Programming in ANSI C” Tata McGraw Hill.
4. BJARNE STROUSTRUP “ The C++ programming language” Pearson Education.
5. HERBERT SCHILD “ C++ The complete Reference” Tata McGraw Hill.
6. ROBERT LAFORE “Object orientation with C++ Programming” Waite Group.

Course No: – 104
Course Title: Advanced Database Management Systems

Unit I

Elementary Database Concepts. Hierarchical, Relational, Network and OO Database Architectures and their comparison. Data Models : EER model and relationship to the OO model, Object Oriented data model and ODMG standard, Other data models – NIAM, GOOD, ORM. Query Optimisation: Query Execution Algorithms, Heuristics in Query Execution, Cost Estimation in Query Execution, Semantic Query Optimisation.

Unit II

Transaction Processing Concepts, Transaction and System Concepts, Desirable Properties of a Transaction, Schedules and Recoverability, Serializability of Schedules, Transaction Support in SQL, Recovery Techniques, Database Backup, Concurrency control, Locking techniques for Concurrency Control, Concurrency Control Techniques, Granularity of Data Items.

Unit III

Client Server Concepts, 2-Tier and 3-Tier Client Server Systems, Client/Server Architecture and the Internet, Client /Database Server Models, Technology Components of Client Server Systems, Application Development in Client Server Systems. Distributed Databases: Reliability and Commit protocols, Fragmentation and Distribution, View Integration, Distributed database design, Distributed algorithms for data management, Heterogeneous and Federated Database Systems.

Unit IV

Deductive Databases: Recursive Queries, Basic inference Mechanism for Logic Programs, Deductive Database Systems, Deductive Object Oriented Database Systems. Commercial and Research Prototypes: Parallel database, Multimedia database, Mobile database, Digital libraries, Temporal database.

Text Book: Fundamentals of Database Systems (3 edition), Elmasri R. and Navathe S.B., 2000, Addison Wesley, Low Priced Edition.

Reference Books:

1. William Page, "Using Oracle 8i – Special Edition", Que/PHI.
2. Ivan Bayross, "SQL & PL/SQL Using Oracle 8i & 9i with SQLJ", BPB.
3. Desai.B , "An introduction to Database Concepts", Galgotia Publications, N.Delhi
4. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGraw-Hill, International Edition.
5. Dates.C , " An introduction to Database Systems", Pearson Education, Asia.

Course No: 105
Course Title : Discrete Mathematics

UNIT I

Proposition, Logic, Truth tables, Propositional Equivalence, Logical Equivalence, Predicates and Quantifiers, Sets: operations on sets, Computer representation of sets, Functions: Domain, Range, One-to-One, Onto, Inverses and Composition, Cardinality of a Set, sequences and summations, The growth of functions . Methods of Proof: Different methods of proof, Direct Proof, Indirect Proof, Mathematical Induction for proving algorithms.

UNIT II

Counting: Basic Counting Principle, The Pigeon-Hole Principle, Permutation, combinations, repetitions, discrete probability, Advanced Counting Techniques: Inclusion-Exclusion, Applications of inclusion-exclusion principle, recurrence relations, solving recurrence relation. Relations: Relations and their properties, Binary Relations, Equivalence relations, Digraphs, Matrix representation of relations and digraphs, Computer representation of relations and digraphs, Transitive Closures, Warshall's Algorithm.

UNIT III

Partially Ordered Sets (Posets), External elements of partially ordered sets, Hasse diagram of partially ordered set, isomorphic ordered set ,Lattices: Properties of Lattices, complemented Lattices.

Graph theory: Introduction to graphs, Graph Terminology, Multigraphs and Weighted graphs, Representing Graphs, Connectivity of Graphs: Paths and Circuits, Eulerian and Hamiltonian Paths, Matrix representation of graphs.Graph Coloring.

UNIT IV

Trees: Rooted trees, Application of trees: Binary Search Trees, Decision Trees, Prefix Codes, Tree traversal, trees and sorting, spanning trees, minimal spanning trees.

Finite Boolean algebra, Functions on Boolean algebra, Boolean functions as Boolean polynomials. Groups and applications: Monoids, semigroups, Product and quotients of algebraic structures, Isomorphism, homomorphism , automorphism, Normal subgroups ,Codes and group codes.

TextBook :

KENNETH H. ROSEN "Discrete Mathematics and Its Applications" The Random House/Birkhauser Mathematics series

Reference Books:

1. LIU "Elements of Discrete Mathematics " Tata McGraw Hill
2. SCHAUMS "Discrete Mathematics " Tata McGraw Hill
3. KOLMAN/REHMAN "Discrete Mathematical Structures " Pearson Education
4. NICODEMI "Discrete Mathematics " CBS

Semester - II

Course No: 201

Course Title: Advanced Computer Systems

Unit I

Computational Models : Introduction , Interpretation of the concept of a computational model , Relationship between , the concepts of computational model , programming language and architecture , Basic Computational models , The Von , Neumann computational model ,Key concepts related to computational models , Granularity , typing . The concept of computer architecture : Evolution and interpretation of the concept of Computer Architecture at different levels of abstraction. The concept of computer architecture at multilevel hierarchical framework. Extensions , Description of Computer Architectures.

Unit II

Introduction to Parallel Processing , : Basic Concepts about program , process, thread , process and threads in languages , concurrent and parallel execution , concurrent and parallel programming languages, Types and levels of Parallelism , Classification of Parallel architectures , Basic Parallel Techniques , Relationship between languages and parallel architectures . Introduction to Instruction level Parallel Processors , Evolution and overview , dependencies , instruction scheduling , preserving sequential consistency , the speedup potential of ILP Processing , Pipelined Processors , Basic Concepts , Design space of Pipelines , Pipelined instruction Processing , Pipelined execution of integer and Boolean instructions , Pipelined Processing of loads and stores.

Unit III

VLIW , Basic Principles ,Overview of Proposed and Commercial VLIW , Superscalar processing , introduction , parallel decoding , superscalar instruction issue , shelving , register renaming , parallel execution , preserving the sequential consistency of instruction execution and exception processing ,Implementation of superscalar CISC processor using a superscalar RISC core. Processing of control transfer instructions. The branch problem ,basic approaches . Guarded exception. Code Scheduling of ILP.

Unit IV

Introduction to data-[parallel architectures , connectivity , SIMD Architecture , fine and coarse grained SIMD architectures , Associative and neural architectures ,Data Parallel pipelined and systolic architectures , vector architectures , Introduction to MIMD architectures , Multi threaded architectures , Distributed Memory MIMD architecture , Shared memory MIMD architectures..

Text Book : Advanced Computer Architecture DEZSO SIMA , TERENCE Mountain , PETER KACSUK , Pearson Education, Fifth Indian reprint 2004.

Reference Books :

V.C. Hamacher. A.G. Vranesic and S. G. Zaky: “Computer Organization”, Tata McGraw Hill.

J.P. Hayes: “Computer Architecture and Organization”, McGraw Hill.

Morris Mano: “Computer System Architecture”, Pearson Education ,3/e.

Course No.: -202
Course Title: Data & File Structures

Unit I

Introduction: Introduction to Data Structure; Primitive and non-primitive data structure; Linear and non-linear data structure; Recursion Function and its examples. String Manipulation, String Matching Techniques & Applications; Markov theorem and its applications; Sparse array and its implementation.

Unit II

Concept of Stack and Queue. Singly and Doubly-Linked Lists, Circular Linked List, their implementation and comparison. Array based and Linked List based Implementation of stack and Queues and their applications.

Unit III

Searching: Sequential and Binary Search on Array-based ordered lists and their time; complexity; Concept of Hash Functions, Hash-tables and Hashing with Chaining. Sorting Techniques: Insertion Sort, Selection Sort, Quick Sort, Heap Sort. External Sorting: k-Way Merge Strategy. File Structure: Sequential Files, Indexed Files, Direct Files.

Unit IV

Binary Trees, their implementation and traversal. Binary Search Trees: Searching, Insertion and Deletion of nodes. Height Balance and Concept of AVL Trees. Concept and purpose of B-Trees.

Graphs: Definition, Terminology and representation using Adjacency Matrix and linked list. Shortest Path Algorithms and their implementation. Graph Traversals: BFS and DFS Algorithms and their Implementations.

Reference Books:

1. Tremblay and Sorenson: "An Introduction to Data Structures with Applications" McGraw Hill, New Delhi, 1976.
2. Horowitz and Sahni: "Fundamentals of Data Structures" Golgotia Publication, 2001.
3. Michael J.Folk et al "File Structure an Object Oriented Approach with C++", 3/e , Pearson Education
4. Tenenbaun M., "Data Structures Using C And C++", Pearson Education.
5. .Baluja G. S. , "Data Structures Through C++", Dhanpat Rai & Co.

Course No. 203
Course Title: Numerical and Statistical Computing

UNIT I

FORTRAN Programming: Introduction, Basic Elements, Input / Output. Assignment, Control Statements, Format Statements, Type Declaration Statement. Functions and Subroutine in FORTRAN, Common and Equivalent Statements, File Processing Statements.

UNIT II

Introduction. Requirements for computer-oriented solutions to numerical problems. Approximations & Errors – Types of Programming Errors, Computer & Arithmetic Errors, Accuracy and Precision, Round Off and Truncation Errors. Use of FORTRAN as a language for computer-based numerical problem-solving. Algorithms to Compute Roots of Equation – Methods of Tabulation or Brute Force Method, Method of Bisection, The Secant Method, Newton-Raphson Method, Method for False Position. Programmatic Implementations of these methods.

UNIT III

Algorithms to Solve Linear Algebraic Equations : Gauss Elimination, Gauss Jordan, Gauss Seidel, L.U. Decomposition. Algorithms for Curve Fitting: Least Square Approximation, Lagrange Interpolated Polynomial, Newton Divided Differences Interpolating Polynomial. Programmatic Implementations.

UNIT IV

Algorithms to solve Ordinary Differential Equations – Euler Method and Modification. The trapezoidal Rule, Simpson's Rule. R-K Method. Programmatic Implementations.

REFERENCE BOOKS:

1. S.C.Chapra & R.P.Canale : “Numerical methods for Engineering”. Tata McGraw Hill.
2. Krishenmurty and Sen : “Numerical Algorithms”
3. V. Rajaraman “ Computer oriented numerical methods.” Prentice Hall of India.
4. McCalla, Thomas Richard: “Introduction to Numerical Methods and FORTRAN Programming”, John Wiley & Sons, Inc.
5. Grewal, B. S.: “Higher Engineering Mathematics”, Hindustan Offset Problems Series.
6. “SCHAUM’S Solved Problems Series”.
7. Sharma ,K. D.,:“Programming in Fortran”.
8. Jain, M. K., Iyengav, S. R. K., Jain, R. K.: “Numerical Methods for Scientific and Engineering Computation”+, Wiley Eastern Ltd, New Delhi.

Course No.: – 204

Course Title: Design and Analysis of Algorithms

Unit I

Algorithms, Pseudo-code Conventions , Analysis of Algorithms, Designing Algorithms , Growth of Functions , Asymptotic notations , Some operations on O-notation. Maximum Rule , Data Analysis and Visualization , Summations , Recurrences , Substitution method , Iteration method , Recursion trees , The Master Method . Time and Space Complexity, Trade off, , Review of stack, Queues, trees , dictionaries Heap , Property and Heapsort, Hashing, graphs.

Unit II

Randomized Algorithms : Description ,Identifying the repeated element , primality testing ,Advantages and Disadvantages. Divide and Conquer, General method, Binary search, Max and Min, Merge sort, Quick sort. Greedy Method, General method, Optimal storage on tapes, Knapsack problem, Job sequencing, Optimal merge pattern, Single source shortest paths.

Unit III

Dynamic programming, General methods, Multistage graphs, All pair shortest paths, Traveling salesman problems. Backtracking, General method, 8-Queen problem, Generalized Algorithm for N-Queen Problem, Sum of subsets, Knapsack problem. Branch and Bound, General method, Basic Concepts of BFS and DFS, Least Cost Branch and Bound, 8_Queen Problem, Traveling salesperson problem.

Unit IV

Lower boundary theory , comparison trees for sorting and searching. Oracles and adversary arguments , Lower bound theory through reductions , P and NP problems. NP hard and NP complete problems _ basic concepts. Need for developing approximate algorithms. Approximate Algorithms , The vertex cover Problem , The traveling salesman problem , The set veering problem , The subset sum problem. Parallel Algorithms. Parallel Computation Model. Parallelism_ PRAM and other Models. Effect on Parallelism on Efficiency. Illustrations of problems suitable for Parallel Implementation.

Reference Books:

1. Brassard and Bratley, “Fundamentals of Algorithms”, Pearson Education .
2. Sedgewick, “ Algorithms in C”, Pearson Education.
3. Baase “Computer Algorithms”, Introduction to Design and Analysis”, 3rd Ed, Pearson Horowitz, Sahni, “ Fundamentals of Computer Algorithms”, Galgotia Publications
4. Coremen, Leiserson, Rivest,Stein, “Introduction to Algorithms”, Second Edition, PHI.
5. Aho, Hopcroft and Ullman, “ The Design and Analysis of Computer Algorithms”, Pearson.

Course No: 205

Course Title : Advanced Data Communication

Unit I

Bandwidth and Channel Capacity. Quantifying Channel Capacity for noiseless channel(Nyquist Law) and noisy channel(Shannon's Law). Example of a digital telephone system to explain basic concepts of analog signals, digital signals, sampling. Data Rate versus Baud Rate. Nyquist Criterion for Sampling. Data transmission concepts. Characteristics of signals(amplitude, frequency, period,wavelength, Signal-to-Noise ratio). Key components in data communications systems. Simplified model. Local area network(LAN) concepts and characteristics.

Unit II

Wide area networks(WANs). WAN technologies (traditional packet and circuit switching, Frame Relay, ATM). ISDN(narrowband) concepts and services. Overview of the OSI model. Transmission media – factors affecting distance and data rate. Guided transmission media: Twisted-Pair, Co-axial Cable. Principles and advantages of optical networks. Types of optical fibers and lasers.

Unit III

Unguided transmission media: Terrestrial Microwave & Satellite Microwave systems and applications. Data encoding. Difference between modulation and encoding. NRZ-L, NRZ-I encoding. Multilevel Binary and Biphase Coding techniques and their implementations. ASK,FSK,PSK and QPSK. PCM concepts: sampling, quantization. Delta Modulation. Amplitude Modulation.

Unit IV

Reliable transmission of data: Asynchronous and Synchronous transmission. Error detection: Parity-based, CRC-based. FCS computation. Error control and recovery techniques. Concept of ARQ standard and its versions. Concept of Multiplexing. FDM. Synchronous and Statistical TDM.

Reference Books:

- 1.William Stallings, "Data and Computer Communications", Pearson Education
- 2.Andrew Tanenbaum, "Computer Networks", Pearson Education 4/e.
3. Ulysses Black, "Principles of Data Communications ", PHI.
4. Morley, Gelber, "The Emerging Digital Future", Addison-Wesley.

Semester - III

Course No: 301
Course Title : Advanced Operating Systems

Unit I

Introduction to Distributed Systems: Goals – Advantages of distributed systems over centralized systems – disadvantages of distributed systems, Hardware & Software Concepts, loosely coupled systems, network operating systems, Network file systems, design Issues –transparency – Flexibility – performance – scalability.

Network and protocols: An introduction to Computer networking , Network technologies , LAN,WAN, Protocols, Technology case study, ATM, The Client – Server Model

Unit II

Remote Procedure Calling: Introduction , Features of RPC, User package, Design issues, Classes of RPC system , Interface definition language, exception handling, delivery guarantees, implementation , interface processing , binding, Locating the binder, RPC in Unix system, Synchronization in Distributed systems: Clock synchronization, Logical Clocks, Physical Clocks, Clock synchronization algorithms, Mutual exclusion, A centralized algorithms,

Unit III

A distributed algorithms, A token ring algorithms, comparison of the three algorithms, Election algorithms, The Bully algorithms, Ring algorithms, Dead Locks in distributed systems, Distributed deadlock detection. Process and Processors in distributed systems: Threads, Introduction, Usage, Design issues for thread packages, An example for thread packages, System models, The workstation model, The processor pool model, The hybrid model , Processor allocation, Allocation models, Design issues, Implementation issues.

Unit IV

Distributed File and Directory Services: Distributed file service requirements, File service components , Flat file service , Directory Service, Client module, Design issues, implementation techniques. Distributed shared memory Introduction: Shared memory, Consistency models, Page based Distributed shared memory, Shared – variable Distributed shared memory, Object based Distributed Shared Memory.

Text Book: Distributed Operating systems, Andrew s.Tanenbanm

Reference Books:

1. Advanced Concepts in Operating Systems, Singhal and Niranjana G.Shivaratna
2. Dietel, H.M. “An introduction to operating system” Pearson Education, 2/e.
3. Milenkovic. M. “An Operating System – Concepts & Design”. McGraw Hill International Education Computer science series 1992.
4. Peterson. J.L.Abharam Silberschatz. “Operating System Concepts”. John wiley ,1989.

Course No: 302
Course Title: Optimization Techniques

Unit I

Linear Programming Problem (LPP): Formulating LPPs, Simplex Algorithm, Big-M Method, Two-Phase Method, Sensitivity Problems. Duality in LPP: Duality Theorems, Dual Simplex Method

Unit II

Transportation Problems: Mathematical Formulation of Transportation problem, Methods of selecting initial basic feasible solution: Matrix minima method, North-West Corner Rule, Vogel's Approximation Method; Unbalanced Transportation Problem; Degeneracy in Transportation Problem and its resolution through MODI Method(U-V Method). Assignment problems: Algorithm, Unbalanced Assignment Problem, Hungarian Method

Unit III

Inventory Models: Inventory problems and their analytical structures, deterministic economical lot size model, Stochastic and deterministic order level system. Game theory: Definition and Terminologies; Pure Strategy: saddle point, Game with two saddle points; Mixed strategies: games without saddle points, $2 \times n$ games, Dominance Property.

Unit IV

Replacement Theory: Replacement of items that fail completely, Replacement of items that deteriorate with time. Sequencing models: Sequencing of n jobs on two machines and three machines with no passing. CPM- Determination of critical tasks. PERT- probability of completing the project on schedule.

Reference Books:

1. S.S. Raw," Optimization Methodologies".
2. H.A.TAHA," Operations Research". Pearson Education
3. S.D. Sharma," Operations Research & Optimization".
4. Kanti Swaroop, " Operations Research and Applications

Course No: – 303

Course Title: Computer Graphics

Unit I

Introduction to Computer Graphics. Applications of Computer Graphics. Graphic Display Devices_ Raster, Refresh, Random. Display Processor, Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Color Display Shadow Masking and Beam Penetration, Use of Lookup tables.. Graphics Input and Output Devices_ Description and Applications. Graphic Kernel System, Introduction to GKS, GKS primitives.

Unit II

2-D Graphics. Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bressenham's and DDA). Circle and Ellipse Drawing Algorithms. 2-Dimensional Transformations. Concepts of Window & Viewport, Window to Viewport Transformations. Filling, Boundary and Floodfill algorithms.

Unit III:

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm, Liang Barsky Algorithm) ,3-D Graphics, Projections: perspective and parallel projection transformations. 3-Dimensional Transformations. Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection. Scan Line Algorithm, Area-Coherence Algorithm.

Unit IV

Curves and Surfaces, Splines, Spline specification, Interpolated & Approximated Splines. Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. B-Splines curves and surfaces. Fractals - Fractal Generation Procedure.

Text Book : Hearn and Baker “ Computer Graphics” 2nd Edition , Pearson Education.

Reference Books

1. W.M.Newman and Sproull. “Principles of interactive Computer Graphics” ,TMH
2. Steven Harrington.” Computer Graphics a Programming Approach” McGraw Hill.
3. Plastock and Kelley. “Schaums outline of theory and problems of computer Graphics”
4. David F Rogers and J Alan Adams. “Procedural Elements of Computer Graphics” McGraw Hill
5. David F Rogers and J Alan Adams. “Mathematical Elements of Computer Graphics” McGraw Hill
6. James. D. Foley, A Vandam etal “Computer Graphics” Pearson.

Course No: 304

Course Title : Computer Networks – Protocols & Programming

Unit I

Goals and applications of networks. LAN, MAN & WAN architectures. Concept of WAN subnet. Overview of existing networks. OSI Reference Model Architecture, TCP/IP Model and their comparison.

Unit II

Internetworking concept and architectural model. Connection-oriented and connection-less approaches. Concept of Autonomous systems and Internetwork Routing. Classful IP addresses. Subnetting, IP Multicasting. Internet Protocol(IP) : connectionless delivery of datagrams(MTU, fragmentation, reassembly).

Unit III

Internet control protocols: ICMP, ARP and RARP. Routing algorithms: Interior(OSPF), Exterior(BGP). Transport Layer : UDP and TCP concepts. Socket API for Network Programming. Network Byte Ordering.

Unit IV

Client-Server application development using TCP & UDP sockets. Basic Server Architectures. Network Security: Firewalls and their components; Encryption techniques and examples of encryption standards.

Reference Books:

1. Andrew Tanenbaum, "Computer Networks", 4th Edition by Pearson.
2. Douglas Comer, "Internetworking with TCP/IP, Volume 1", Pearson.
3. W. Richard Stevens, "UNIX Network Programming", Pearson.
4. Maufer, "IP Fundamentals", Pearson.
5. Douglas Comer, "Client-Server Programming with TCP/IP, Volume 3", Pearson.

Course No: 305
Software Engineering & Management

Unit I

Concept of Software engineering, Evolving role of software, Concept of software, Software Characteristics, Software Components, Software Engineering Challenges (Scale, Quality Productivity, Consistency and Repeatability, Change), Software standard, Software Engineering approach. Software Process Models: Waterfall Model, Prototyping Model, Spiral Model, Incremental Model, Concurrent Development Model.

Unit II

Software Process and Project Metrics : Measures , Metrics and Indicators , Software measurement : Size -Oriented Metrics , Function - Oriented Metrics , Extended Function point metrics.Capability Maturity Model Integration (CMMI), Process Planning, Estimation, COCOMO Model, Risk Analysis & Management: Software risks, Risk identification, Risk monitoring and management.**Software requirements**: need for SRS, requirement process; Requirement specification (characteristics, components), Concept of Use Cases, Concept of validation

Unit III

Design Engineering: Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology; Object-Oriented Design, OO Concepts, Design Concepts, Design Methodology, Dynamic & Functional Modeling, Design Verification.

Unit IV

Software Quality Concepts: Quality, Quality control, Cost of quality; Software Quality Assurance (SQA), Formal approaches to SQA, Software Reliability: Measures of Reliability, Software safety, Quality Standards.Software Testing: Testing fundamentals, Black-Box Testing, White Box Testing, Regression Testing, Smoke Testing, Alpha Testing, Beta Testing, Recovery Testing, Security Testing, Stress testing, Performance testing.

Suggested Readings:

1. ROGER S. PRESSMAN - Software Engineering - A Practitioner's Approach, Sixth edition,
2. Pankaj Jalote - An Integrated approach to Software Engineering, 3rd edition, Narosa Publication.
3. Sommerville - Software Engineering. Pearson , 7/e , 2006.
4. Software Engineering SCHAUM'S Outlines, TMH.
5. JAMES F. PETERS Software Engineering – An Engineering Approach, Wiley& Sons

Semester - IV

Course No: 401

Course Title : Organization Behavior and Personal Management

Unit – I

Basic Concepts of Management, Definition, Need and Scope, Different schools of management – Behavioral Scientific System, Contingency.

Management theories by - F. W. Taylor, Henry Fayol and Elton Mayo.

Introduction to OB, significance of OB, Emerging challenges, Characteristics historical evolution and competencies of OB. Perception.

Unit - II

Individual Behavior: Managerial implications of Learning, Personality, Motivation and Job Stress. Managerial Skill and Functions - Level of Management- Functions of Management

Unit – III

Personality – Development of personality, Attributes of personality.

Leadership – Definition, Importance, qualities of leaders, types of leaders – autocratic, democratic.

Group Behavior: Group Dynamics and Team Behavior, Organizational Conflict, Communication, Leadership, Managerial Implications of Group Behavior.

Unit – IV

Organizational Behavior: Organizational Structure, Organizational Power and Politics.

Total Quality Management, Case Study.

Organizational Culture, Organizational Change and Development.

Recommended BOOKS :

1. Stephen Robbins, “Organizational Behavior”. Prentice Hall India Pvt. Ltd New Delhi.
2. Don Hellriegel, John Slocum, Richard Woodman, “Organizational Behavior” South-Western Thompson Learning.
3. Fred Luthans, “Organizational Behavior”. McGraw Hill Book Company.
4. Keith Davis, “Organizational Behavior”, Tata McGraw Hill Publishing Co. Ltd.
5. Ricky Griffin & Georgy Moorehead, “organizational Behavior”, Hongh Co. Boston.
6. Steven McShane & Van Glinar, “Organizational Behavior”, Tata McGraw Hill Publishing Co. Ltd.
- Stephen R. Covey, “The seven Habits of Highly Effective people”, Simon & Schuster.

Course No.: 402

Course Title: Object Oriented Modeling, Analysis & Design

Unit 1

OOAD – Introduction , Applying UML and Patterns in OOAD , Assigning Responsibilities , What is analysis and Design , An Example , The UML , Iterative Development –an Unified Process idea , Additional UP Best Practices and Concepts , The UP Phases and Schedule oriented Terms , The UP disciplines. Process Customization and the development case. The Agile UP. The Sequential Waterfall Lifecycle. Inception. Artifacts that may start in inception, Understanding requirements , types of requirements.

Unit 2

Use –case Model , Writing requirements in context , goals and stories , background , use cases and adding value , use cases and functional requirements , use case types and formats . Goal and scope of a use case , Finding primary actors , goals and use cases , writing use cases in an essential UI-free style , Actors , Use Case Diagrams , Use Cases within the UP , Case Study. Identifying other requirements. From inception to elaboration.

Unit 3

Use Case Model : Drawing System Sequence Diagrams. Example of an SSD. Inter System SSDs , SSDs and Use Cases , System Events and the System Boundary , Name System Events and Operations , Showing Use Case Text , SSDs within the UP. Domain Model : Visualizing Concepts , Domain Models , Conceptual Class Identification , Candidate Conceptual classes , Adding Associations , The UML association notation , NextGen POS Domain Model Associations , NextGen POS Domain Model , Adding Attributes , Non Primitive Data Type Classes , Adding Detail with Operation Contracts , Contract Sections , Post Conditions , Contracts , Operations and the UML. Operation Contracts within the UP.

Unit 4

From Requirements to Design , Interaction Diagram Notation , Sequence and Collaboration Diagrams , GRASP , Responsibilities and methods , interactions diagrams , Patterns , GRASP : Pattern of General Principles in Assigning Responsibilities , Information Expert , creator , Low Coupling , High Cohesion , Controller , Object Design and CRC Cards , Design Model : Use Case Realization with GRASP Patterns , Determining Visibility , Creating Design Class Diagrams , Mapping Design to Code. GRASP : More Patterns , Polymorphism , Pure Fabrication , Indirection , Protected Variations , GoF Design Patterns : Adapter , Factory , Singleton , Strategy , Façade , Observer / Publish-Subscribe / Delegation Event Model ,Relating Use Cases , Modeling Generalization , Refining the Domain Model , Adding New SSDs and Contracts , Modeling Behaviour in Statechart Diagrams , Designing Architecture with Patterns , Organizing the Design and Implementation Model Packages , Introduction to Architecture Analysis and the SAD.

Reference Books:

1. James Rumbaugh, “Object Oriented Models and Design” Pearson Education 2/e Harrington.”
2. C & Object Oriented Paradigm” John Viley & sons Publication
3. Ali Bahrani “Object Oriented Systems Development” McGraw -Hill 1999
4. Lafore Robert, “Object Oriented Programming in C++”, Galgotia Publications.
5. Balagurusami, E, “Object Oriented with C++”, Tata McGraw-Hill.

Course No: 403

Course Title: Data Warehousing and Data Mining.

Unit I

Data warehouse: Definitions, features, building blocks/ components, data marts, Meta data in data warehouse; Planning a data warehouse, The project team, project management considerations, Business requirements; data design, the architectural plan, Data storage specifications, Information delivery strategy.

Unit II

Architecture and Infrastructure: Concept of data warehouse architecture, operational infrastructure, physical infrastructure, hardware and operating systems, database software, tools.

The role of metadata, metadata types, metadata requirements.

Principles of dimensional modeling: Dimensional modeling basics, Use of CASE tools, The STAR schema, The Snowflake Schema.

Unit III

Data Extraction, Data Transformation, Data Loading.

Data Quality: Need, Data Quality Challenges, Data Quality Tools.

Information access and delivery, Information delivery tools.

Online Analytical Processing (OLAP): Features, functions, OLAP models, Implementation considerations, OLAP platforms, OLAP tools and products.

Unit IV

Introduction to Data Mining: definitions, Data mining techniques, applications.

Physical Design in data warehouse: Steps, Physical Design considerations, Physical storage.

RAID technology, estimating storage sizes, Indexing the data warehouse: B-Tree Index, Bitmapmed Index, Clustered Index

Performance Enhancement Techniques: Data Partitioning, Data Clustering, Parallel processing, data arrays.

Data warehouse deployment .

Text Book: Paulraj Pooniah , “ Data Warehousing Fundamentals “ Wiley

Reference:

Alex Berson , Stephen J. Smith “ Data Warehousing , Data Mining and OLAP , Tata McGraw Hill , 2004 Tenth reprint 2007.

Sam Anahory , Dennis Murray ,” Data Warehousing in the real world “ , Pearson Education

Course No.: 404
Course Title: System Software Design

Unit I

Introduction, Machine Structure , Evolution of the Components of programming system, assembler, loaders, macros, linkers, compilers, operating systems. Evolution of Operating Systems , Operating System User View Point , Functions , Batch Control Language , Facilities , General Machine Structure , General Approach to a New Machine , Machine Structure 360-370 : Memory , Registers , Data , Instructions , Special features, Machine Language. Assembly Language

Unit II

General Design Procedure , Assemblers, Design of an single pass assembler and multi pass assembler , statement of the problem, data structure and format of databases, Algorithm, look for modularity, and review for searching and sorting techniques. Macros, Macros instructions, features , conditional macro instruction, macro calls within macros, Implementation of restricted facility, two pass algorithm, single pass algorithm, Implementation of macro calls within macros. Implementation within an assembler

Unit III

Loaders and Linkers, Loader Schemes , Compile and go loaders, general loader scheme, absolute loaders, subroutine linkages , relocating loaders , other loader schemes and binders. Linking loaders, overlays and dynamic binders, Design of an absolute loader , Complete Design of a direct linking loader.

Unit IV

Introduction to Programming languages : Importance of high level languages , features . Formal Systems and Programming Languages : An introduction , Use of formal systems in Programming languages , Formal specification , Formal grammars, Hierarchy of Languages, Backus – Naur Form – Backus Normal Form – BNF , Canonic Systems and Formal Systems.

Compilers, Statement of problem, phases of Compiler-Lexical phase, syntax phase Interpretation phase, optimization, storage assignment code generation and assembly phase, Passes of a compiler.

TextBook : John J. Donovan , “ Systems Programming” , Tata McGrawHill

Reference Books:

Leland L.Beck."System Software" 4th edition Pearson 1997

Barron.D.W."Assemblers and Loaders" Mc Donald and Javes 1978

Ullman.J.D."Fundamentals of Programming System" Addison and Wesley

D.M.Dhamdhare."System Programming and Operating Systems"2nd edition

ELECTIVE,s for 4th Semester

Course No: 408

Course Title: Windows Programming using C#

Unit I

Introduction to windows Programming. .Net Architecture , The relationship of C# to .net , The Common Language Runtime , Advantages of Managed Code. A Closer Look at Intermediate Language , Support for Object orientation and Interfaces , Distinct Values and Reference types , Strong Data Typing , Error handling and Exceptions , Use of Attributes , Assemblies , Private Assemblies , Shared Assemblies , Reflection , .net framework classes , namespaces , creating .net applications using C# , Creating windows forms , windows controls , windows services , The role of C# in the .net enterprise architecture. The .net Environment , Working with visual studio 2005 , Assemblies , .net Security , Localization , Deployment.

Unit II

C# Basics , variables , predefined data types : Value types and reference types , CTS types ,Conditional statements ,loops , jump statements , Enumerations , Arrays , Using statement , Namespace , Aliases , The Main() Method , Multiple Main Methods , Passing Arguments to main() . More on compiling C# files , console I/O , Using Comments , The C# preprocessor directives. C# Programming Guidelines. Objects and Type : Classes and Structs , Partial classes , static classes , The object class Inheritance : Types of inheritance , virtual methods , hiding methods , calling base versions of functions , sealed classes and methods , constructors of derived classes , modifiers , interfaces , derived interfaces.

Unit III

Operators and Casts : Operator shortcuts , The ternary operator , The checked and unchecked operators , The is operator , The as operator , The sizeof operator , The typeof operator , Nullable types and operators , The Null coalescing operator , operator precedence , Type safety, Type conversions , Boxing and unboxing , comparing objects for equality , Operator overloading , User defined casts. Delegates and Events , Memory management and Pointers , Strings and regular expressions , Collections , Array Lists , The Stack , Queue , SortedList class, Hash Tables and Dictionaries ,

Unit IV

Generics , Generic collection classes ,Error and Exception Handling , Threading , Applications with multiple threads , Manipulating Threads , Creating Threads with Thread pool. Data Access with .net : Ado.net overview , Using Database Connections , Executing commands , Fast Access , The Data Reader , Managing data and relationship : The Dataset Class , XML schemas , Populating a Dataset , Persisting Dataset Changes , Working with ADO.net , windows forms , viewing .net data.

Text Book : Professional C# 2005 by Christian Nagel , Bill Evgen , Jay Glynn Wrox Publications , 2006.

Reference

1. Dietel & Dietel , "C# , How to Program",Pearson Education.
2. Visual C#.Net by John Sharp & John Jagger, PHI, New Delhi.
3. Visual Studio .Net by Francisco, Microsoft Publication.

Course NO: 409

Course Title: Pervasive Computing

Unit I

Technologies : Past, Present, Future , Pervasive Computing , The pervasive computing market, m-Business , Conclusions and Challenges , Future , Application Examples , Device Technology : Hardware , Human-machine interfaces , Biometrics , Operating Systems , Java for Pervasive devices , Device Connectivity : Protocols , Security , Device Management , Web Application Concepts : History of World wide Web . World wide Web Architecture , Protocols , Transcoding , Client Authentication via the Internet.

Unit II

, WAP : Introduction , Components of the WAP architecture , WAP infrastructure , WAP Security Issues , Wireless Markup Language , WAP push , Products , i-mode , Voice Technology : Basics of Speech Recognition , voice standards , speech applications , speech and pervasive computing , security, Personal Digital assistants : History , Device Categories , PDA Operating Systems , Device Characteristics , Software Components , Standards , Mobile Applications , PDA browsers.

Unit III

Architecture : Server Side Programming in Java : J2EE and overview , Servlets, Enterprise Java Beans , Java Server Pages , Extensible Markup Language , Web services , Model-View-Controller Pattern, Pervasive web application architecture : Background , scalability and availability , Development of pervasive computing web applications , Pervasive application architecture.

Unit IV

Example Application : Introduction , User Interface overview , Architecture , Implementation. Access from PCs : Smart Card-based authentication via the Internet , Ordering goods , Access via WAP : WAP functionality , Implementation , Access from Personal Digital Assistants: Extending the example application to personal digital assistants. Implementation for synchronized devices, for intermittently connected devices , for connected devices. Access via voice : Extending the example application to voice access , Implementation.

Reference Books :

Jochen Burkhardt, Dr. Horst Henn , Stefan Hepper , Klaus Rintdorff, Thomas schack “ Pervasive Computing “ Technology and Architecture of Mobile Internet Applications , Pearson Education.

Course No: 410

Course Title: Programming Language Principles

Unit I

The role of Programming Languages : Towards Higher Level Languages programming paradigms , Language implementation. Language Description : Syntactic Structures , Expression Notations , Abstract Syntax trees , Lexical Syntax , Context free grammars , grammars for expression. Imperative Programming : Structured Programming , Syntax directed control flow , Design considerations , handling special cases in loops , programming with invariants ,proof rules for partial correctness , control flow in C

Unit II

Data Representation : The role of types , basic types , arrays , records , unions and variant records , Sets , Pointers , Two String tables , types and error checking. Procedure Activations : Introduction to Procedures , parameter passing methods, scope rules for names , nested scope in source text, activation records ,lexical scope : procedures as in C

Objected oriented programming : Constructs for program structuring , Information hiding , Program design and modules , modules and defined types , class declarations in C++ , dynamic allocation in C++ , templates : Parameterized types , Implementation of Objects in C+., Inheritance , derived classes and information hiding

Unit III

Functional Programming : Language of expressions , types, values and operations , approaches to expression evaluation , lexical scope , type checking, Function declaration by cases , Functions as first-class values ,Implicit types , data types exception handling , Scheme , a dialect of Lisp , the structure of lists , list manipulation, Simplification of expressions. Logic Programming , Computing with relations , Introduction to Prolog , data structures in Prolog , Programming techniques , controls in Prolog, Cuts

Unit IV

, An introduction to concurrent Programming : Parallelism in hardware , Streams : implicit synchronization , concurrency as interleaving, Liveliness properties , safe accesses to shared data concurrency in ADA .

Language Description : Semantic Methods , Synthesized attributes, Attribute grammars , natural semantics , Denotational Semantics , Equality of Pure Lambda terms , Substitution revisited , Computation with pure lambda terms , programming constructs as lambda terms , the typed lambda calculus , polymorphic types

Reference Books:

1. Ravi Sethi ,“ Programming Languages ,Concepts and Constructs”, Pearson Education
2. Freidman, Wand ,Haynes, ”Essentials of Programming Languages”, PHI.

Course No: 411

Course Title : MANAGEMENT INFORMATION SYSTEM (MIS)

Unit I

Organisation and Information Systems , Changing Environment and its impact on Business - The IT/IS and its influence - The Organisation: Structure, Managers and activities - Data, information and its attributes - The level of people and their information needs - Types of Decisions and information - Information System, categorisation of information on the basis of nature and characteristics. , Transaction Processing System (TPS) - Office Automation System (OAS) - Management Information System (MIS) - Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System (ES) - Executive Support System (EIS or ESS).

Unit II

Need for System Analysis - Stages in System Analysis - Structured SAD and tools like DFD, Context Diagram Decision Table and Structured Diagram. System Development Models: Water Flow, Prototype, Spiral, RAD – Roles and responsibilities of System Analyst, Database Administrator and Database Designer. Information systems for Accounting, Finance, Production and Manufacturing, Marketing and HRM functions - IS in hospital, hotel, bank

Unit III

Enterprise Resources Planning (ERP): Features, selection criteria, merits, issues and challenges in Implementation - Supply Chain Management (SCM): Features, Modules in SCM - Customer Relationship Management (CRM): Phases. Knowledge Management and e-governance ,Nature of IT decision - Strategic decision - Configuration design and evaluation Information technology implementation plan.

Unit IV

Security and Ethical Challenges , Ethical responsibilities of Business Professionals – Business, technology, Computer crime – Hacking, cyber theft, unauthorized use at work. Piracy – software and intellectual property. Privacy – Issues and the Internet Privacy. Challenges – working condition, individuals. Health and Social Issues, Ergonomics and cyber terrorism.

RECOMMENDED BOOKS:

1. "Management Information Systems", Kenneth J Laudon, Jane P. Laudon, Pearson/PHI,10/e, 2007
2. "Management Information Systems", W. S. Jawadekar, Tata McGraw Hill Edition, 3/e, 2004
3. Turban, Efraim, Ephraim McLean, and James Wetherbe. 2007. Information Technology for Management: Transforming Organizations in the Digital Economy. New York, John Wiley & Sons.

Course No: 412

Course Title : Theory of Computation & Formal Languages

Unit I

Basic concepts of theory of computation: Alphabets, Strings, and Representations, Formal Languages and Grammars, Finite State Transducers, Finite-State Automata and Regular Languages, Limitations of Finite-Memory Programs, Closure Properties for Finite-Memory Programs, Decidable Properties for Finite-Memory Programs.

Unit II

Recursive finite-domain programs, Recursion, Pushdown Transducers, Context-Free Languages, Limitations of Recursive Finite-Domain Programs, Closure Properties for Recursive Finite-Domain Programs.

Unit III

Turing Machines. Programs and Turing Transducers, Non-Determinism versus Determinism, Universal Turing Transducers, Un-decidability. Decidable Properties for Recursive Finite-Domain Programs.

Unit IV

Introduction to resource-bounded computation, Time and Space, A Time Hierarchy, Nondeterministic Polynomial Time, More *NP*-Complete Problems, Polynomial Space, *P*-Complete Problems.

Suggested Readings:

1. Hopcroft, J., and Ullman, J. (1979), "*Introduction to Automata Theory, Languages and Computation*", Pearson Education.
2. Hopcroft J, R. Motwani, and J. Ullman, "Introduction to Automata Theory, Languages and Computation, 3rd Ed. 2006, Pearson Education.
3. P. Linz, "Introduction to Formal Languages and Automata", 3rd Ed. 2000, Jones and Barlett, PWS Publishing Company.
4. Donald Knuth, "The Art of Computer Programming", Prentice Hall.

Course No: 413

Course Title: Advanced UNIX/LINUX Programming

Unit I

Unix Basics: Introduction to Unix/Linux, Basic Commands, Text processing commands, data processing in Unix/Linux, Unix Administration – creating and managing users, managing printing.

Unit II

Introduction to Shell: Unix/Linux Shells, Shell variables, Environment variables. Arithmetic, Relational and Logical operators.

Programming with Shell: Shell Programming, Different Shell constructs, looping statements, decision statements, keywords, solving arithmetic expressions.

Unit III

GUI Development in Unix/Linux: Accessing Unix and Linux in GUI mode, Introduction to X Windows. Introduction to GUI development in Unix and Linux, Introduction to Qt as development tool. Introduction to various controls and forms in Qt. Designing simple forms in Qt, manipulating various controls in Qt.

Unit IV

Database Basics with Unix and Linux: Basics of Database, Introduction to MySQL, Basic commands of MySQL e.g. insert, delete, update etc. Connecting to database with Qt. Develop small application using Qt and MySQL.

References Books:

Kernighan and Pike, “The UNIX Programming Environment”, Pearson Education.

Karnetkar, “ UNIX Shell Programming”, BPB.

Tackett & Burnett, “Using Linux- Special Edition(Que)”, PHI.

Semester - V

Course No: 501
Course Title : Java Programming

Unit I

Java Program Development , Java Source File Structure , Comparison with other languages (C & C++), Java and Internet, Features of Java, Java Virtual machine, ByteCode , Lexical Tokens, Identifiers, Keywords, Literals, Comments , Primitive Datatypes, Variables: Assignment, Initialization and Conversions, Operators: Arithmetic, Assignment, Modulus, Relational, Boolean, Bitwise., Precedence Summary ,Unicode Character Set , Arrays: Single and Multidimensional. Control Statements and Looping Structures

Unit II

Class Fundamentals , Object reference , Garbage Collection, Constructors, Access Control, Modifiers, methods , Nested , Inner Class & Anonymous Classes , Abstract Class, Argument Passing Mechanism , Method Overloading, Recursion , Dealing with Static Members. Finalize() Method, Native Method. Use of “this “ reference , Cloning Objects, Generic Class Types, Inheritance in Java , Overriding Super Class Methods, Use of “super”, Polymorphism in inheritance , Type Compatibility and Conversion , Packages & Interfaces: Defining and importing packages , Understanding Class path , Implementing interfaces.

Unit III

Exceptions & Errors ,Types of Exception ,Control Flow In Exceptions , Use of try, catch, finally, throw, throws in Exception Handling ,In-built and User Defined Exceptions, Checked and UnChecked Exceptions, Operation on String ,Mutable & Immutable String , Using Collection Bases Loop for String , Tokenizing a String ,Creating Strings using StringBuffer , Multi-Threaded Programming ,Thread Life-Cycle , Thread Priorities , Synchronizing Threads , Inter -communication of Threads, DeadLock. Applet & Application , Applet Architecture, Parameters to Applet , Embedding Applets in Web page. Utility Methods for Arrays , Observable and Observer Objects , Date & Times , Using Scanner.

Unit IV

Streams, Input and Output Classes,The Standard Streams,File Object , File I/O Basics , Reading and Writing to Files ,Buffer and Buffer Management, Read/Write Operations with File Channel , Serializing Objects , The Collection Framework , Collection Types , Sets , Sequence , Map , Hashing ,Use of ArrayList & Vector , Event-Driven Programming ,The Event Delegation Model , Event Classes, Event Sources , Event Listeners , Adapter Classes, Anonymous Inner classes , Keyboard and Mouse Event Handling , Avoiding Deadlocks in GUI Code ,Networking Basics , Client-Server Architecture , Socket Overview, Networking Classes and Interfaces , Network Protocols ,Developing Networking Applications in Java

Suggested Readings:

1. Herbert Schildt, “The Complete Reference Java-2 “ ,Sixth Edition 2004,Tata McgrawHill.
2. Dietel & Dietel, “Java: How to Program Java 2, Sixth Edition, 2006, Pearson Education.
3. Horstmann & Cornell, “Java2 Vol-1 & Vol-2”,Seven Indian Reprint 2006, Pearson Education.
4. E. BalaGurudamy “ Programming with java A Primer” 3rd edition

Course No: 502

Course Title: Modeling & Simulation

Unit I

Concepts of Systems, Models, and Simulation. Distributed Lag Model, Cobweb Models, The process of a simulation Study, Exponential Growth Models, Exponential Decay Models, Type of simulation, Discrete-Event Simulation: Time-Advance Mechanisms, Components and Organization of a Discrete-Event Simulation Model. Monte Carlo Method. Simulation of Single-Server Queuing System, Simulation of an Inventory System

Unit II

Continuous Simulation: Pure-pursuit Problem.

Random Number Generators: Linear Congruential Generators, Other kinds of Generators, Testing Random-Number Generators.

Generating Random Variates: General Approaches, Continuous and Discrete distributions.

Unit III

Introduction to GPSS, General Description, GPSS block-diagram, Simulation of a Manufacturing Shop. SNA, Function, Simulation of a Supermarket, GPSS Model of a Simple Telephone System

Unit IV

Output Data Analysis for a Single System: Transient and Steady-State Behavior of a Stochastic Process, Type of Simulations with regard to output Analysis and Statistical Analysis for Testing Simulation. Verification and Validation of Simulation. An introduction of different types of simulation languages.

Reference Books:

- G. Gordon. "System Simulation", (3rd Edition) Pearson Education, 2000.
- Law and Kelton, "Simulation Modeling and Analysis", McGraw Hill, 2001.
- N. Deo, "System Simulation with Digital Computer", Prentice Hall of India 1979
- Fred Maryanski, "Digital Computer Simulation", CBSPD 1987
- James A. Pyne, "Introduction to Simulation- Programming Techniques and Methods of Analysis", McGraw Hill 1988
- Zeigler and Kim, "Theory of Modeling and Simulation", Academic Press, 2002
- Banks et al, "Discrete event Simulation", Pearson Education, 2001

Course No: 503
Artificial Intelligence and Neural Networks

Unit I

Intelligent agents , Agents and environments -The nature of environments -Structure of agents , Problem solving agents , Example problems , Searching for solutions , Uniformed search strategies , Avoiding repeated states , Searching with partial information. Informed search and exploration , Informed search strategies , Heuristic function , Local search algorithms and optimistic problems , Local search in continuous spaces , Online search agents and unknown environments , Backtracking search -Adversarial search

Unit II

First order logic , Syntax and semantics for first order logic , Using first order logic , Knowledge engineering in first order logic , Inference in first order logic– Prepositional versus first order logic , Unification and lifting , Forward chaining , Backward chaining – Resolution , Knowledge representation , Ontological engineering, Learning from observations , Forms of learning , Inductive learning , Learning decision trees ,Ensemble learning

Unit III

Knowledge in learning , Logical formulation of learning , Explanation based learning , Learning using relevant information , Inductive logic programming , Statistical learning methods , Learning with complete data , Learning with hidden variable , EM algorithm – Instance based learning , Reinforcement learning , Passive reinforcement learning – Active reinforcement learning , Generalization in reinforcement learning.

Unit IV

Neural Computing : Nature and Goals Overview of network architectures and learning paradigms , Single-layer perceptrons and their limitations , The Multilayer Perceptron : The sigmoid output function , Hidden units and feature detectors , Training by error back propagation , The error surface and local minima , Generalization, how to avoid 'overtraining' , Binary Decision Neurons : The McCullough-Pitts model ,The Hopfield Model , Self-Organising Nets : The Kohonen self-organising feature map.

TEXT BOOK

1. Russell, S. and Norvig, P., “Artificial Intelligence-A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.
2. Neural Computing: An Introduction; R Beale and T Jackson; Institute of Physics Publishing.

References :

1. Patterson ,” Introduction to Artificial intelligence and expert systems” , Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
3. Luger, G.F., “Artificial Intelligence , Structures and Strategies for Complex Problem Solving”,Pearson Education / Prentice Hall of India, 2002.

Course No.: 504
Course Title : Web Programming

UNIT I

HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Colour controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes List types and its tags, Use of Frames and Forms in web pages.

UNIT II

VB Script Concepts: VB Script Language Elements: Constants, Variables and Data Types, Mathematical Operators, Logical Operators, Looping and Decision Structures.

VB Script Functions and Objects: Date Conversion Functions, Mathematical Functions, Data Formatting Functions, Text Manipulation Functions, Date and Time Functions.

UNIT III:

ASP Concepts: SSI Directives, Response Object, Request Object Cookies, Application, Session and Server Objects, Global.asa, ASPError Object, Object Context.

Reading and Writing Files on Web Server.

UNIT IV

Integrating with Databases: OLEDB, ODBC, Remote Data Service, Active Data Objects, Connection Object, RecordSet and Fields Objects, Using SQL statements to Query Data, Command and Parameter Objects, Using Error Collection. Developing ASP Application for a Case Study.

TEXTS & REFERENCE BOOKS :

ACTIVE SERVER PAGES 2.0 (UNLEASHED)

BY *STEPHEN WALTHER* : *TECHMEDIA*

ASP 3 PROGRAMMING BIBLE

BY *ERIC A. SMITH* : *IDG*

BOOKS(REPRIN02001)

TEACH YOURSELF ASP 3.0 IN 21 DAYS

BY *SCOTT MITCHELL, JAMES*

ATKINSON : *TECHMEDIA (1ST EDITION 2000)*

MASTERING ACTIVE SERVER PAGES 3.0

BY *RUSSELL JONES* : *BPB(1ST EDI 2000)*

ELECTIVE,s for 5th Semester

Course No: 508

Course Title: Wireless and Mobile Communications

Unit I

Classification and types of Wireless telephones. Introduction to Cordless, Fixed Wireless(WLL), Wireless with limited mobility(WLL-M) and (Fully)Mobile Wireless phones. Introduction to various generations of mobile phone technologies and future trends. Wireline vs. Wireless portion of mobile communication networks. Mobile-Originated vs. Mobile-Terminated calls. Mobile-Phone numbers vs. Fixed-Phone numbers; Billing Issues.

Unit II

Electromagnetic spectrum, its use and allocation to well-known bands. Concept of cells, sectorization, coverage area, frequency reuse, cellular networks & handoffs.

Unit III

Wireless Transmission concepts; types of antennas, signal propagation, multipath propagation. Comparison of FDM, TDM and CDM techniques. Basic concepts of Spread Spectrum(SS) technique; Direct Sequence SS versus Frequency Hopping SS.

Unit IV

Simplified implementation of IS-95 CDMA using chip sequences. Concept of CDMA(PCS& Cellular) channel; Forward and Reverse CDMA channel for a cell/sector. Concept of(Walsh)Code Channels within a CDMA Channel. Purpose of Pilot, Sync, Paging, Forward Traffic Channels. Purpose of Access & Reverse TCs. Comparison of Cellular and PCS CDMA networks; frequencies and cell-sizes. Advantages/Disadvantages of smaller cell size. Concept of Voice Coding . Components of Mobile Network Infrastructure: MS, BTS, BSC, MSC; their basic functions and characteristics. Types of handoffs in GSM. Use of HLR and VLR in mobile networks.

References Books:

1. Andy Dornan, “The Essential Guide to Wireless Communications Applications”,Pearson.
2. Jochen Schiller, “Mobile Communications”, Pearson.
3. K.Pahlavan, P.Krishnamurthy, “Principles of Wireless Networks”, Pearson Education.
4. Andrew Tanenbaum, “ Computer Networks(4th Edition)”, Pearson Education.
5. T. Rappaport, “Wireless Communications, Principles and Practice(2nd Edition). Pearson Education

Course No: 509
Course Title: Bioinformatics

Unit I

Introduction to bioinformatics, Definitions and concepts, Biological complexity, The role of bioinformatics. Types of biological data, types of Biological Databases – flat file databases, relational databases, object-oriented databases, XML representation of biological databases, Sequence databases (EMBL, GenBank, DDBJ, SWISS-PROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, SMART, etc), Protein structure and fold classification databases (PDB, CATH, SCOP), pathway databases, PubMed database.

Unit II

Search engines - SRS, Entrez; BLAST, FASTA, Data Submission Tools: Nucleotide Sequence Submission Tools, Protein submission tools, Command line Tool for GenBank; Data Analysis Tools: Tools for Nucleotide Sequence Analysis, Tools for Protein sequence Analysis; Prediction tools: Phylogenetic trees and phylogenetic Analysis, Gene Prediction, Protein structure and Function prediction; Modeling tools: Tools for 2D Protein Modeling, Tools for 3D protein Modeling

Unit III

Ontologies in Bioinformatics: The need for ontologies (Gene naming, functional classifications, references schemes), Classification of ontologies – one dimensional, 2 dimensional, three dimensional, Gene ontology, EcoCyc etc.
Introduction to Markup Languages for biological data: BioML, ProML, CML, GAME, AGAVE

Unit IV

Querying and Integration of Biological Databases: Warehouse Integration, mediator-wrapper based integration, navigational integration. Existing systems and their drawbacks. XPath query language for querying biological data.

Reference Books:

1. Developing Bioinformatics Computer Skills, Cynthia Gibas & Per Jambeck, O'Reily
2. Bioinformatics – Databases, Tools and Algorithms, Orpita Basu, Simminder Kaur Thukral, Oxford Higher Education.
3. Introduction to bioinformatics, T. K. Attwood & D J Parry-Smith, Pearson Education
4. Bioinformatics – A beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame, WILEY DreamTech India Pvt.
5. Krane , "Bioinformatic", Pearson Education.

Course No : 510
Course Title: Digital Image Processing

UNIT I

Introduction to discrete time signals and systems: Discrete time signals, Discrete time systems, Analysis of discrete time, Linear time-invariant systems [Both 1D and 2D].
Introduction to digital image processing: Digital Image representation, Fundamental steps in image processing. Elements of digital image processing systems, Applications of digital image processing

UNIT II

Image sensing and acquisition. Image sampling and quantization, imaging geometry. Image transforms : Concepts of Spatial domain and Frequency domain Images, Fourier, Inverse Fourier, Fast Fourier [Both 1D and 2D].

UNIT III

Image Enhancement: Enhance in the spatial domain, some basic grey level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing of spatial filters, Sharpening spatial filters.
Enhancement in frequency domain: Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering.

UNIT IV

Image Restoration: Model of the image Degradation / Restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Linear, Position-invariant degradation, Estimating the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering, Constrained least squares filtering, Restoration by SVD.

Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding based segmentation, Region based segmentation.

Image Compression models: Error criteria, Lossy compression, Loss-less compression.

Reference Books :

- 1) Digital image processing 2nd edition by Rafael C.Gonzalez,Richard E.Woods(Pearson edition) .
- 2)Fundamentals of digital image processing by A.K.Jain(Pearson edition) .
- 3)Fundamentals of digital image processing by Catlemrene(Pearson edition).
- 4)Image processing analysis and machine vision by Milan Sonka,Vaclahlavac,Roger Boyle.
- 5)Digital signal processing by John G.Proakis, G.Manolakin “, 4/e Pearson Education

Course NO: 511
Course Title: Quality Assurance & Testing

Unit – I

Introduction to Testing: Verification and Validation; Software Testing for Conventional & Object Oriented Architectures; Testing Completion criteria; Strategic Issues; Test Strategies for Conventional & Object Oriented Software; Validation Testing; System Testing.

Unit – II

Testing Tactics: Basis Path Testing; Control Structure testing; Black Box Testing; White Box Testing; Object Oriented Testing Methods(Test Case design Implications of OO concepts, Fault based Testing, Test Cases, Scenario Based Testing); Testing specialized Environments, Architectures, and applications(Testing GUIs, Testing Client Server Architectures, Testing Documentation); Testing Patterns.

Unit – III

Introduction to Software Quality: Establishment of a software quality programme, Software Quality Assurance Planning-An overview, Software Quality Assurance Plan-Purpose and Scope, Standard,Practices,Conventions and Metrics, Tools, Techniques and Methodologies,Risk management: Concept, Reactive vs. Proactive Risk strategies, Software risks, Risk identification (Assessing Overall Project Risk, Risk Components and drivers.

Unit – IV

Quality Management: Quality Concepts (Quality, Quality Control, Quality assurance, Cost of quality),Software Quality assurance, Software reviews, Formal Technical Reviews, Formal approaches to Software quality assurance, Software Reliability, (Measures of Reliability and Availability, Software Safety), ISO 9000 Quality standards.

Suggested Readings:

1. **ROGER S. PRESSMAN** - Software Engineering - A Practitioner's Approach, Sixth edition, TMH.
2. **Pankaj Jalote** - An Integrated approach to Software Engineering, 3Rd edition, Narosa Publication.
3. **SommerVille** Software Engineering- “,Pearson Education
4. **SCHAUM'S Outlines**, TMH.
5. LOUISE TAMERS – Introducing Software Testing – Pearson
6. Gopalaswamy,”Software Testing”, Pearson Education

Course No: 512

Course Title : Design & Development of Embedded Systems

Unit I

Introduction to Embedded Systems(ES), their examples and applications. Concept, Definition and Classification. Advanced hardware fundamentals. Criteria for Processor and Memory Selection for ES.

Unit II

Interrupts- Basics, Shared-Data Issues, Latency. ES software architectures. Round-Robin with interrupts; Function-Queue scheduling. Issues of context, latency and deadline.

Unit III

Introduction to Real-Time Operating Systems(RTOS). Tasks, Task States, Semaphores and Shared Data. Use of OS services e.g. Timer functions, Message Queues, Events, Pipes and ISRs.

Unit IV

Discussion of basic design using RTOS and examples. Hard Real-Time scheduling considerations. Memory and power conservation. Embedded Software Development tools: Host/Target machines, Linker/Re-Locator, Debugging Techniques. Case study of Programming (at least one) industry-standard RTOS e.g. Micro-C/OS , VxWorks, (Embedded) Linux. Detailed study of its services and use of its API.

References Books:

David Simon, "An Embedded Software Primer", Pearson (Asia).

Raj Kamal, "Embedded Systems – Architecture, Programming & Design", TMH.

Qing Li, "Real-Time Concepts for Embedded Systems", CMP.

Arnold Berger, "Embedded Systems Design – An Introduction to Processes, Tools & Techniques", CMP.

Course No: 513
Course Title :Network Security & Cryptography

Unit I

Basics: Introduction, Protocol Structure Specification and Modeling: Validation Models, Correctness requirements, Protocol Design, Finite State machines

Unit II

Conformance Testing, Synthesis and validation: Conformance Testing, Protocol Synthesis, Protocol Validation,

Unit III

Mechanics of Routing Protocols, Internet working with Dissimilar Protocols, Future of Routing,
Protocol designing: Simplicity VS flexibility VS Optimality, Overhead and scaling, Operation above Capacity, forward compatibility, Migration: Routing Algorithms and addressing parameters, making multi protocol operation possible, Robustness, determinism VS Scalability, performance for correctness

Unit IV

Design Tools: A protocol Simulator, A Protocol Validator, using the validator,
Network Security: Features Security in Wireless, Adhoc and Sensor Networks,

References:

1. William Stallings ,” cryptography and Network Security”, Pearson Education
2. Interconnections: Bridges, Routers switches and Internet-working protocols
Radia Perlman (Pearson education)
2. IP Routing Fundamentals Mark Spockack (Pearson Education)
3. Design and Validation Computer Protocols : Gerard J. Holzmann (Prentice Hall)

Semester - VI

- i. Project seminar**
- ii. Project Work with
Dissertation**