UNIVERSITY OF KERALA

Revised Scheme & Syllabus of the MCA programme

(effective from 2006 admissions)

A major objective of the MCA programme, in addition to other academic objectives, is to create skilled man power at the level of programmer, system analyst, project manager and system manager.

The duration of the course is six semesters in 3 years. The student has to take, generally, 5 theory papers , 2 practical courses and one seminar /(Communicative English in the1st semester) in the first five semesters. In the fourth semester one practical course and a seminar together is replaced with a mini-project work.. In 6th semester there is no theory /practical course but one has to do a major project work. In each week a student is supposed to get 10 practical hours and hence in every semester a total of 160 hours of practical training in the laboratories. The contact hours for theory/ tutorial comes to around 20 hours/week. The attendance in the theory & practical is compulsory

General :

Examinations:

University Examinations will be conducted at the end of each semester as decided by the Academic Council of the University and as per the scheme included in this document.
General rules of PG examinations w.r.t publication of results/repetitions/ improvement/valuation etc., under Kerala University are applicable for MCA programme also.

Sessional Marks:
The sessional marks are awarded based on 2 class tests and assignments/ lab reports for theory/ practical and attendance. Split up is shown below:

Theory

Attendance	20%
Assignments (minimum 2)	30%
Class tests (minimum 2)	50%

Practical:

Attendance	20%
Performance in the lab (lab reports)	30%
Lab tests (minimum 2)	50%

For seminars, the sessional marks are based on presentation / seminar report and participation.

The students are required to present the progress (in respect of project works) twice to the Department Faculty.

Question Paper Pattern. : As per KU Order. No. Ac. A. IV/2/027861/2001 dated 2-09-2002

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Detailed Syllabus

06.101 COMBINATORICS AND GRAPH THEORY 3-1-0

Module I Fundamental principles of counting - permutations and combinations - binomial theorem - combinations with repetition - combinatorial numbers - principle of inclusion and exclusion - derangements - arrangements with forbidden positions - Generating functions - partitions of integers - the exponential generating function - the summation operator - recurrence relations - first order and second order - nonhomogeneous recurrence relations - method of generating functions

Module II Introduction to graphs - definitions - subgraphs - paths and cycles - matrix representation of graphs - Euler tours - chinese postman problem - planar graphs - Euler's formula - platonic bodies - applications of kuratowski's theorem - hamiltonian graphs - graph colouring and chromatic polynomials - map colouring

Module III

Trees - definitions and properties - rooted trees - trees and sorting - weighted trees and prefix codes - biconnected components and articulation points - Kruskal's and Prim's algorithms for minimal spanning trees - Dijkstra's shortest path algorithm - Bellman-Ford algorithm - all-pairs shortest paths - Floyed-

Warshall algorithm - the max-flow min-cut theorem - maximum bipartite matching

Text book

1. Grimaldi R. P., *Discrete And Combinatorial Mathematics: An Applied Introduction*, 3/e, Addison Wesley

Reference books

1. Clark J. & Holton D. A., *A First Look at Graph Theory*, Allied Publishers (World Scientific), New Delhi

2. Corman T. H., Leiserson C. E. & Rivest R. L., *Introduction to Algorithms*, Prentice Hall India

3. Mott J. L., Kandel A. & Baker T.P., *Discrete Mathematics for Computer Scientists And Mathematicians*, 2/e, Prentice Hall of India

4. Liu C. L., *Elements of Discrete Mathematics*, 2/e, McGraw Hill, Singapore

5. Rosen K. H., *Discrete Mathematics and Its Applications*, 3/e, McGraw Hill, Singapore

06.102 PROBABILITY AND STATISTICS 3-1-0

Module I

Probability: Probability theory: Sample spaces, Events and probability, Discrete probability: Union, Intersection and Compliment of events, Conditional probability, Baye's theorem; Random variables and distributions — Discrete probability distribution — Binomial, Poisson, Hypergeometnc; Density functions and distributions functions, Continuous probability distribution — Uniform, Exponential, Normal, Student's 1, X, Beta and F — Static. Expectations and higher order moments; Characteristic functions

Module Il

Laws on large numbers: Weak laws and Strong laws on large numbers, central limit theorems and other limit theorems Statistics: Review of basic statistics, Linear correlation coefficient, Linear regression, Non Linear regression, Multiple correlation and Multiple regression

Module Ill

Sampling: Theory of sampling, population and sample, sampling survey methods and estimation. Statistical Inference: Testing of Hypothesis and Inference

Books:

1. Hogg R.V., Craig A.L., Introduction to Mathematical Statistics, American Publishing Co. pvt Ltd.
2. Yule U.G., Kendall M.G., An Introduction to the theory of Statistics, Chailes Gruffin & Co. Ltd

3. Draper N.A., Smith H., Applied Regression analysis, John Wiley & Sons Inc
4. Anderson T.W., An Introduction to Multivariate Statistical analysis, John Wiley & sons, Inc
5. Brokes B.C., and Dick W.E.L., An Introduction to Statistical Method, Heinemann Educational Books, 1969

06.103 PROGRAMMING IN C 2 - 1- 0

Module I

Introduction to programming languages – types of programming languages – high level languages – assembly language – machine language. Problem solving concepts – flow charts and algorithms – problem definition phase – general problem solving strategies – top-down design – breaking a problem into sub problems – choice of a suitable data structure. Documentation of programs – debugging of programs – program testing. Important C concepts. Preprocessor directives – header files – data types and qualifiers – operators and expressions – enumerations - data input and output

Module II

Control statements – arrays and strings – structures and unions – working with bits in C – storage classes. Pointers – arrays of pointers – structures and pointers.

Module III

Memory allocation functions: Function – function definition – function prototypes – function call by value and call by reference – recursive functions. Data files – formatted, unformatted and text files. Low level programming in C. command line arguments.

Text Books:

1. Kamthane A.N., Programming with ANSI and Turbo C , Pearson Education India 2002
2. V. Rajaraman ., Computer Programming in C , PHI
3. Venkateshmurthy, M.G., Programming Techniques through C Pearson Education India.
4. Hanly J.R., and E.B. Koffman Problem Solving and Program Design in C 4th ed.,, Pearson/Addison Wesley

References:

1. Keringhan., The C Programming language 2nd ed., Pearson Education.
2. Spirit of C - Cooper.
3. Tremblay, J. P., and R.B. Bunt, Introduction to Computer Science an Algorithmic approach McGraw Hill.

06.104 DIGITAL SYSTEMS 3-1-0

Module I

Number systems – Decimal, Binary, Octal and Hexadecimal – conversion form systems to another representation of negative numbers – representation of BCD numbers – character representation – character coding schemes – ASCII – BBCDIC etc. – Algorithms for addition subtraction, multiplication and division of binary and BCD number – Addition and subtraction of octal and hexadecimal numbers. Representation of floating point numbers – precision – addition, subtraction, multiplication and division of floating point numbers.

Module II

Postulates of Boolean algebra – Logic functions – logic gates – methods of minimization of logic functions – Karnaugh map method and tabulation method – realization using logic gates. Design of combinatorial logic circuits – adder, subtractor, binary parallel adder, decimal adder, code converter, magnitude comparator, decoder, multiplexer, demultiplexer, parity generator – design examples.

Module III

Sequential Logic Circuits – Flip flops RS, D, JK & T type – Master slave flip flop. Analysis and design of clocked sequential circuits – state diagram – state reduction and assignment – design with state equations – shift registers – serial adder – Design of synchronous and asynchronous Counters – Timing Sequences.

Text Books

1. Morris Mano., Digital Logic and Computer Design PHI.

References:

2. Gothman W.H. Digital Electronics – An introduction to theory and practice – Prentice hall of India.
3. J. Peatman – Design of systems – Mc Graw Hill International Students edition,
4. Bartee T, Digital Computer Fundamentals, 6th edition, Mc Graw Hill 1986.
5. Rajaraman. V., and T. Radhakrishnan – An introduction to digital computer design, 4th ed., Prentice Hall.1997.

06.105 FILE STRUCTURES AND PROGRAMMING IN COBOL 3-1-0

Module I

Introduction to data processing: files, types and organization, records and files, data collection, preparation, verification, editing and checking Business files Master and Transaction files, generations, backup and file recovery procedures

Module II

COBOL programming ,divisions, identification and environment division, data division file section, working storage section, procedure division, verbs, movement, arithmetic and program control verbs, table handling, structured program . development

Module III

Sequential files, File sorting, searching, merging, matching direct access files, indexed sequential access files, character handling, report writer, subroutines

Books:

1. Roy M.K., and Dastidar Ghosh D., COBOL Programming, Tata McGraw Hill.
2. Philippakis and Kazmier, Information System Through COBOL, 2nd Ed., McGraw Hill .
1. Popkin G.S., Advanced Structured COBOL 2nd Ed., Kent Pub.. Comp.
2. Pierson & Horn: Structured COBOL Programming, Soft Foreman Co.,
3. Rajaraman V. and Sahasrabudha H.V., Computer Programming in COBOL, Prentice Halt India.
4. Grover P.S., Programming with Structured COBOL, Macmillan

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06.106 COMMUNICATIVE ENGLISH 2-0-0

Reading- Skimming-scanning-detailed reading-predicting content-interpreting charts and tables-identifying stylistic features in texts - evaluating texts-understanding discourse coherence-guessing meaning from the context- note making / transferring information.
Word formation with prefixes and suffixes-discourse markers and their functions-degrees of comparison- expressions relating to recommendations and comparisons-active and passive voice-antonyms-tense forms- gerunds- conditional sentences-modal verbs of probability and improbability-acronyms and abbreviations - compound nouns and adjectives-spelling-punctuation.
Sentence definition-static description-comparison and contrast-classification of information-recommendations- highlighting problems and providing solutions-formal and informal letter writing-using flow-charts/diagrams paragraph writing-editing.

Defining, describing objects-describing uses/functions-comparing-offering suggestions-analysing problems and providing solutions-expressing opinions (agreement/ disagreement) –expressing possibility/certainty – framing questions-providing answers.

Text Books:

1. " English for Engineers and Technologists ", Volume I. Authors : Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd.,
2. Sarah Freeman, Written communication in English, Orient Longman, .

06.107 C PROGRAMMING LAB 0-0-4

Experiments covering the topics included in the subject 06.103 should be done. Linux/Unix platform may be selected

06.108 COBOL PROGRAMMING LAB 0-0-4

Experiments covering the topics included in the subject 06.105 should be done.

06.201 DATA STRUCTURES AND ALGORITHMS 3-1-0

Module I

Introduction to programming methodologies – structured approach, stepwise refinement techniques, programming style, documentation – analysis of algorithms: frequency count. Data abstraction. Complexity of algorithms: Time and space complexity of algorithms using "big oh" notation. Recursion: Recursive algorithms, Analysis of recursive algorithms. Logic characteristics of strings, physical representation for strings

Module II

Study of basic data structures – vectors, arrays, records, stacks, queues and dqueues. – linked lists – trees, binary tree traversals – graphs – applications. Storage management – free storage lists, reference counters, garbage collection, storage compaction, boundary tag method.

Module III

Internal and external sorting techniques – selection, bubble, insertion, merge sorting, partition exchange sorting, heap sort. Searching – linear and binary – hashing. File organizations- External sorting – sorting with disks, sorting with tapes.

Text Books

1. Tremblay and Sorenson., Introduction to data structures with applications, TMH.

References:

1. Thomas H. Corman, Charles E. Leiserson and Ronald L. Rivest., Introduction to Algorithms., 2nd ed., Prentice Hall of India.1990
2. Seymour .L., Theory and Problems of Data Structures –, Schaum's series.
3. Wirth., N., Algorithms + Data Structures = Programs –Prentice Hall Englewood cliffs.
4. Hugges. J.K., & J.I. Michtm A Structured Approach to Programming –, Prentice Hall.

06.202 COMPUTER ORGANIZATION 2-1-0

Module I

Basic Structure of digital computer, functional units, basic operational concepts, bus structures, software, addressing methods and machine program sequencing, instruction formats, instruction sequencing addressing modes, assembly language, addressing modes and instructions, simple I/O programming, stacks, subroutines. Processing unit – fundamental concepts, execution of a complete instruction, sequencing of control signals

Module II

I/O organization – Accessing of I/O devices, DMA, Interrupts, handling, I/O channels. Memory organization – basic concepts, semiconductor RAM memories, memory system considerations, semiconductor ROM memories, multiple module memories and interleaving, cache memory, Virtual memory segmentation, paging, Associative memory

Module III

Computer peripherals – printers, plotters, scanners, storage devices, input devices. 8085 microprocessor, architecture, instruction set, assembly language programming

Text Books

1. Hamachar, Vranesic & Zaky, Computer Organization. McGraw Hill Publishing Company.5th ed, 2002.
2. Pal Chaudhari., Computer Organization and Design, 2nd ed., PHI., 1999.
3. Gaonkar., Microprocessors and interfacing.

References:

1. Gear, C.W., Computer Organization Programming –McGraw Hill International Student Edition.
2. Glenn H. Mac Even, Introduction to Computer Systems using PDP – II and Pascal McGraw Hill

06.203 ACCOUNTING AND FINANCIAL MANAGEMENT 3-1-0

Module I

Accounting: principles, concepts and conventions, double entry system of accounting, introduction to basic books of accounts of sole proprietary concern, control accounts for debtors and creditors, closing of books of accounts and preparation of trial balance. Final accounts: trading, profit and loss accounts and balance sheet of sole proprietary concern with normal closing entries. introduction to manufacturing account, finally accounts partnership firms, limited company. Introduction to accounting packages like Tally

Module Il

Financial Management: meaning and role Ratio analysis: meaning, advantages, limitations, types of ratios and their usefulness. Fund Flow statement: meaning of the terms fund, flow and fund, working capital cycle, preparation and interpretation of the fund flow statement.

Module III

Costing: nature and scope, importance, method of finalisation of master budget and financial budgets.Marginal costing: nature, scope and importance, Break even analysis, its uses and limitations, construction of break even chart, practical applications of marginal costing; standard costing: nature and scope,computation and analysis of vanances with reference to material cost, labor cost and overhead cost, interpretation of the vanances Introduction to computerized accounting system: coding logic and codes required, master files, transaction files, introduction to documents used for data collection, processing of different files and outputs obtained.

Books:

1. KellokJ., Elements of accounting, Heinemann
2. Rockley L.E., Finance for the Non-Accountant, 2 Edition, Basic Books.
3. Levy and Sarnat, Principles of Financial Management, Prentice Hall International.
4. Arnolel, Financial Accounting, Prentice Hall International (Paperback Edition)
5. Horngren , Sundem and Selto (9^{th} ed), Introduction to Management Accounting, Prentice Hall International (Paperback Edition)
6. Murthy U.S., Management Finance, 2 Edition, Vakils Refers & Simons Ltd.
7. Van Home, James C., Financial Management and Policy, Prentice Hall
8. Pandey I.M., financial Management, Vikas publications

06.204 OBJECT ORIENTED PROGRAMMING THROUGH C++ 3-1-0

Module I

Fundamentals of object-oriented Design : Data Abstraction, Encapsulation, classes, Inheritance and Polymorphism, class Hierarchies. C++ enhancements to C : Default Function Arguments, Placement of variable declarations, the scope resolution operation, the "Const" Qualifier, References: References as Aliases, references and pointers similarities and differences, references as function parameters, references as return values. Introduction to classes: Declaring and using classes, class members , Creation and destruction of objects, constructors and destructors- accessing data members

Module II

Returning a reference, "Const" objects and member function., inline functions, Classes and dynamic memory allocation: New, delete operators, "this" pointer. Static members, friends, array of class objects. Function overloading, constructor overloading, Operator overloading : Overloading unary operator, overloading binary operator, data conversion

Module III

Inheritance and polymorphism: Derived class and base class, derived class constructors, overriding member functions, public and private inheritance, virtual functions, polymorphism, multiple inheritance, classes within classes., abstract classes, Generic functions, generic classes, exception handling, File processing – formatted – unformatted and random files. Microsoft foundation classes : Strings, data structure.

Text Books

1. Robert Lafore., Object Oriented Programming in Microsoft C++– Galgotia Book House 1995
2. Kamthane, Object oriented Programming with ANSI and Turbo C++., Pearson Education.

References:

1. Balaguruswamy., Object Oriented Programming in Microsoft C++ -
2. Barkakti., Object Oriented Programming
3. Ravi Chander., Object Oriented Programming in C++

06.205 DATABASE MANAGEMENT SYSTEMS 3-1-0

Module I

Introduction to database- traditional file system- data and need for information- sequential, random and indexed sequential files- data organization- single and multilevel indexes- B trees and B+ trees- secondary storage devices- database approach–data models- schemas and instances- Data independence – 3 schema architecture – Data base languages – Data base users – Classification of data base systems – E-R modeling– Attributes and keys – E-R diagrams – Weak entities – extended E-R model- mapping ER model to relational model

Module II

Introduction to Relational model: Basic concepts: Domains Attributes, keys, tuples, relations – Relational data base schemas – relational Algebra operations, SQL in queries – views- Over view of relational calculus- Conceptual design of relational data base – Normalization theory- Functional dependencies- membership and minimal covers- Loss less decomposition of relations- First, Second, Third and Boyce – Cod normal forms – Multi valued dependencies and Fourth normal form – Join dependencies and Fifth normal form.

Module III

Security issues in database- DBMS and web security - Transaction management -properties of transactions- database architecture- concurrency control- serializability - locking methods- time stamping methods- database recovery- introduction to object oriented DBMS and distributed DBMS - emerging trends

Text Books:

1. Henry F. Korth and Abraham Silbershatz- Database System Concepts-2nd ed., McGraw Hill 1992.
2. Thomas Connolly and Carolyn Begg - Database systems 3rd edition – Pearson Education, 2003

References:

1. Database management systems- Alexis Leon and Mathews Leon- Vikas publishing

2. Ramez Elmsri and Shakant B. Navathe- Fundamentals of Database Systems- 3rd ed., Pearson Education. 2000.
3. Jeffry D. Ullman - Principles of Database Systems 2nd ed., Galgotia Publications.1988

06.206 OBJECT ORIENTED PROGRAMING&DATA STRUCTURE LAB 0-0-4

Implementation and applications of data structures like stack, queue, tree, linked list, graph etc and experiments on sorting and searching should be done. OOPs concepts should also be experimented

06.207 MICROPROCESSOR LAB 0-0-4

Programming exercises on 8085 microprocessor trainer kit. Interfacing

06.301 SYSTEM ANALYSIS AND DESIGN 2-1-0

Module I

Overview of system analysis and design — business system concepts, categories of information systems, system development strategies, implementation and evaluation, tools for system development. Reasons for project proposals — managing project review and selection, preliminary investigation, scope of study, conducting the investigation, testing project feasibility, handling infeasible project. Tools for determining system requirements — activities in requirements determination, fact finding techniques, tools for documenting procedures and decisions, structured analysis development strategy — features of data flow strategy, features of a data dictionary, recording data descriptions

Module II

Application prototype development strategy — purpose of application prototyping, steps in prototype method, use of prototypes, tools for prototyping, prototype strategies Analysis to design transition - specifying application requirements, objectives in designing an information system, what features must be designed? Output objectives, type of output, how to present information, designing printed output, designing visual display output. Design of input and control — objectives of input design, capturing data for input, input validation, checking the transaction, validation, checking the transaction data, modifying the transaction data.

Module III

Design of online dialogue — how is online different? Purpose and characteristics of interface, designing dialogue and dialogue strategies, data entry dialog, basic file terminology, data structure diagrams, types of files, methods of file organization System engineering and quality assurance — design objectives, program structure charts, design of software, top down structure of modules, coupling, cohesion, span of control, module size, shared modules. Managing system implementation — training, training system operators, user training, training methods, conversion methods, post implementation

review, review methods. Hardware and software selection — hardware selection, determining size and capacity requirements, computer evaluation and measurement, plug compatible equipment, financial factors, maintenance and support, software selection, evaluation of software, software contracts.

Text book:

1. James A. Senn, Analysis and Design of Information Systems, Second edition, McGraw Hill International Edition,

Reference Books:

1. Hussain, K.M., and Dona Hussain, Information System Analysis, Design & Implementation Tata McGraw Hill, New Delhi, 1995.
2. Elias M. Award , System Analysis and Design, , Second Edition, Galgotia Publishing Ltd., New Delhi, 1995
3. Don Yeates, System Analysis and Design, McMillan India(Ltd),1996.
4. Hawryszkiewycz, I.T., Introduction to System Analysis and Design, 3"' Edition, PHI, 1997
5. Rajaraman V., Analysis and Design of Information Systems, PHI,
6. Gupta A.K. & Sarkar S.K., System Analysis, Data Processing and Quantitative Techniques, Galgotia., 1997

06.302 COMPUTER GRAPHICS 3 – 1 – 0

Module I

Basic concepts in Computer Graphics - Types of Graphic Devices - Interactive Graphic inputs - Basic Raster Scan Graphics - Line Drawing Algorithms - Circle Generation Algorithms - Scan Conversion - frame buffers - solid area scan conversion - polygon filling.

Module II

Two dimensional transformations - Homogeneous coordinate systems - matrix formulation and concatenation of transformations - Windowing concepts - two dimensional clipping.

Module III

Introduction to graphics in three dimension - plane projections - vanishing points - specification of a 3D view - introduction to Bezier curves, B-Splines and surfaces - 3D transformations and clipping - hidden line elimination - shading - Graphical User Interfaces. Introduction to multimedia systems.

Text Books :

1. Donald Hearn and M. Pauline Baker., Computer Graphics – C Version., Pearson Education
2. William M. Newman and Robert F. Sproull. Principles of Interactive Computer Graphics, McGraw Hill

References :

1. David F. Rogers, Procedural Elements for Computer Graphics –McGraw Hill
2. Johm F. Kodgel Buford, Multimedia systems , Pearson Education/Addison Wesley.
3. Tay Vaughan, Multimedia making it works, 6th ed., TMH, 2004

06.303 NUMERICAL ANALYSIS & OPTIMIZATION TECHNIQUES 3-1-0

Module I:

Errors in numerical calculations - sources of errors - significant digits – Numerical solution of Non-linear equations - Bisection method - Regula-falsi method - Newton-Raphson method - Fixed point method of iteration - Rates of convergence of these methods; Solution of system of algebraic equations - exact methods - triangularization method - iterative methods ; Gauss - Seidel and relaxation method; Polynomial interpolation - Lagrange interpolation polynomial - divided differences - Newtons` divided difference interpolation polynomial - finite differences - operators Δ,∇,e,δ- Gregory - Newton forward and backward difference interpolation polynomials - central differences .

Module II:

Mathematical formulation of linear programming problem: Formulation of LPP : canonical and standard forms of LPP, Graphical method of solution, Simplex method - artificial variables - Charnes M method , revised simplex algorithm- two phase technique - duality in linear programming - dual simplex method and sensitivity analysis.

Module III:

Transportation Problem, Loops in transportation table, Methods of finding initial basic feasible solution, Tests for optimality. Assignment Problem, Mathematical form of assignment problem, methods of solution, Network analysis by linear programming and shortest route, maximal flow problem

Reference books

1. Sastry S. S., Numerical Analysis, Prentice-Hall India
2. Froberg, Introduction to Numerical Analysis, Second Edition, Addition Wesley
3. Gerald & Wheatley, Applied Numerical Analysis, Pearson Education Asia, Sixth edition.
4. P.K. De, Computer Based Numerical Methods and Statistical Techniques, CBS Pub.2006
5. Grawin W.W., Introduction to Linear Programming, McGraw Hill
6. Gass S.I., Introduction to Linear Programming, Tata McGraw Hill
7. Rao S.S., Optimization Theory and Applications, Wiley Eastern

06.304 OPERATING SYSTEM 3-1-0

Module I

Introduction : Basic concepts - terminology Historical perspective - early system - simple monitor - performance - types of OS - batch processing - multiprogramming - time sharing - real time system - Protection - different classes of computers - functions and components of an operating system - OS structure - Multiprocessor system - distributed system. Operating system services. Information management : File concepts file support - file system - directory structure - gaining access to files - basic file system calls - sharing and security - operation on files - file protection - allocation methods - implementation issues - case study.

Module II

Processor management : CPU scheduling - Review of Multiprogramming concepts - scheduling concepts - scheduling algorithm - Multiprocessor scheduling , Concurrent process - precedence graph - hierarchy of process - The critical section problem - Semaphores - process coordination - determinant program Modularization - Synchronization - concurrent languages - Structured and Modular concurrent programming. Memory management : Preliminaries - Memory architecture evolution - Bare machine - objectives - Resident monitor - Swapping - fixed partitions - variable partitions - paging - segmentation - combined system - virtual memory concepts - overlay - demand paging - page replacement - space allocation policies - segmented paging dynamic linking - caching of secondary storage information.

Module III

Device management : Physical characteristics – FCFS, SST , C- SCAN selecting a disk scheduling algorithm - sector queuing. I/O scheduling policies - terminal I/O handling - channels and control units - virtual devices. Dead locks : The dead lock problem characteristics prevention avoidance - detection - Recovery from dead lock - combined approach to dead lock handling. Protection : Goals of protection - Mechanisms and policies - domain of protection - access matrix and its implementation. Dynamic protection structures, Language based protection - security. Case study : Typical Operating System Characteristics MS DOS, WINDOWS, WINDOWS NT, NETWARE & UNIX.

Text Books :

1. A. Silberchats. et.al., Operating System Concepts- Windows XP Updation,6th ed., A John Wiley .2003

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References :

1. 1.Hanson, P.B., Operating System Principle, Prentice Hall of India.
2. Shaw. A. C. The Logical design of operating systems, Prentice Hall
3. 3.Deitel. H.M., Operating system principles –,2nd ed., Pearson Education/ Addison Wesley,.

06.305.1 SYSTEM PROGRAMMING 3-1-0

Module I

Systems Programming – What is systems programming, Difference between systems programming and application programming – Dependence on systems programming on hardware – System software and Machine architecture. Traditional (CISC) machines – VAX architecture, Pentium Pro architecture, RIC machine – ultra SPARK, Power PC, Cray architecture.

Module II

Assemblers – Basic assembler functions – machine dependent assembler features – machine independent assembler features – assembler design options – one pass assembler, multi pass assembler – assembler implementation – MASM, SPARC assemblers. Loaders and Linkers basic loader functions, machine dependent loader features, machine independent loader featured, loader design options – linkage editors, dynamic linkage editors, dynamic linking, bootstrap loaders, examples – DOS linker

Module III

Macro processors – basic macro processor functions – machine dependent and machine independent macro processor architectures – design options – implementation examples – MASM, ANSI C macro processors. Introduction to Compilers Text Editors – overview of the editing process – user interface, editor structure. Debuggers – debugging functions and capabilities, relationship with other parts of the system – user interface criteria.

Text Books

1. Leland L. Beck System Software – An Introduction to System Programming, 3rd ed., Addison Wesley Publishing.1997.

References:

1. John J. Donovan., Systems Programming , TMH, 1995
2. Dhamdhere, D.M., Operating Systems and Systems Programming, 2nd ed., TMH., 1997.

06.305.2 COMPILER DESIGN 3-1-0

Module I

Introduction to compilers and interpreters – Overview of compilation, Issues in compilation – structure of a compiler – compiler writing tools – bootstrapping – notations and concepts for languages and grammars – regular expressions – context free grammar, derivations and parse trees, BNF notations. Context of a lexical analyzer – construction of lexical analyzer, deterministic and non deterministic finite automata.

Module II

Compile time error handling, error detection, reporting, recovery and repair. Basic parsing techniques - Top down parsing - recursive descent parser, predictive parser simple LL(1) grammar. Bottom up parsers, operator precedence parser, LR grammar, LR(0), SLR(1), LALR(1) parsers.

Module III

Syntax directed translation schemes, intermediate codes, translation of assignments, translation of array reference, Boolean expressions, case statements, back patching, code optimization, loop optimization and global optimization, sources of sample code generation.

Text books:

1. Alfred V Aho and Jeffery D Ullman Principles of Compiler Design , Narosa/Addison Wesley

References:

1. Aho, Sethi,& Ullman., Compilers Principles, Techniques and Tools , Addison Wesley
2. Jean Paul Tremblay and Sorenson., The Theory and Practice of Compiler Writing McGraw Hill

06.305.3 THEORY OF COMPUTATION 3-1-0

Module I

Introduction to theory of computation, Finite state automata – description of finite automata, Properties of transition functions, Designing finite automata, NFA, 2 way finite automata, equivalence of NFA and DFA, Mealy and Moor machine, finite automata with epsilon moves, Regular sets and regular grammars, regular expressions, pumping lemma for regular languages, closure properties of regular sets and regular grammars, Application of finite automata, Decision algorithms for regular sets, Minimization of FSA.

Module II

Chomsky classification of languages, CFGs, Derivation trees, ambiguity, simplification of CFLs, normal forms of CFGs, pumping lemma for CFGs, decision algorithms for CFGs, designing CFGs, PDA – formal definition, examples of PDA, equivalence with CFGs, PDA and CFG, Chomsky hierarchy.

Module III

Turing machines basics and formal definition, Language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, Equivalence of single tape and multitape TMs, recursive and recursively enumerable languages, decidable and undecidable problems – examples, halting problem, reducibility.

Text Books :

1. Hopcroft and Ullman., Introduction to Automata Theory, Languages and Computation. 2nd ed., Pearson EducationNarosa,

References:

1. Manna, Mathematical theory of computation –McGraw Hill
2. Peter Linz., Introduction to Formal Languages and Automata Theory, Narosa Publishing., 1997.
3. Zvi Kohai., Switching and Finite Automata Theory ,Tata McGraw Hill

06.305.4 ALGORITHM ANALYSIS AND DESIGN 3-1-0

Module I

Concepts in algorithm analysis – the efficiency of algorithms, average and worst – case analysis, Asymptotic notation, time and space complexity, Recurrences – substitution method, iteration method and master method, Analysis of sorting algorithms insertion sorting, heaps, maintaining the heap property, building heap, heap sort algorithm, priority queues, Description of quick sort, randomized version of quick sort.

Module II

Red – Black trees – Height balanced trees – AVL TREES, rotations, Definition of B – trees – basic operations on B – trees, Algorithm for sets – Union and Find operations on disjoint sets, Graphs – DFS and BFS traversals, Spanning trees – Minimum Cost Spanning Trees, Kruskal's and Prim's algorithms, Shortest paths – single source shortest path algorithms, Topological sorting, strongly connected components.

Module III

Algorithm Design and analysis Techniques – Divide – and – Conquer, Merge Sort, Integer multiplication problem, Strassen's algorithm, Dynamic programming – Matrix multiplication problem, Greedy algorithms – Knapsack problem, Back – tracking – 8 Queens problem, Branch and Bound – Traveling Salesman problem. Definitions and Basic concepts of NP – completeness and NP – Hendress. Study of NP – Complete problems.

Text Books:

1. Thomas H. Corman, Charles E. Leiserson and Ronald L. Rivest., Introduction to Algorithms., 2nd ed., Prentice Hall of India.1990.
2. Horowitz , Sahni & Rajasekharan., Fundamentals of Computer Algorithms Galgotia Publication.1998
3. Kenneth A. Merman and Jerome L. Paul, Fundamentals of Sequential and Parallel Algorithms , Vikas Publishing Company

References:

1. A.V Aho, J.E. Hopcroft and J.D. Ullman, The Design and Analysis of Computer Algorithms Addison Wesley Publishing Company
2. Gilles Brassard and Paul Bratley , Fundamentals of Algorithms –, Prentice Hall of India.1996.

4. Sara Baase., Allaen Van Gelder., Computer Algorithms - Introduction to Design and Analysis., Addison Wesley.2000.
5. A.V. Aho, J.E. Hopcroft and J.D. Ullman, Data Structures and Algorithms, Addison Wesley.

06.306 DATABASE LAB 0-0-4

The following topics should be covered

Database customization
Creating databases/table spaces
Creating objects
Moving data
Recovery
Locking
Preparing applications for execution using a front end tool

06.307 COMPUTER GRAPHICS LAB 0-0-4

Topics covered in the subject 06.302 should be given as experiments
Line drawing algorithms, circle drawing, 2d and 3d transformations, polygons, hatching, filling, animations, 3d graphics

06.401 JAVA PROGRAMMING 2-1-0

Module I
The Java Revolution: Java applets, Java features, Byte codes, Internet classes. Review of object-oriented fundamentals: Object-oriented programming, encapsulation, inheritance, polymorphism, Object summary, Java genesis, global variables, pointers, memory allocation, data types, type casting, unsafe arguments lists, header files, unsafe structures, preprocessor Java language introduction: Java keywords, lexical issues, comments, reserved keywords, identifiers, literals, operators, separators, variables, declaring a variable, scope and lifetime of variables Data types: Numeric types, integers, floating point numbers, casting characters, Boolean, simple type, arrays, multi dimensional arrays.

Module II
Operators: Arithmetic operators, bit wise operators, relational operators, precedence, operator overloading. Flow control, branching, if-else, break, switch, looping, while, do-while, for, continue, exceptions, etc. Classes: The general form of a class, object references, instance variables, the new operator, the dot operator, method declaration, method calling, this, instance variable hiding, constructors, overloading, methods, overloading constructors, inheritance, super classes, creating multilevel hierarchy, method overloading, dynamic method dispatch, final, finalize, static, abstract, etc. Packages and interface: Defining a package, compiling classes in packages, importing packages, access protection, Interfaces: defining an interface, . implementing interfaces,

applying interfaces, variables in interfaces. String handling: Special string operations, character extraction, string , comparison, searching strings, modifying a string, string buffer, different string methods. Exception handling: Fundamentals, exception types, uncaught exceptions, try , and catch, multiple catch clauses, nested try statements, throws, exception sub classes , Boolean logic operators, Short circuit logical operators. Multithreaded Programming: Thread basics, creating and running a thread, the thread life cycle, thread priorities, advanced threading, synchronization, , messaging, inter thread ommunications, priorities and scheduling, daemon
threads.

Module III

Standard Java packages: Type wrapper classes, multithreading support classes, vector, stack, bitset, interface observer, stream tokenizer, GUI classes, Java I/O , classes and interfaces, file, the stream classes, filtered streams, buffer streams, , random access file Client/Server models, sockets, Internet addressing, Inet address, TCP/IP client sockets, URL connection. , Applets: The Applet class, applet architecture, applet display methods, repainting, handling events, HTML Applet tag, passing parameters to applets, applet context. Abstract window toolkit: Window fundamentals, container class, frame windows, creating a frame window in an applet, displaying information within a window, graphics drawing lines, rectangles, polygons, ellipses and circles, arcs, working , with color. Dyna Draw: The source, from C to Java, Dyna Draw out , Imaging: Creating, Loading and displaying images, Image observer interface, media tracker, Memory image source, pixel grabber, Image filter.

Text Book:

Java Hand Book, Patrick Naughton, Tata-McGraw Hill Publishing, New Delhi,

Reference Books:

1. Vanhelsuwe, Laurence et.al, Mastering Java, BPB, 1996.
2. Patrick Naughton and Herbert Schildt , Java: The Complete Reference, Tata McGraw Hill, 1997.
3. Andrew Cobley, The Complete Guide to Java, , Comdex
4. H. M. Dietel & P. J. Deitel, Java: How to program, PHI
5. Anuff, (ed).The Java Source Book, Galgotia
6. Somasundaram,K., Programming in Java 2, Jaico Pub.,2005.

06.402 PRINCIPLES OF MANAGEMENT 3-1-0

Module I

Definition of Management — Organizational Structure — Classical theories of organization — Functional approach, division of labour, Lines of authority, Span of control, authority and responsibility, efficiency of management, Behavioral theories of organization — Limitations of formal organization, human relation, group behavior, committee and group decision making, motivation and responsiveness to stimuli, Decision process approach, Parts of organization system, development of corporate strategy, dynamics of decision, role of system.

Module Il

Types of models: Mathematical planning models, deterministic and probabilistic models, relevance of models - for understanding analysis and design, planning and forecasting, rr and control limitations.Personnel functions — its evolution, objectives, principles, philosoDtues and pohdes, dutias &wi responsibilities of the personnel manager position of personnel department in the organization, line and staff relationship and the changing concept of personnel management in India.

Module Ill

Manpower planning —its use and benefits, problems and limitations, manpower inventory, manpower forecasting, job descriptions, manpower skills analysis and practices in the Indian industry — Recruitment — job specification, selection process, psychological testing, interviewing techniques, transfer, promotion and its policies, induction placement and exit interview — training and development its objectives and policies, planning and organizing the training department; training manager and his job, on and off the job training techniques, career planning, objectives of performance appraisal and its methods.

Reference Books:

1. Monappa Awn & Saiyadian M.S., Personnel Management 5 reprint, Tata McGraw Hill 1979
2. Prasad L.M., Principles and Practices of Management, S. Chand & Sons,1998
3. Temngton and Hall, Personnel Management: A new Approach, Prentice Hall International (Paperback edition)
4. Hellrigel Don, Solum, John W. & Woodman Richard, Organizational Behavior West Pub Comp, New York.

06.403 SOFTWARE ENGINEERING 3-1-0

Module I

Introduction- FAQs about software engineering - professional and ethical responsibility - system modeling - system engineering process - the software process - life cycle models - iteration - specification - design and implementation - validation - evolution - automated process support - software requirements - functional and non-functional requirements - user requirements - system requirements - SRS - requirements engineering processes - feasibility studies - elicitation and analysis - validation - management - system models - context models - behavior models - data models - object models - CASE workbenches

Module II

Software prototyping - prototyping in the software process - rapid prototyping techniques - formal specification - formal specification in the software process - interface specification - behavior specification - architectural design - system structuring - control

models - modular decomposition - domain-specific architectures - distributed systems architecture - object-oriented design - objects and classes - an object oriented design process case study - design evolution - real-time software design - system design - real time executives - design with reuse - component-based development - application families - design patterns - user interface design - design principles - user interaction - information presentation - user support - interface evaluation

Module III

Dependability - critical systems - availability and reliability - safety - security - critical systems specifications - critical system development - verification and validation - planning - software inspection - automated static analysis - clean room software development - software testing - defect testing - integration testing - object-oriented testing - testing workbenches - critical system validation - software evolution - legacy systems - software change - software maintenance - architectural evolution - software re-engineering - data re-engineering

Module IV

Software project management - project planning - scheduling - risk management - managing people - group working - choosing and keeping people - the people capability maturity model - software cost estimation - productivity estimation techniques - algorithmic cost modeling, project duration and staffing quality management - quality assurance and standards - quality planning - quality control - software measurement and metrics - process improvement - process and product quality - process analysis and modeling - process measurement - process CMM - configuration management - planning - change management - version and release management - system building - CASE tools for configuration management

References:

1. Ian Sommerville, Software Engineering, 7/e, Pearson Education Asia
2. Pressman R. S., Software Engineering, 5/e, McGraw Hill
3. Mall R., Fundamentals of Software Engineering, Prentice Hall of India
4. Behferooz A. & Hudson F.J., Software Engineering Fundamentals, Oxford University Press
5. Jalote P., An Integrated Approach to Software Engineering, Narosa

06.404.1 WINDOWS PROGRAMMING 3-1-0

Module I

The basics: Introduction to C++, windows programming, MFCs, review of C++ programming techniques, Microsoft Foundation Class and windows programming techniques, program building and debugging, managing screen, mouse, keyboard, timer etc, menu and accelerators, control of child window and dialog boxes.

Module II

Windows I/O graphics device interface: concept of GUI, device context, outputting the text, selecting text style, outputting line and box figures, mapping modes, other graphic techniques, handling the keyboard event and mouse. Windows features: child window controls, dialog box and controls, designing and managing menus, processing messages, writing MDI applications, memory
management

Module Ill

Graphics: using drawing functions, using bitmaps and bit operators. MFC programming, SDI programming, MDI program, structure of MFC programming, OLE programming.

Books:

1. Michael Young., Windows programming with Microsoft C++, , Sybex, Tech publications, .
2. Jacob Lee and Yula Kim., Windows programming Handbook, Comdex,

06.404.2 OBJECT ORIENTED ANALYSIS AND DESIGN 3-1-0

Module I

Concepts — complexity — the inherent complexity of software, the structure of complex systems, the role of decomposition, the role of abstraction and the role of hierarchy — on designing complex systems — the meaning of design, categories of analysis and design methods. The object model — the evolution of object model, trends in software engineering foundations of the model, OOP, OOD, OOA — elements of the object model — abstraction, encapsulation, modularity and hierarchy — applying the object model. Classes and objects — the nature of an object — what is an object, state, behavior and identity of objects — relationships of objects — links and aggregation — the nature of a class — relationship among classes — association, inheritance, aggregation, using instantiation and metaclass — the interplay of classes and objects — relationship between classes and objects in analysis and design on building quality classes and objects — measuring the quality of an abstraction, choosing operations, relationships and implementations.

Module II

Classification — the importance of proper classification — classification and object-oriented development, the difficulty of classification — identifying classes and objects — classical and modem approaches, object oriented analysis — key abstraction and mechanisms. The method — the notation — elements of the notation — class diagrams essentials: classes and their relationships, class categories, advanced concepts, specifications — state transition diagrams — object diagrams — interaction diagrams — module diagrams — process diagrams — applying the notation.

Module III

The process — first principles — traits of successful projects, towards a rational design process — the micro development process — identifying classes and objects, the semantics of classes and objects, the relationships among classes and objects and implementing classes and objects — the macro development process conceptualization, analysis, design, evolution and maintenance. Pragmatic management and planning — risk management, risk planning and walkthroughs — staffing — resource allocation, development team roles — release management — reuse - quality assurance and metrics — documentation — tools — special topics — the benefits and risks of object oriented development. Applications (case study) — data acquisitions, weather monitoring station frame works, foundation class library, client/server computing, inventory tracking.

Text Book:

1. Grady Booch., Object-Oriented Analysis and Design with Applications, Pearson Education/The Benjamin/Cumming publishing Company Inc.

Reference Books:

1. Peter Coad and Edward Yourdon., Object-Oriented Analysis, , Yourdon Press,
2. Peter Coad and Edwa Yourdon, Object-Oriented Design, , Yourdon Press
3. Martin and Dell., Object-Oriented Analysis and Design, , Prentice Hall, New Jersey,

06.404.3 ADVANCED COMPUTER ARCHITECTURE 3 – 1 – 0

Module II

Introduction to parallel processing – Evolution, parallelism in uniprocessor systems, parallel computer structures, classification, schemes, principles of pipelining and vector processing – principles of designing pipelined processors – vector processing requirements, vectorization methods, the architecture of Cray – 1 Cyber 205.

Module II

Structure and algorithms for array processors – SIMD processors, interconnection networks, associative array processing, The Iliac IV systems architecture – The MPP system architecture, Performance enhancement methods.

Module III

Multiprocessor architecture – functional structures, interconnection networks – parallel memory organization – multiprocessor operating system – interprocess communication mechanisms – system – interprocess deadlock and protection, scheduling strategies, parallel algorithms, The C.mmp system architecture, The S – I multiprocessor system. Control flow versus data flow computers, data flow computer architecture, systolic array architecture.

Text books:

1. K. Hawang & Brigg.,Computer Architecture and Parallel Processing McGraw Hill International edition.

References:

2. H.P. Hayes., Computer Architecture and Organization –, McGraw Hill.
3. P.M. Kogge., The Architecture of pipelined Computer –McGraw Hill.
4. Kogge., The Architecture of Symbolic Computers McGraw Hill.
5. M Sasikumar, Dinesh Shikkare, P. Raviprakash Introduction to Parallel Processing –- Prentice Hall of India.
6. V Rajaraman , C Sivarama Moorthy., Parallel computers – Architecture and Programming : - Prentice hall of India.

06.404.4 SOFTWARE PROJECT MANAGEMENT 3 – 1 – 0

Module I

Product: The evolving role of software-an industry perspective-aging software plant-software competitiveness. Software - characteristics-components-application-crisis on the horizon-software myths. Process: Process-methods-tools-a generic view of software Engineering-software process models-linear sequential model-proto typing model- RAD model- incremental, spiral, component, assembly and concurrent development models. Project Management concept: People – Product-Process-Project

Module II

Software process and project metrics: - Measures- Metrics and indicators- Software measurements-metrics for software quality- integrating metrics within the software process. Software project planning: Planning objectives - software scope-resources-software project estimation-Decomposition Techniques –Empirical estimation models-COCOMO model-automated estimation tools. Risk management: software risks-risk identification-risk projection-risk mitigation, monitoring and management-safety risks and hazards-RMMM plan.

Module III

Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task-refinement of major task-defining a task network-scheduling-project plan. Software quality assurance-quality concepts-software reviews-formal technical review-Formal approaches to SQA- software reliability-SQA plan-the ISO 9000 quality standards. Software configuration management: baselines-software configuration item-the SCM process-identification of objects in software configuration-version control-change control-configuration audit-status reporting-SCM standards.

Text Book:

1. Walker Royce, Software Project management: A unified framework , Pearson Education

References:

1. Pankaj Jalote., Software Project management in practice, Pearson Education
2. Kelkar, S.A., Software Project management: A concise study, PHI
3. Mike Cottorell and Bob Hughes , Software Project management –
4. Sommerville I , Software engineering –, Addison Wesley
5. Robert Futrell, Donald F Shafer and Linda I Quality software project management , Person Education
6. Pressman ,R.S., Software Engineering, McGraw Hill International

06.405.1 E – COMMERCE 3 – 1 – 0

Module I

Internet and World Wide Web- origin, commercial use of internet, growth of Internet. Economic Forces – Transaction cost, forces against vertical integration. Mark Up Languages – HTML, XML, Web Server, clients.

Client server architecture – intranet, extranet, Web based Tools – Web server hardware, Web server software features, Site Development and Management. Search engines

Module II

Electronic commerce - Tools, Web hosting, Java, Java Applets, Java Script, Active X control, E-mail –attachments. Communication channel threats, Encryption algorithms standards, Secure sockets layer, Firewalls.

Module III

Electronic payment system – Electronic cash, e-Wallets Smart card Brand creation on the web. Web Auction strategies Legal environment of e-commerce. Cultural Issues Social Implication. Impact on world economy.

Text book:

1. Kalakota.& Winston ,Frontiers of Electronic commerce , Pearson Education/Addison Wesley Publications
2. 2. H.A. Napier, P.J. Judd, O.N. Rivers, S.W. Wagner, Creating a winning E – Business , Vikas Publishing House

Reference :

1. Gary P Schneider and James T Perry ,Electronic Commerce Course Technology -Thomson Learning, Cambridge.

06.405.2 MULTIMEDIA SYSTEMS 3 – 1 – 0

Module I

Multimedia – definition, applications, introduction to making multimedia, multimedia Requirements, multimedia hardware – connections memory and storage devices, Input devices, output hardware, communication devices, multimedia software, basic tools, making instant multimedia.

Module II

Multimedia building blocks, text, sound, images, animation and video compression techniques, inter frame and intra frame compression. JPEG image compression standard and MPEG motion video compression standards, Fractal compression.

Module III

Object oriented multimedia, multimedia framework, frame work overview, media, transform, format and component classes; integrated multimedia systems. Multimedia and internet, multimedia on the web, tools for the World Wide Web.

Text books:

1. Tay Vaughan, Multimedia making it work ,6th ed., Tata McGraw Hill, 2004.
2. Simon J Gibbs and Dionysios C Tsichritziz, Multimedia Programming objects, Environments and frameworks – Addison Wesley 1995.
3. John F. Koegd Buford Multimedia Systems , Addison Wesly.

06.405.3 DATA MINING AND WAREHOUSING 3 – 1 – 0

Module I

Introduction to data warehousing- evolution of decision support systems- data warehouse environment- modeling a data warehouse- granularity in the data warehouse- data warehouse life cycle- building a data warehouse- online analytical processing

Module II

Data mining – demands potential and major issues- classification of data mining techniques- generalization, summarization and characterization- discovery and analysis of patterns, trends and deviations- mining knowledge in database systems

Module III

Data mining models- decision trees- genetic algorithms- neural nets – data mining process- data preparation – defining a study- data cleaning- prediction- enabling data mining through data warehouse- integration of data mining tolls with database systems- data mining applications – future trends

Text Books:

1. Anahory and Murray .,Data warehousing in the real world , Pearson Education/Addison Wesley
2. W H Inmon ,Building the Data Warehouse –, John Wiley & Sons

References:

1. George M Marakas, Modern Data Warehousing , Mining and Visualization-, Peason Education
2. Margaret H Dunham, Data Mining: Introductory and Advanced Topics- *Core Concepts* , Pearson Education
3. U.M. Fayyad G P and Shapiro.,Advances in Knowledge Recovery and Data Mining MIT Press.

4. George M Marakas, Decision support systems in the 21st century –, Pearson education

06.405.4 BIOINFORMATICS 3-1-0

Module I

Molecular biology, gene structure and information content, molecular biology tools, genomic information content, data searches and pairwise alignments, gaps, scoring matrices, Needleman and Wunsch algorithm, global and local alignments, database searches.

Module II

Patterns of substitution within genes, estimating substitution numbers, molecular clocks, molecular phylogenetics, phylogenetic trees, distance matrix methods. Character-based methods of phylogenetics, parsimony, ancestral sequences, searches, consensus trees, tree confidence, genomics, prokaryotic gene structure, gene density, eukariotic genomes, gene expression.

Module III

Protein and RNA structure prediction, polypeptic composition, secondary and tertiary structure, algorithms for modeling protein folding, structure prediction, proteomics, protein classification, experimental techniques, ligand screening, post-translational modification prediction

References

1. D. E. Krane and M. L. Raymer, Fundamental Concepts of Bioinformatics, Pearson Education, 2003.
2. T. K. Attwood and D. J. Parry-Smith, Introduction to Bioinformatics, Pearson Education, 2003.
3. J. H. Zar, Biostatistical Analysis, 4/e, Pearson Education, 1999.

06.406 JAVA PROGRAMMING LAB 0-0-4

Topics covered in the subject 06.401 should be included.

06.407 MINI PROJECT 0-0-6

A mini-project should be done by the students based on concepts they have already learnt in the first two years of the MCA programmes. It may be primarily based on database concepts, object oriented concepts, optimization tools, compiler design, management aspects etc.

Objectives of the mini project:.

Working on Mini project is to get used to the larger project, which will be handled in the 6th semester

The project work constitutes an important component of the MCA programme of KU and it is to be carried out with due care and should be executed with seriousness by the students. The objective of this mini project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

Guidelines:

A student is expected to devote about 1-2 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal that is to be treated as an assignment. The synopsis approval will be given by Faculty/Project Counsellors. Project Proposal should include the following:

Title

Objectives

Input and Output

Process Logic

Limitations of the Project

Tools/Platforms, Languages to be used

Scope of Future Application.

Mini-project evaluation: The evaluation of the mini-project will be based on the project reports submitted by the student a presentation and a demonstration. The sessional marks shall also be awarded based on report/seminars/demo.

06.501 COMPUTER NETWORKS 3 – 1 – 0

Module I

Introduction – Uses – Network Hardware – LAN –MAN – WAN – Wireless networks, Inter networks – Network Software – Protocol hierarchies – Design issues for the layers – Interface & Service – Service Primitives. Reference models – OSI – TCP/IP. Physical layer – ISDN Services – Broad band ISDN – Narrow band ISDN ATM Networks – ATM Switches – Data Link layer Design Issues – Error & Error Detection & Correction – Flow Control Example Data link Protocols. HDLC DLL in Internet – DLL in ATM.

Module II

MAC Sub layer – IEEE 802 FOR LANs & MANs 802.3, 802.4, 802.5 & 802.6 Bridges – High Speed LANs – FDDI.

Module III

Network layer – Routing – Shortest path routing – Flooding – Flow based Routing – Routing for mobile hosts – Congestion control algorithms – Internetworking – Network layer in internet & ATM. Transport Layer – Elements of Transport Protocol – TCP & UDP. ATM adaptation layer – application layer – Cryptography. DNS, SNMP – Electronic mail – World Wide Web.

Text Books:

1. Andrew S Tanenbaum Computer Networks –, 5th ed.,Pearson Education.2003.
2. Douglas., Computer Networks and Internets, Addison Wesly.

References:

3. William Stallings Data and Computer Communications , 7th ed., Pearson Education.,.
4. Ha Willman Stallings, Hand book of Computer Communications Standards, Volume 1 –PHI.
5. Keshav.S, An Engineering Approach to Computer Networking, Pearson Education.1997.

06.502 INTERNET TECHNOLOGY 3 – 1 – 0

Module I

Computer networks and the internet-principles i\of application layer protocols-HTTP-FTP- email –DNS-socket programming –web servers-web pages- Multimedia networking:-applications-streaming stored audio and video- internet telephony- RTP-scheduling and policing mechanisms- integrated services-RSVP-differentiated services-network management-the internet management frame work

Module II

Network security-e-mail security-privacy-S/MIME –IP security-overview-architecture-authentication-header and payload-combining security associations-key management-web security-SSL and transport layer security-SET-systems security-intruders and viruses-firewalls-design-trusted systems

Module III

Mobile internet-mobile network layer-mobile IP-dynamic host configuration protocol-ad hoc networks-mobile transport layer-implications of TCP on mobility-indirect TCP-snooping TCP- mobile TCP transmission-selective retransmission-transaction oriented TCP-support for mobility-file systems-WAP protocols-WML -wireless telephony applications

Text Books:

1. Kurose J F and Ross, K.W.,Computer Networking: A Top Down Approach Featuring the Internet , Addison Wesley,
2. Stallings W Cryptography and Network Security Principles & Practice.,,3rd ed., Pearson Education 2003.
3. Schiller J ., Mobile communications –, Addison Wesley

References:

1. Deitel, H M and Deitel, P. & Nieto T R Internet and World Wide Web: How to program , Pearson education
2. Singhal S , et.al., WAP: The Wireless Application Protocol –, Pearson education
3. Goncalves M, Firewalls: A complete guide –Tata McGraw Hill.
4.

06.503 ARTIFICIAL INTELLIGENCE 2 – 1 – 0

Module I

Artificial Intelligence: Introduction, Intelligent Agents. Problem solving: Problem solving by searching, Informed search, and Exploration, Constraint satisfaction Problems, Adversial Search.

Module II

Knowledge and Reasoning: Logical Agents, First-order Logic, Inference in First-Order Logic, Knowledge Representation Planning: Planning, Planning and Acting in the Real World,

Module III

Uncertain Knowledge: Uncertainty, Probablistic reasoning,Making simple decisions. Learning: Learning from Observations, Knowledge in learning, Statistical learning Methods, Reinforcement Learning.

Text book:

1. Stuart Russel and Peter Norvig., Artificial Intelligence a Modern Approach, 2nd ed., Pearson Education 2002.

References:

2. Nilsson, N.J., Artificial Intelligence:A New Synthesis., Morgan Kaufmann , 1998.
3. Rich & Knight ., Artificial Intelligence , 2nd ed., McGraw Hill, 1992
4. Luger., Artificial Intelligence 4th ed., Pearson Education.

06.504.1 CRYPTOGRAPHY AND NETWORK SECURITY 3 – 1 – 0

Module I

Symmetric Cipher Models- Substitution techniques- Transposition techniques- Rotor machines- Steganography- DES: Simplified DES- Block Cipher principals- The Data Encryption Std.. The Strength of DES- Differential and linear Cryptanalysis- Block Cipher Design principles- Block Cipher modes of operations- IDEA: Primitive operations- Key expansions- One round, Odd round, Even Round- Inverse keys for description. AES: Basic Structure- Primitive operation- Inverse Cipher- Key Expansion, Rounds, Inverse Rounds.

Module II

Public key Cryptography and RSA functions:- Principles of Public key Cryptography Systems- RSA algorithms- Key Management - Diffie-Hellman Key Exchange, Elliptic curve cryptography- Authentication requirements- Authentication functions- Message authentication codes- Hash functions- Security of Hash functions and MACS- Digital signatures- Authentication protocols- Digital signature standards.

Module III

Network security: Electronic Mail Security: Pretty good privacy- S/MIME IP Security: Architecture- authentication Header- Encapsulating Security payload- Combining Security associations- Key management- Web Security: Web Security considerations- secure Socket Layer and Transport layer Security- electronic translation. Firewalls-Packet filters- Application Level Gateway- Encrypted tunnels

Text Book:

1. William Stallings Cryptography and Network Security –, 3rd ed., *Principles& Practice*.,Pearson Education.

References:

1. Charlie Kaufman, Radia Perlman, Mike Speciner , Network Security- *Private Communication in a Network World,* 2nd ed., Pearson Education

06.504.2 DISTRIBUTED SYSTEMS 3 – 1 – 0

Module 1

Characteristics of distributed System: Examples of distributed systems – resource sharing and web – world wide web – issues in the design of distributed system. System models: Architectural models and fundamental models. Networking and internetworking: Types of network – network principles – internet protocols

Module II

Interprocess communication : the API for internet protocol – external data representation and marshalling – client server communication - group communication- case study: inter process communication in Unix. Distributed objects and remote invocation:

communication between distributed objects – remote procedure call – Events and notification. Operating system support: Operating system layer – protection – processes and threads- communication and invocation – Operating system architecture security: Overview of security techniques

Module II

Distributed file system: File service architecture - network file system- Andrew file system-recent advances Transactions and concurrency control: nested transactions-locks-optimistic concurrency control-comparison of methods for concurrency control-flat and nested distributed transactions- distributed deadlocks- transactions recovery. Replication System model and group communication- fault tolerant services-transactions with replicated data

Text Book:

1.George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems: Concepts and Design –3rd ed., Pearson Education.

References:

1. Andrew S Tanenbaum and Maarten Van Steen Distributed Systems: Principles and Paradigms –Pearson Education.
2. Thomas Connolly and Carolyn Begg., Database Systems: A practical approach to design implementation and management –- Pearson Education

06.504.3 NEURAL COMPUTING 3 – 1 – 0

Module I

Introduction – Brain and Computer – learning in biological systems and machines – the basic neuron – modeling a single neuron – learning in simple neurons – the perception – the perceptron learning rule – proof – limitations of perceptron – the multiplayer perceptron – Back Propagation network – Counter Propagation network.

Module II

Kohnen self Organizing networks – introduction – the Kohnen algorithm – weight training – neighborhoods – reducing the neighborhood – the phonetic typewriter – Hopfield networks – introduction – the Hopfield model – the energy landscape – the Boltzman machine – constraint satisfaction.

Module III

Adaptive resonance theory – architecture and operation – ART algorithm – training the ART network – classification – associative memory – Bi-directional associative memory – application of neural nets – pattern recognition.

Text Books :

1. Beale. R and Jackson. T, “Neural Computing – An Introduction” , Adam Hilger.

References :

1. Philip D. Wasserman, “Neural Computing – Theory and Practice”, Van Nostrand and Reinhold,
2. James A. Freeman and David M. Skapura, “Neural Network Algorithms, Application and Programming Techniques”, Addison – Wesley publishing company,

06.504.4 CLIENT SERVER COMPUTING 3-1-0

MODULE I.

The client-Client Server model, Concurrent Processing, Program Interface to Protocols, Socket interface, Client Software Design - Example, Concurrency in clients

MODULE II

The Server Server Software Design, Interactive Connectionless and connection Oriented Servers, Concurrent Connection Oriented Servers, Single Process Concurrent Servers, Multi-protocol Servers, Multiservice Servers, Uniform, Efficient Management of Server Concurrency

MODULE III

Applications -Tunneling at the transport and applications levels. Application Level gateways, External data representation, Remote Procedure call, Distributed program Generation, Network File System, Mount, Telnet.

Reference :

1.D.E Comer and D L Stevens, Internetworking with TCP/IP Vol III, *Pearson Education*

06.505.1 WEB APPLICATIONS DEVELOPMENT 3-1-0

MODULE I

Developing applications Creating Java Applications, Creating HTML resources, Creating Web applications with dynamic content Database applications Database connectivity, SQL Wizard & SQL Query Builder, Stored procedures, Accessing databases from applications

Module II
Testing and Deploying Web applications Server Instances & server configurations, Testing and Debugging applications, Deploying Web applications

MODULE III
Profiling & Team Programming Plug-ins development

Reference :
1. Osamu Takaglwa et.al, " Web Sphere Studio Application Developer Programming Guide" IBM.Com/red Books

06.505.2 SIMULATION AND MODELING 3 – 1 – 0

Module I
System Models - Continuous and discrete models - Static and Dynamic Models - Principles used in modeling - system studies - system analysis - design and postulation. System simulation : Techniques of simulation - Monte Carlo Method - Comparison of analysis and simulation - Types of system - Simulation Numerical computation for simulation - Applications of digital analog and hybrid computers in continuous system simulation - Real time simulation.

Module II
Exponential growth models, exponential decay models - Logistic curves - Generation of growth models - system models - system dynamic diagrams - Multisegment models Representation of time - delay - Review of probability concepts - Arrival pattern and service times - poisson arrival patterns - Exponentiations, Erlang and Hyper Exponential Distribution - Mathematical studies of Queuing problems.

Module III
Discrete system Simulation : Discrete events - Generation of arrival patterns - Simulation of telephone systems - Simulation languages - GPSS programming General description - simscript programs, simscript system concept.

Text Book :
1. Geoffrey Gordon., System simulation –, Prentice Hall of India Pvt. Ltd.1999.

References :
1. Maryanski F., Digital Computer Simulation , CBS Distributors.
2. Bank and Carson., Discrete Event System Simulation, , Prentice Hall Inc.

06.505.3 UNIX AND SHELL PROGRAMMING 3-1-0

Module I

Unix overview — History of Unix — Structure of Unix OS — The Kernel — running a command, shell — all about Unix file system - file structure — file creation — mode umbers and file names — file system — multiple file system — checking file system — mounting and unmounting special files — file security.

Module Il

Problem solving approaches in Unix — Unix commands — Compound command, redirection, tees, pipes. filters — Unix tools, grep, sed, tr, awk — shell scripts — C programs for soMng r — Building your own command library program. Shell — Working with t boume shell — shell meta character shell vahab user created, system created, standard) - local and global shell variables — shell scripts — interactive shell scripts — shell script argument — looping and making choice, for loop, case, while and until — A survey of C shell — csh.

Module Ill

Unix and GUI, X Windows, Motif, Unix and networking sockets — socket interfaces — Advanced IPC facilities. Linux — History, structure, comparison with Windows and OS/2 — system security and stability — Utilities.

Text Books:

1. Stephan Pratta., Advanced Unix Programming, , BPB,
2. Lowell Jay Arther & Ted Barnn.,Unix Shell Programming,

Reference Books:

1. Unix for programmers and users — A complete guide, Eagle Wood Cliffs, PHI,
2. David A Curry.,Unix System Security — A guide for users and system administrators,
3. Sumithaba Das., Unix System V — Concepts and Applications, Tata McGraw Hill,
4. Peter Norton and Harley Habin., Guide to Unix, BPB,.

06.505.4 MANAGEMENT INFORMATION SYSTEMS 3-1-0

Module I

Definition of management information system, MIS a evolving concept, MIS and other academic disciplines subsystems of MIS. Structures of MIS, Operating elements of an information system, MIS support for 5 decision making, MIS structure based on management activity, MIS structure based on organizational function, synthesis of MIS

structure formal versus informal information structure, extent of integration, extent of user-machine interaction.

Module Il

Decision making process: Phases in the decision making process, intelligence and design phases, concepts of decision making, behavioural model of decision maker, behavioural model of organizational decision making, decision making under psychological stress, methods for deciding among alternatives, documenting and communication decision rules, reliance of decision making concepts of information system design.Concepts of information: Definition of information, information in mathematical theory of communication, information present in quality of information, value of information in decision making, value of information other than a decision. Humans as information processors: The Newell-Simon model, tentative limits on human information processing, concepts of human cognition a learning, characteristics of human information processing performance. -managers as information processors, implications for information system design. System concepts: General model of a system, types of systems, subsystems, system stress and system change, system concepts and organizations, system concepts applied to MIS

Module Ill

Concepts of organizational planning: The planning process, computational support for planning, charactenstics of control processes, the nature of control in organizations. Organizational structure and management concepts: The basic model of organizational structure, modifications of basic organization structure, information processing model of organization, organization culture and power, organization change, management theories, organizations as socio-technical systems, implications of organizational structure and management theory for MIS. Decision support systems: Expert systems, support for decision making process, approaches to development of decision support systems, summary of planning support system, summary of a control support systems. Planning for information systems: content of information system master plan, the Nolan stage model, the three stage model of the planning process, strategic planning, stage analysis of organizational information requirements, resource allocation.

Text Book:

1. Gordon B. Davis, Margrethe H. Olson., Management Information Systems — Conceptual Foundation, Structure and Development, , Second Edition, McGraw Hill International Editions.

Reference Books:

1. Roberts Murdick, Joel E. Rose .,Information Systems for Modem Management, Second Edition, PHI, New Delhi.

2. Mcleod., Management Information Systems A Study of Computerized Information Systems, Sixth Edition, Prentice Hall.
2. James A O'Brien., Management Information Systems: A Managerial End User Perspective,, Galgotia,
3. David Kroenke and Richard Hatch , Management Information Systems, ,MCH,

06.506 COMPUTER NETWORKS LAB 0-0-4

Implementation of TCP, UDP, FTP, telnet, email clients, chatting, unicasting, multicasting

06.507 WEB APPLICATIONS LAB 0-0-4

Experiments like the flowing should be done in this lab

Implement Web applications using Servelets, HTML and JSPs and deploy.

Test the application on an Application Server.
Debug Web applications locally and remotely.
Developing applications in a team environment.
Retrieval of data from database using SQL and exchange information in XML format.

06. 601 —Project Work.

Students are advised to carry out the project work in-order to understand systematic and good software development methodologies and management in an industry or R&D environment for a duration of a full semester and submit a detailed report. The Master's level projects should be done individually.