Department Information Technology

School of information science and Technology

KANNUR UNIVERSITY

Regulations, Curricula, Syllabus and Scheme of Examinations

(Credit and Semester System)

Master of Computer Applications

(With effect from 2010 Admission)

1. **Duration** of the MCA programme shall be 3 years, divided into 6 semesters. Each semester should have 16 – 18 weeks. The entire period of the sixth semester shall be devoted for the Major project work.

2. **Selection** will be based on Entrance examination conducted by the University. The Entrance examination will consist of questions from the following:

   i. Mathematics : 50%

   (Syllabus : Set theory, Propositional Logic, Boolean Algebra, Linear Algebra, Coordinate Geometry and Conic Section, Trigonometry, Matrices, Vectors, Linear Programming, Differential Calculus, Integral Calculus, Series and Sequences, Real and Complex numbers, Polynomials, Permutations & Combinations and Elementary Probability theory.)

   ii. Aptitude and Mental ability : 50%

3. **Eligibility for admission**: Bachelors Degree in any discipline of this University or any other degree of other University / Institution recognized by this University as equivalent thereto with a minimum of 50% marks in optional main subjects and mathematics as one of the subject at least at Higher secondary level.

   Candidates studying in the final year / semester of their qualifying degree and have successfully cleared all the papers of their previous years / semesters may appear for the entrance examination. Such candidates, if selected, will be admitted only on producing the qualifying degree mark-list.

4. **Course Structure**

   4.1. Two kinds of courses/subjects/papers are offered - core courses and elective courses. Core courses are offered by the department conducting the programme. Elective courses are offered either by the department conducting the programme or by any other department.

   4.2. Elective courses should be relevant to the programme for which the student is admitted and are identified by the department council of the department offering the programme.

   4.3. Each course shall have a unique alphanumerical code.

   4.4 Credit of a course (except for the project work / dissertation) should not exceed 4. One credit shall be given to one-hour lecture or 3 hours practical/tutorial work per week.

   4.5 No regular student shall register for more than 24 credits and less than 12 credits per semester.

   4.6 The minimum total credits required for the successful completion of a six semester MCA programme is 120, and in which minimum credits required for core courses is 80, and minimum for elective courses is 18.

   4.7 The department council shall design the core and elective courses including the detailed syllabus for each programme offered by the department. The department council shall have the freedom to introduce new courses and / or to modify / redesign existing courses and replace any existing course with a new course to facilitate better exposure and training for the students.

   4.8 Prior approval from the Board of Studies and Academic Council is not required for such modifications but shall be done only with the approval of the academic committee. Such changes shall be brought to the notice of the board of studies, faculties and academic council in the next meeting.

5. Evaluation of all semester papers will be in two parts viz. Continuous Assessment (CA) and End Semester Assessment (ESA). Forty percent marks will be set apart for CA and sixty percent marks will be set apart for ESA for both theory and practical parts. Weightage for theory and practical components will be according to the credit distribution.

- Continuous assessment includes assignments, seminars, periodic written examination etc. There shall be a minimum of two test papers and two assignments for which the minimum percentage of marks will be twenty and ten respectively.
- One teacher nominated by the Head of the Department by rotation will act as the Semester Coordinator for consolidating the mark lists for internal evaluation. The consolidated mark-lists will be published in the Departmental notice board on the completion of the classes for that particular semester under the seal and signature of the Head of the Department and the Semester Coordinator.

☞ **Seminar:** Each student should select a relevant topic and prepare a seminar report, under the guidance of a faculty member. Students should prepare an abstract of the topic and distribute it to every faculty member at least two days ahead of the seminar. Presentation shall be for a minimum of one-hour duration. Presentation and seminar report will be evaluated by a group of at least three faculty members (Mark distribution: 50% for report and 50% for presentation and discussion).

☞ **Project :**

(a) Mini Project: Mini project should be carried out during the fifth semester along with other papers. The project will be carried out in the Department under the guidance of a faculty member who shall be responsible for the continuous assessment (CA) based on the periodic progress and progress report. Every student should do the mini project individually and no grouping is allowed. Project report should be submitted for end semester evaluation. Evaluation for ESA shall be conducted by a board of two examiners (Mark distribution: Content 30% + Methodology 30 % + Presentation 20 % + Viva- voce 20 %).

(b) Major Project: The Major project work should be carried out over the entire period of the final semester in an Industry / R & D organization / Department. If the project is carried out in an Industry / R & D organization outside the campus, then a co-guide shall be selected from the Department. If the project work is of interdisciplinary in nature, a co-guide shall be taken from the other department concerned. Every student should do the Major Project individually and no grouping is allowed. All the candidates are required to get the approval of their synopsis and the guide before commencement of the project from the Department. A Supervisor / Guide should be a postgraduate in CS or allied subject or a person of eminence in the area in which student has chosen the project. A Departmental committee duly constituted by the Head of the Department will review the project periodically every month. The Continuous Assessment marks (CA) will be based on the periodic progress and progress report. At the end of the semester the candidate shall submit the Project report (two bound copies and one soft copy) duly approved by the guide, co-guide for End Semester Assessment. A board of two examiners appointed by the University should conduct evaluation for ESA. (Mark distribution: Content 30% + Methodology 30 % + Presentation 20 % + Viva- voce 20 %). If project work and the report are found to be not up to the expected standard, the examiners can ask the candidate to modify and resubmit the project report after incorporating the suggestions of the examiners. Such reports shall be resubmitted within the stipulated period suggested by the examiner(s).

6. Grievance Redressel Mechanisms: There shall be provision for grievance redressel at three levels. Complaints should be filed within one week of the publication of the results.

6.1 There shall be a grievance committee at the department level, which shall hear the complaints of the students. The Department Council along with a student nominee of the Department Students Union from the concerned faculty shall act as the grievance committee.

6.2 At University level the constitution of the grievance committee shall be as under

a) The Pro-Vice-Chancellor — Chairman and Convener
b) The Convener of the Curriculum Committee — Vice Chairman
c) The Head of the Department concerned.
d) A nominee of the University Students Union

This committee shall hear the complaints unsolved by the department grievance committee.

6.3 Complaints unsolved by the University level grievance committee shall be placed before the Vice-Chancellor.

7. End Semester Assessment:

(a) Question pattern (Theory part): There shall be *eight questions, with at least one question from each unit, carrying equal marks*. Each question may contain sub divisions also. Student has to answer any five full questions to secure full marks.

(b) Question pattern (Practical part): One compulsory question that may contain sub divisions is to be attempted by the student.

8. Grading:

8.1 An alphabetical grading system shall be adopted for the assessment of student's performance in each course. The grade is based on a ten-point scale. The following table gives the range of marks, grade points and the alphabetical grade.

Range of marks %	Grade points	Alphabetical grade
90 – 100	9	A+
80 – 89	8	A
70 – 79	7	B+
60 – 69	6	B
50 – 59	5	C
<50	0	F

8.2 A minimum of grade point 5 (Grade C) is needed for the successful completion of a course.

8.2 Performance of a student at the end of each semester is indicated by the Grade Point Average (GPA) and is calculated by taking the weighted average of grade points of the courses successfully completed. Following formula is used for the calculation. The average will be rounded off to two decimal places.

$$GPA = \frac{\text{Sum of (grade points in a course multiplied by its credit)}}{\text{Sum of credits of the course}}$$

8.4 The overall performance of a student is indicated by the Cumulative Grade Point Average (CGPA) and is calculated using the same formula given above.

8.5 Approximate percentage of marks can be calculated by using CGPA **X** 10 + 5

8.6 Based on CGPA overall letter grade of the student shall be in the following way.

CGPA	Overall letter grade
8.5 and above	A+
7.5 and above but less than 8.5	A
6.5 and above but less than 7.5	B+
5.5 and above but less than 6.5	B
4.5 and above but less than 5.5	C

8.7 Classification for the degree is given as follows:

Classification	Overall letter grade
First Class with distinction	*A+ and A*
First Class	*B+ and B*
Second Class	*C*

8.8 Supplementary Examination for Failed Candidates:

i) Candidates, who have failed (F grade) in the semester examinations (except project work) can appear for the failed papers for the particular semester along with regular students. However, the Continuous Assessment (CA) marks shall remain the same. Two such supplementary chances will be given for each semester within two years.

ii) In the event of failure in Project Work the candidate shall re-register for project work, redo the project work and resubmit the project report afresh for evaluation. The Continuous Assessment marks shall be freshly allotted in this case.

8.9A student who fails can repeat the full programme once if the department council permits.

8.10. No student shall be allowed to take more than twelve consecutive semesters for completing a MCA programme from the date of enrolment.

9. Grade Card

9.1 The university under its seal shall issue to the students a grade card on completion of each semester and a consolidated grade statement at the end of the MCA programme.

9.2 Grade card shall contain the following.

a. Title of the courses taken as core/elective.
b. The credits associated with and grades awarded for each course.
c. The number of credits (core and elective separately) earned by the student and the grade point average.
d. The total credits (core and elective separately) earned by the student till that semester.

9.3 The grade card issued on completion of the programme shall contain the name of the programme, the department / school offered the programme, the titles of the courses taken, the credits associated with each course, grades awarded, the total credits (core and elective separately) earned by the student, the CGPA and the class in which the student is placed.

10. Ranking:

Only those candidates who have passed all the papers in the first appearance within the minimum period will be considered for ranking on the basis of CGPA for the entire course.

11. Promotion to Higher Semester:

Only a student who has minimum required attendance (75%) or whose shortage has been condoned by the University for genuine reasons and registered for the semester examination will be eligible for promotion to higher semester. Students who fail to secure minimum attendance or condonation by the University may be given one more chance to repeat the semester along with the subsequent batch of students after obtaining re-admission, if the Department Council permits.

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Master of Computer Applications
Course Structure and Scheme of Evaluation (From 2010Admission)
(Credit and Semester System offered in the Department of IT)

Semester 1

Subject Code	Subject	Instructional Hrs/week			Marks			
		L	P	T	ESA	CA	Tot	
MCAC11	Computer Organization	3	0	1	60	40	100	3
MCAC12	Discrete Mathematics	3	0	1	60	40	100	3
MCAC13	Digital Systems and Microprocessors	4	0	1	60	40	100	4
MCAC14	Operating Systems	3	2	1	60	40	100	4
MCAEI	Elective - I	2	3	1	60	40	100	3
MCAEII	Elective II	3	2	1	60	40	100	4
MCAC17	Seminar	0	0	4	-	50	50	1
Total		18	7	10	360	290	650	22

Semester 2

Subject Code	Subject	Instructional Hrs/week			Marks			
		L	P	T	ESA	CA	Tot	
MCAC21	Linux Administration	2	2	1	60	40	100	3
MCAC22	Database Management Systems I	2	3	1	60	40	100	3
MCAC23	Data Structures & Algorithms	3	2	1	60	40	100	4
MCAC24	Data Communication & Networks	3	0	1	60	40	100	3
MCAEIII	Elective - III	4	0	1	60	40	100	4
MCAEIV	Elective IV	4	0	1	60	40	100	4
MCAC27	Seminar	0	0	4	-	50	50	1
Total		18	7	10	360	290	650	22

Semester 3

Subject Code	Subject	Instructional Hrs/week			Marks			
		L	P	T	ESA	CA	Tot	
MCAC31	Finite Automata & Formal Languages	3	0	1	60	40	100	3
MCAC32	Network Programming and Administration	2	3	1	60	40	100	3
MCAC33	Software Engineering	3	0	1	60	40	100	3
MCAC34	Computer Graphics	3	3	1	60	40	100	4
MCAEV	Elective V	4	0	1	60	40	100	4
MCAEVI	Elective VI	4	0	1	60	40	100	4
MCAC37	Seminar	0	0	4	-	50	50	1
Total		19	6	10	360	290	650	22

Semester 4

Subject Code	Subject	Instructional Hrs/week			Marks			
		L	P	T	ESA	CA	Tot	
MCAC41	Internet & Java Programming	2	2	1	60	40	100	3
MCAC42	Visual Programming	2	3	1	60	40	100	3
MCAC43	Cryptography & Network Security	2	2	1	60	40	100	3
MCAC44	Artificial Intelligence	3	0	1	60	40	100	3
MCAEVII	Elective - VII	4	0	1	60	40	100	4
MCAEVIII	Elective –VIII	4	1	1	60	40	100	4
MCAC47	Seminar	0	0	4	-	50	50	1
Total		17	8	10	360	290	650	21

Semester 5

Subject Code	Subject	Instructional Hrs/week			Marks			
		L	P	T	ESA	CA	Tot	
MCAC51	Advanced Java Programming	2	2	1	60	40	100	3
MCAC52	Data Base Management Systems II	3	0	1	60	40	100	3
MCAC53	Linux Kernel	2	3	1	60	40	100	3
MCAE IX	Elective -IX	4	0	1	60	40	100	4
MCAEX	Elective – X	4	0	1	60	40	100	4
MCAC56	Mini Project	0	5	5	60	40	100	2
Total		15	10	10	360	240	600	19

Semester 6

Subject Code	Subject	Duration of the Project	Marks			Credit
			ESA	CA	Total	
MCAC61	Major Project & Viva	18 weeks	210	140	350	14

List of Electives

MCAE1 Numerical Computing with C
MCAE2 Object Oriented Programming using C++
MCAE3 Object Oriented Programming using Java
MCAE4 Design & Analysis of Algorithms
MCAE5 System Programming & Compiler Design
MCAE6 Probability & Statistics
MCAE7 Operation Research
MCAE8 Graph Theory and Combinatorics
MCAE9 System Simulation & Modeling
MCAE10 Signals & Systems
MCAE11 Digital Signal Processing (PR : MCAE10)
MCAE12 Information Theory and Coding (PR : MCAE11)
MCAE13 Digital Speech Processing (PR : MCAE11)
MCAE14 Natural Language Processing
MCAE15 Advanced Microprocessors
MCAE16 Embedded Systems
MCAE17 Advanced Computer Architecture
MCAE18 VHDL Programming
MCAE19 Bioinformatics Foundations
MCAE20 Bioinformatics using Perl (PR MCAE19)
MCAE21 Bioinformatics Techniques. (PR MCAE20)
MCAE22 Sequence & Genome Analysis (PR MCAE21)
MCAE23 Advanced Bioinformatics Algorithms (PR MCAE22)
MCAE24 Neural Computing
MCAE25 Fuzzy Sets & Systems
MCAE26 Pattern Recognition
MCAE27 Digital Image Processing (PR : MCAE11)
MCAE28 Web Technology
MCAE29 Data Mining
MCAE30 Multimedia Technology
MCAE31 Linux firewalls & IPV6 Protocols

Core Papers

MCAC11 Computer Organization

Unit 1 : Number Systems, Character codes, Basic structure of Computers.

Unit 2 : Machine Instructions and Programs, Input/Output Organization.

Unit 3 : Memory system.

Unit 4 : Arithmetic, Basic Processing Unit.

Unit 5 : Computer Peripherals, Basic concepts of Pipelining and Parallel processing.

Reference Books:

1. Carl Hamacher, Z Vranesic & S Zaky, Computer Organization, McGraw-Hill 2002
2. J.P. Hayes, Computer Architecture, McGraw-Hill 2002
3. M. Morris Mano, Computer System Architetutre, PHI 2003
4. Sivarama. P. Dandamudi, Fundamentals of Computer Organization and Design, Springer Veralg 2004.

MCAC12 Discrete Mathematics

Unit 1

Mathematical logic: statements and notations, connectives, normal forms, well formed formulas, implications, satisfiability and tautology, predicate calculus.

Unit 2

Set and relations: sets, subsets, operations on sets, principle of inclusion and exclusion, piano axioms and mathematic inductions, generating functions, recurrence relations. Product sets and partitions, relations, properties of relations, equivalence of relations, manipulation of relations.

Unit 3

Functions, pigeonhole principles, permutation and combinations, conbinatorics – simple counting techniques. Partially ordered sets, external elements of posets, lattices.

Unit 4

Elementary Probability Theory, Groups and semi groups:

Unit 5

Graph: definition, walks, path, trails, connected graph, regular and bipartite graph, cycles and circuits. Tree and rooted tree, spanning tree, eccentricity of vertex, radius and diameter of graph, central graph, centre(s) of a tree. Hamiltonian and Eulerian graph, planar graphs.

Reference Books

1. Kenneth H. Rosen, Discrete Mathematics and Applications, TMH 2003
2. J.P.Tremblay and R Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH 2001
3. John Truss, Discrete Mathematics for Computer Scientists, Pearson Edn 2002

MCAC13 Digital Systems & Microprocessors

Unit 1.

Gates, Boolean algebra & Laws, Combinational Circuits: Sum of product, Product of sum, K-Map Simplification- up to six variables. Tabular method. Decoders, Multiplexer, De-multiplexer, Encoder, Adders. Logic families.

Unit 2

Sequential circuits: Flip-flops, Registers : shift registers. Counters.

Unit 3

Microprocessor: Architecture of 8085, Block diagram and pin outs , Instruction set. Addressing modes, Subroutines, Interrupts. Peripheral interfacing.

Unit 4

Advanced Microprocessors: Architecture of 8086, Additional features of 8086.

Unit 5

Special features of advanced processors 386, 486 and Pentium.

Reference Books

1. John . M. Yarbrough , Digital Logic Applications and Design ,Thomson -2002 .
2. M. Moris Mano, Digital Design – PHI 2001
3. R. Gaonkar, Microprocessor Architecture and Programming. TMH-2002.
4. Brey B. Brey, The Intel microprocessors , PHI 2003

MCAC14 Operating Systems

Unit 1

Operating System concepts, system Calls, operating System structure.

Unit 2

Processes, threads, Interprocess communication, Scheduling.

Unit 3

Resources, Deadloacks – Detection, Recovery, avoidance, prevention.
Basic memory management., swapping, virtual memory, Page replacement algorithms, design issues, Segmentation.

Unit 4

Principles of I/O Hardware and Hardware, I/O software layers.
Files, Directories, File system Implementation.

Unit 5

Case study – Linux – Processes, memory management, I/O, file system.

Reference Books

1. A.S. Tanenbaum Modern Operating Systems, Pearson Edn, 2001.
2. A. Silberschaw, P.B. Galvin, G. Gagne , Operating System Concepts, John Wiley and Sons, 2003.
3. Dhamdhere, Operating Systems, TMH 2002.
4. Operating systems, William Stallings, PHI, 2005

MCAC21 Linux Administration

Unit 1

Introduction: Various parts of operating system: kernel, system programs, and application programs; system calls; Important parts of kernel; Major services in a UNIX system: init, login from terminals, syslog, periodic command execution crown and at; Graphical user interface; Bourne shell scripts: scripts execution, permissions and file magic, variables and parameters, inherited environment, if else elsif constructs, conditional tests,case statement, for construct.

Unit 2

Boot process: The LILO boot process: LILO parameters, /etc/lilo.conf; loadlin; The /boot directory and files; initrd file and mkinitrd; Run levels: */etc/inittab, start-up script /etc/rc.d/rc.sysinit;* System initialization scripts*: /etc/rc.d/rc.serial, /etc/rc.d/rc.local, /etc/issue, /etc/issue.net, /etc/rc.d/init.d/... scripts operation, starting X windows automatically.*

Unit 3

System Configuration: The /etc/sysconfig/… files used in network setup: */etc/sysconfig/network-scripts/ files (parameter files and scripts), /etc/sysconfig/ files for clock, mouse, static-routes, keyboard, network and pcmcia; kernel modules;* kernel daemon; /etc/conf.modules and module parameters; /lib/modules/… directory structure and contents.File system configuration: file system types, /etc/fstab loyout and meaning; Basic user environment: /etc/skel/… and home directories, Window manager configuration file locations;

Unit 4

*System Security***:** Host security: tcp_wrappers and /etc/hosts.allow and /etc/hosts. deny, /etc/security, shadow password, file permissions, users groups and umask; Adding and deleting users; Printing: /etc/printcap file, adding local and remote printers, /etc/hosts.lpd file, print filter system for local printers, using lpc, lpq and lprm;

Unit 5

*System maintenance***:** Syslogd, klogd and /etc/syslog.conf; Using a remote syslog; The system crontab, dailyscript, tmpwatch and logrotate; Using and managing the system log files; Basic system backup and restore operations; Emergency rescue operations; Basic shell configuration for Bourne and bash shells: /etc/bashrc, /etc/profile, ~/.bashrc, ~/.bash_profile, ~/.profile**.**

Reference books:

1. Evi Nemeth ., et al, Linux Administration Hand Book , PHI 2003

2. Essential System Administration, O'Reilly & Associates, Inc.
3. Johen Hein,The Linux Companion for System Administration –Addison Wesley.
4. Nicholas Wells, Linux Installation and Administration, Thomson Vikas 2000.

MCAC22 Data Base Management Systems I

Unit 1

Database concepts, ER model, basic concepts, constraints, Keys, ER diagram, Reduction of ER schema, UML, design of an ER database schema, relational model, relational algebra, views, tuple relational calculus, domain relational calculus, relational database, SQL- basic structure, set operations, sub queries, joint relation, DDL, DML, embedded SQL, QBE.

Unit 2

Integrity and security, domain constraints, referential integrity, assertion, triggers, authorization in SQL, relational database design- 1st, 2nd, 3rd, 4th, BCNF, 5th Normal forms.

Unit 3

Object relational data model, nested relations, complex types, inheritance, reference types, querying with complex types, functions and procedures.

Indexing and hashing, basic concepts, static hashing, dynamic hashing, multiple key accesses.

Transaction concepts, state, atomicity and durability, serialisability, transaction definition in SQL. Concurrency control, protocols, deadlock handling.

Unit 4

Case study : PostgreSQL – data type – tables – psql – operations on tables – sub queries – views -operators & functions – indices – arrays – transactions and cursors .

Unit 5

Administrating PostgreSQL – authentication and Encryption – Database management – User and group management – PostgreSQL programming – Pl/pgSQL.

Reference Books

1. Silbersehatz, Korth and Sudarshan, Database system concepts, MGH 2002
2. Ramakrishnan and Gehrke, Database Management Systems, 3rd Edn, Mc Graw Hill, 2003
3. A Leon & M Leon, Database Management Systems , Leon Vikas – 2003.
4. Elmasri and Navathe, Fundementals of Database systems, Pearson 2004
5. O'Reilly, Practical PostgreSQL Shroff Publishers(SPD) 2002.

MCAC23 Data Structures and Algorithms

Unit 1

Data structures:- definition, abstract data types. Algorithms: top-down and bottom-up approaches to algorithm design. Analysis of algorithm: time and space complexity, frequency count, big oh notation , practical complexities. Arrays: representation, address calculation, Sparse matrix representation and manipulation using arrays.

Unit 2

Linked list: singly, doubly and circular linked lists, header and trailer nodes , basic operations, polynomial as linked list, manipulation of linked polynomials, sparse matrix representation using linked list. Stack: representation using arrays and linked list, applications of stack, expression evaluation. Queue: array implementation, circular queue, linked queue, priority queues, applications of queue.

Unit 3

Non linear data structures: tree – definitions, binary tree , tree traversal (both recursive and non-recursive), binary tree representation of a tree, threaded binary tree, binary search tree, application of trees, sets, decision and game trees, AVL trees, Red Black trees, B Trees.

Unit 4

Searching : sequential and binary search algorithms, Hashing. Sorting, Insertion, Selection, Bubble, Quick, Merge and Heap sort algorithms. Comparison of sort algorithms, sorting on multiple keys.

Unit 5

String representation: string matching algorithms. Graphs: representation of graphs, graph traversals, Application, Minimum Cost spanning trees, Shortest Path Problems.

Reference Books

1. E. Horowitz, S. Sahni and D. Mehta, "Fundamentals of Data Structures in C++", Galgotia, 2002.

2. R. Kruse, C.L. Tondo and B. Leung, "Data Structures and Program Design in C, 2nd Edn, Pearson Education, 2003
3. Y. Langsam, M. J. Augenstein and A.M. Tanenbaum, "Data Structures using C and C++", 2nd Edn, PHI, 2002
4. A.V. Aho, J.D. Ullman and J.E. Hopcroft, "Data Structures and Algorithms", Addison Wesley.

MCAC24 Data Communication and Networks

Unit 1

Introduction, Network Hardware, Software, Reference Model, Internet, ATM, Physical Layer, Transmission Media, Wireless Transmission, Switching – circuit switching, packet switching, message switching, hybrid switching – Communication satellites

Unit 2

Data Link Layer design issues, Error detection and correction, Elementary data link protocols, Sliding Window protocols, Data Link Layer in the Internet.

Unit 3

Medium access layer, Channel allocation problem, Multiple access protocols, Ethernet, Wireless LAN, Bluetooth.

Unit 4

Network Layer, design issues, Routing Algorithms, Congestion Control algorithm, Internetworking, Internet Protocol, IP address, Internet Control Protocol.

Unit 5

Transport Layer, Design issues, Connection Management – addressing, establishing and releasing a connection, Simple Transport Protocol, Internet Transport protocol, E-mail, Network security, Cryptography.

Reference Books

1. Tanenbaum, Computer Networks, Fourth Edition, Pearson Education , 2003.
2. Fred Halsall, Data Communications, Computer Networks and Open Systems, 4th Edn, Pearson Education, 2003
3. B. Forouzan, Introduction to Data Communication and Networking, 3rd Edn, TMH, 2004

MCAC31 Finite Automata & Formal Languages

Unit 1

Introduction to the Theory of computation and Finite Automata: Mathematical preliminaries and Notation, three basic concepts, applications, deterministic Finite Acceptors, Nondeterministic finite acceptors, equivalence of Deterministic and Nondeterministic finite acceptors, reduction of the Number of states in Finite Automata.

Unit 2

Regular Languages, regular grammars and Properties of Regular Languages: regular expressions, connection between regular expressions and regular languages, regular grammars, closure properties of regular languages, elementary questions about regular languages, identifying language.

Unit 3

Contest-free languages and simplification of context-free grammars and normal forms: context-free grammars, parsing and ambiguity, context-free grammars and programming languages, methods of transforming grammars, two important normal forms.

Unit 4

Pushdown automata and properties of context-free languages: Non-deterministic pushdown automata, pushdown automata and context-free language, deterministic pushdown automata and deterministic context-free languages, two pumping lemmas, closure properties and decision algorithms for context-free language.

Unit 5

Turning machines and other models of turning machines: the standard turning machine, combining turning machines for complicated tasks, Turing's thesis, minor variation on the turning machine, combining turning machines, a universal turning machine .

Reference Books

1. An introduction to Formal Languages and Automata, Peter Linz, Narasa publishing House, 1997.
2. Introduction to Languages and the Theory of Automata- John C Martin MGH 1997
3. Introduction to Automata Languages and Computation,- J P Hopcroft. J D Ullman, Narosa Publication,

MCAC32 Network Programming and Administration

Unit1.

TCP / IP Network Configuration: Introduction to TCP / IP network, Protocols, IP address, Hostname, Configuring a Host : setting the host name, assigning IP address, broad cast, net mask and name server address, Editing Host and network files,

Interface Configuration: loop back interface, Ethernet interface, The SLIP and PPP interface, Configuring Gateway. Routing through gateway, Network commands: ifconfig, netstat, route.

Unit 2

Network applications Configuration: File Transfer Protocol (FTP) and Trivial File Transfer Protocol (TFTP), Network File Systems (NFS) . Network Information System(NIS), Hyper Text Transfer Protocol (HTTP) and Web server, Server Message Block (SMB) Protocol and Samba server, Dynamic Host configuration Protocol (DHCP) Firewalls, Remote booting.

Unit 3

Domain Name Services (DNS) and Mail services: working of DNS, Host name Resolution Name lookup with DNS, Reverse Lookup, Domain Name Servers and Zones, DNS database: SOA, NS, MX, A and PTR records, Secondary and primary DNS, Zone change notification, root servers, internet root domains, configuring DNS, Using nslookup. Simple Mail Transfer Protocol (SMTP) , Post office Protocol(POP) Multipurpose Internet Mail Extension (MIME), SMTP and POP3 command, Mail routing, Configuring A mail server,

Unit 4

Inter Process Communication programming : Create a process- fork() system call, Parent and Child Process, Process ID, User and Group ID Half Duplex Unix Pipes, Named Pipes, (First In First Out) , Streams and messages, System V IPC : Message Queues, Semaphores, Shared memory, Sample programs for IPC that uses Pipes, FIFO.

Unit 5

Socket Programming: Overview, socket address, Elementary Socket System Calls: socket, socket pair, bind, connect, listen, accept, send, sendto, recv, recvfrom, close, Byte ordering routines, Byte Operations, Address conversion routines, Advanced socket system calls: readv and writev, sendmsg and recvmsg, getpeername, getsockname, getsockopt and setsockopt, shout down, select, reserved port, Simple client Programs that uses some reserved ports, Simple Client / Server Program Using Unreserved ports.

Reference Books:

1. Olaf Kirch & Terry Dawson, Linux Network Administrators Guide, O'relly, 2003
2. Hunt, Linux DNS server Administration, BPB Publication, 2003
3. W Richard Stevens, Unix Network Programming, PHI, 2002

MCAC33 Software Engineering

Unit 1

The Product- The Process- Project management concepts- Software Project and Project Metrics.

Unit 2

Software Project Planning – Risk Analysis and Management- Project scheduling and Tracking- Software Quality Assurance.

Unit 3

Software Configuration Management- System Engineering – Analysis Concepts and Principles- Analysis modeling.

Unit 4

Design concepts and Principles- Architectural Design-User Interface Design.

Unit 5

Component Level Design- Software Testing Techniques- Software Testing Strategies- Technical Metrics for Software.

Reference Books

1. R.S.Pressman, Software Engineering A Practitioner's approach – MGH – 2001.
2. Ian Sommerville, Software Engineering, 5th Edn. Addison Wesley, 2002

MCAC34 Computer Graphics

Unit 1

Video Display Devices, Raster Scan System, Input Devices, Hard Copy Devices, Graphic Software, Output Primitives.

Unit 2

Two dimensional transformation, Clipping, Window-View port Mapping.

Unit 3

User dialogue, Input of Graphical data, Input functions, Input Device Parameters, Picture Construction Techniques, Virtual Reality Environments.

Unit 4

Three Dimensional Concepts, Projections- 3D transformations, 3D viewing

Unit 5

Visible- Surface detection: Back- Face Detection, Depth Buffer method, Scan line method, A buffer method, Properties of light, Infinitive Color Concepts, RGB Color models, Computer Animation.

Reference Books

1. D. Hearn and M.P. Baker Computer Graphics- PHI 1998.
2. W.M. Neumann and R.F. Sproull Principles of Interactive Graphics MGH 1979.
3. Foley, Van Dan, Hughes – Computer Graphics – Addison Wesley,2000.
4. Steve Harrington- Computer Graphics MGH 1989.

MCAC41 Internet and Java Programming

Unit 1

Internet basics: Internetworking with TCP/IP, Domain Name Systems, Sockets and socket API, Telnet, File Transfer Protocol – TFTP, NFS – Simple Mail Transfer Protocol, Network News Transfer Protocol, Gopher Protocol, HTTP, WWW, Internet browsers, URL

Unit 2

Java basics: data types, variables and arrays, operators, control statements, classes and methods, inheritance, exception handling, multithreading, stream I/O, string handling packages.

Unit 3

Java applets: windows, graphics and multimedia with Java, uses of Java applets in web page creation, Java Beans: properties and methods, event model, introspection, customizers and property editors, persistent storage, developing packages

Unit 4

Java script: objects, names, literals, operators and expression, statements, functions, events, windows, documents, forms. Pearl: data types, statements, I/O, built in functions, regular expressions, subroutines, CGI programming with Java and Pearl: CGI overview, Input to CGI, Output from CGI, Forms, server side includes, hypermedia documents.

Unit 5

VB script, variables, operators, intrinsic functions, procedures, intrinsic HTML form controls, button controls, Active X: building a basic control, OLE and Active X, HTML and VDO live technology, real audio and video in internet.

Reference books

1. Bob Breedlov et al., Web Programming Unleashed – Sams Net Publishing, 1st edn.
2. Ken Arnold and James Gosling, The Java Programming Language, Addison Wesley, 3rd edn.

MCAC42 Visual Programming

Unit 1

Introduction to VC++ and MFC: IDE, resource editor, resource files, Application wizard and class wizard, message handling, tools in VC++, simple programs DLL and API, Messages, Components, User, GDI and kernel.

MFC fundamentals, Structure of MFC applications, Creating Main window using MFC, Processing messages.

Unit 2

Windows basic controls and classes: Message box, Menus, Basic SDI classes, Application class, Document class, View class, Mainframe Class. *CframeWnd and* Message maps, Menu message handler and Timer settings, CMenu, Object and functions, CWind( ), Child windows, CWind::create( ), dialogues and common dialogue classes, Static controls and Dynamic controls, Message handling with controls, simple dialog based program, Data transfer function, DDV functions, Cstring, Communication between dialogs, Modal and Modeless dialogs, CcmdUI

Unit 3.

Graphics and Text Drawing : GDI and device context, GDI object and device context settings, stock drawing objects, CDC classes and examples, setViewportOrg( ), CClientDC object, setROP2( ), OnPaint( ), setting text, background colour and background display mode, fast drawing and bit map graphics.

Advanced Windows Controls and Multitasking : Updown controls spin controls, slider controls, progress bar, tool bar, status bar, tree views and calendar controls, property sheets and wizards, thread basics, multiple threads, suspending and resuming threads, synchronization, semaphore, event objects, CCriticalSection and Timed Lock Request.

Unit 4.

Document View Architecture: Document view frame work (4 classes), Initializing application, storing and retrieving documents, CDocument and CView class, OnDraw( ), Document template, RUNTIME_CLASS macro, application wizard, class wizard, adding message handler using class wizard, designing user interface, printing the view, serialization and CArchieve, splitter windows and filing, Collection classes, MDI app;lication, CForm View class, form program.

Unit 5.

ActiveX controls and ODBC classes : ActiveX and OLE, COM and COM interface, MFC and ActiveX, ActiveX projects, ActiveX control program and control properties, stock caption properties, ActiveX methods, stock DoClick methods, ActiveX events, ActiveX control containers. ODBC classes: ODBC, Database drivers, DSN, connecting VC++ program to remote database. CDatabase class, open, close, CRecordSet class, establishing connection, Movefirst, Movenext, Movelast, Moveprev functions, adding, editing and deleting records, Edit, AddNew and Update functions, sorting and filtering records, m_strSort and m_strFilter variables, create simple database editing programs.

Reference books:

1. Shirley Wodtke, MFC C++ classes, 1997
2. John Paul Muller, Visual C++ from the Group-TMGH,1998.
3. Herbert Schildt, MFC programming, 1996
4. Robert D. Thompson, MFC programmers refernce, 1998
5. Michael J. Young, Mastering Visual C++ 6.0, 2000

MCAC43 Cryptography & Network Security

Unit 1

Foundations of Cryptography and security: Ciphers and secret messages, security attacks and services. Mathematical tools for cryptography: substitution techniques, moudular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic. Design Principles of Block Ciphers: Theory of Block Cipher Design, Feistel cipher network strcture, DES and Triple DES, modes of operation (ECB, CBC, OFB, CFB), strength of DES.

Unit 2

Bock cipher Algorithms: IDEA, CAST, Blowfish, Rijndael(AES). Pseudo Random Numbers and Stream Ciphers: PRN sequence, Linear congruential generators, cryptographic generators, design of stream cipher, RC4, RC5.

Unit 3

Public Key cryptography: Prime numbers and testing for primality, factoring large numbers, discrete logarithms, RSA algorithm. Key management, Diffi-Helman Key exchange, elliptic curve arithmetic, elliptic curve cryptography, Public key cryptography standards. Hashes and message digests: message authentication and Hash functions, Hash algorithms.

Unit 4

Digital signatures, certificates and standards: DSS, DSA, Public Key Infrastructure, Digital Certificates and basics of PKCS standards. Authentication: Kerberos, X.509, Authentication service. Electronic mail security: Pretty Good Privacy, S/MIME, X.400.

Unit 5

IP and Web security protocols: IP security and virtual private networks, secure soket layer and transport layer security. System security, Computer Virus, Firewall and Intrusion Detection: virus and related threats, virus counter measures, intrusion detection and password management, firewall design principles. Electronic commerce security: electronic payment system, secure electronic transaction, protocols, Cybercash, iKey, Ecash, DigiCash, Smartcard based system.

Reference books

1. William Stallings, Cryptography and Network Security, Pearson 2004
2. Buce Schneier., Applied cryptography – protocalls and algorithms, Springer Verlag 2003

MCAC44 Artificial Intelligence

Unit 1

Artificial Intelligence- scope, history and applications, the predicate calculus, Inference rules, Structures and strategies for state space search, Strategies for space search, representing reasoning with the predicate calculus.

Unit 2

Heuristics Search: admissibility, monotonicity and informedness, Heuristic in games, Complexity issues, Control and implementation of state space search, Recursion based search, Pattern directed search, Production systems, Predicate calculus and planning, The black board architecture for problem solving.

Unit 3

Knowledge Based System: Knowledge-Intensive problem solving, Overview of expert system technology, rule based expert systems, model based reasoning, Case based reasoning, The Knowledge-Representation problem, reasoning with uncertain or incomplete information, The statistical approach to uncertainty, Non-monotonic systems, reasoning with Fuzzy sets.

Unit 4

Knowledge representation languages, Issue in Knowledge Representation, a survey of Network Representation. Conceptual graph: A Network Representation language, structured representation, Introduction to LISP: search in LISP, a functional approach to the farmer, wolf, goat and cabbage problem. Higher order functions and procedural abstraction, search strategies in LISP, a recursive Unification function, interpreters and embedded languages, Logic programming in LISP, streams and delayed evaluation. An expert system shell in LISP.

Unit 5

Automated reasoning: Weak methods in theorem proving, The general problem solver and difference tables, resolution theorem proving, further issues in automated reasoning, Machine learning: connectionist- Foundation for connectionist networks, Perception learning, back propagation learning, competitive learning, Hebbian coincidence learning, Attractor networks or memories, machine learning – social and emergent models, The genetic algorithm, classifier systems and genetic programming, artificial life and society based learning.

Reference Books:

1. G.F. Luger and W.A Stubblefield, Artificial Intelligence – Structures and Strategies for complex problem solving, Addison-Wesley-1998.
2. P.H Winston – Artificial Intelligence Addison-Wesley-1992.
3. E. Rich and Knight, Artificial Intelligence, TMGH,1991.
4. Nils J. Nilsson , Artificial Intelligence , A New Synthesis, Morgan Kauf 2000.

MCAC51 Advanced Java Programming

Unit 1

Java Database connectivity:- JDBC Archiecture- Drivers- Database connections-Statements-Resultsets-Transcations-metadata-stored procedures-error handling-BLOBs and CLOBS

Unit 2

Java Networking :- RMI -Architecture- Defining remote Objects-Creating stubs & skeletons –Seializable classes-Accessing Remote Objects-factory classes-Dynamically loaded classes-RMI activation-Registering remote objects-marshalled objects CORBA –Architecture-Services-IDL-ORB-Naming service-Inter-ORB Comminication-creating CORBA objects-simple server class-helper class-holder class-client and server stubs-registering with naming services,findinf remote object-adding object to naming context-initial ORB references

Unit 3

JNDI- Architecture-context-initial context class-Object in a context –Naming shell application-listing the children of acontext-binding objects –acessing directory services-X.500 dirctories-Dir context interface-Attributes and attribute interface-modifying directory entities-creating directory entities-searching.

Unit 4

Java Servlets- Servelet life cycle-servlet Basic-servlet chaining-HTTP servlets-forms and interaction-POST-HEAD and other request-server-side includes-cookies-Session tracking-databases and non-HTML Content-Request dispatching-shared attributes-resource abstraction

Unit 5

Enterprise Java Beans:-EJB roles—EJB Client-Object –container-Transaction Management—implementing a Basic EJB Object-Implementing session Beans-Implementing Entity Beans-Deploying an enterprise Java Beans Object-Changes in EJB1.1 specification.

Reference books.

1. David Flanagan,Jim Farley, William Crawford & Kris Magnusson , Java Enterprise in a nutshell- A desktop Quick reference –O'REILLY, 2003
2. Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley - 2001
3. Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002

MCAC52 Data Base Management systems II

Unit 1

Review of basics.

Relational database – Integrity constraints: functional, multivalued and join dependency, template Algebraic, Inclusion and General functional dependency, chase algorithms.

Unit 2.

Query processing and optimization : Evaluation of relational operations, transaction of relational Expressions, Indexing and Query Optimization.
Deductive databases : Datalog and Recursion, Evaluation of datalog program, recursive queries with negation.

Unit 3.

Parallel and Distributed databases : Distributed Data Storage – Fragmentation and replication, Location and fragment transparency, Distributed Query Processing and Optimization, Distributed Transaction modeling and Concurrency control, Distributed deadloack, commit protocols, design of parallel databases, Parallel Query evaluation.

Unit 4.

Image and Multimedia Databeses : Modeling and storage of Image and Multimedia Data, Data structures – R-tree, k-d-tree, Quadtrees, Content Based Retrieval : Colour histograms, textures etc. Image Features, Spatial and topological relationships, Multimedia data formats, video data model, Audio and Handwritten data, Geographical Information systems.

Unit 5

Data Miming : Knowledge Representation Using rules, Association and classification rules, sequential patterns, Algorithms for rule discovery.
Data warehousing : Data Warehouse architecture, multidimensional Data Model, Update propagation, OLAP Queries.

Reference Books

1. Silbersehatz, Korth and Sudarshan, Database system concepts, MGH 2002
2. Ramakrishnan and Gehrke, Database Management Systems, 3rd Edn, Mc Graw Hill, 2003
3. A Leon & M Leon, Database Management Systems , Leon Vikas – 2003.
4. Elmasri and Navathe, Fundementals of Database systems, Pearson 2004

MCAC53 Linux Kernel

Unit 1

Introduction: Characteristics, *multi-tasking, multi-user access, multiprocessing, architecture independence, demand load executables, paging, dynamic cache for hard disk, shared libraries, POSIX 1003.1 support, various formats for executable files, Memory protected mode, support for national keyboards and fonts, different file systems, TCP/IP, SLIP and PPP support*; Compiling the kernel; Configuration facilities; Kernel architecture; Processes and tasks; Important data structures, *task structure, process table, files and inodes, dynamic memory management, queues and semaphores, system time and timers*; Main algorithms, *signals, interrupts, booting the system, timer interrupt, scheduler*; System call, *working, getpid, nice, pause, fork, execve, exit, wait*; Implementing new system calls.

Unit 2

Memory Management: Architecture independent memory model; Pages of memory; Virtual address space; Converting the linear address; Page directory; page middle directory; page table; Virtual address space; user segment; virtual memory areas; brk system call; Mapping functions; Kernel segment; Static and dynamic memory allocation in the kernel segment; Block device caching; Block buffering; update and bdflush processes; Buffer cache list structures; Paging; Page cache and management; Finding free page; reloading a page.

Unit 3

Inter-process communication**:** Synchronization; Communication via files, locking; Pipes; System V IPC, access permissions, numbers and keys, semaphores, message queues, shared memory, ipcs and ipcrm commands; IPC with sockets; Unix domain socket implementation.

Unit 4

File System**:** Basic principles; Representation in the kernel; Mounting; Superblock operations; Inode; Inode operations; File structure; File operations; File opening; Directory cache; Proc file system; Ext2 file system; Structure; Directories in ext2 file system; block allocation.

Unit 5

Device Drivers: Character and block devices; Polling and interrupts; Interrupt mode; Interrupt sharing; Bottom halves; Task queues; DMA mode; Hardware detection; Automatic interrupt detection; Driver implementation; setup function; init; open and release; read and write; IOCTL; select; lseek; mmap; readdir; fsync and fasync; check_media_change and revalidate.

Reference books:

1. M beck , Linux Kernel Internals, Second edition, Addison Wesley. 1998
2. Robert Love, Linux Kernel Development, SAMS, 2003

Electives

MCAE1 Numerical Computing with C

Unit 1

Fundamentals of c programming, Control structures, Arrays, Functions.

Unit 2

Pointers, Structures, Strings, Files.

Unit 3

Matrix operations.

Transcendental and Polynomial Equations – Bisection method, iterations methods.

Unit 4

System of linear equations and Eigen value problems.

Interpolation and approximations.

Unit 5

Differentiation and integration.

Reference Books

1. B.W. Kernighan and D.M. Ritchie, The C Programming Language, PHI 2002
2. B.S. Gottfried, Programming with C, TMH, 2001
3. Yashvant Kanetkar, Let Us C, BPB, 2002.
4. Numerical Methods for Scientific and Engineering computation, Jain, Iyengar & Jain, New Age, 2003

MCAE2 Object Oriented Programming using C++

Unit 1

Introduction to OOP – overview of C++, class, structures, union, friend functions, friend classes, inline functions, constructors, destructors, static members, scope resolution operator, passing objects to functions, function returning objects

Unit 2

Arrays, pointers, *this* pointer, references, dynamic memory allocation, function overloading – default arguments, overloading constructors, pointers to functions, ambiguity in function overloading

Unit 3

Operator overloading, Member operator function, friend operator function, overloading some special operators like [ ], ( ), comma operator, inheritance, types of inheritance, protected members, virtual base class, polymorphism, virtual functions, pure virtual functions,

Unit 4

Class templates and generic classes, function templates and generic functions, overloading a function templates, power of templates, Exception handling, Derived class exception, over handling generic function, exception handling functions, terminate ( ) , unexpected ( ), uncaught( ), exception ( ).

Unit 5

Streams, formatting I /O with class functions and manipulators, creating own manipulator, overloading << and >> , File I/ O , name spaces, conversion functions, array based I /O, Standard Template Library (STL).

Reference books:

1. Herbert Schilbt, C++ - the complete reference, TMH 2002
2. J.P. Cohoon and J.W. Davidson, C++ program design – An intro. to programming and Object Oriented Design.- MGH 1999.
3. Jonson, C++ programming today, PHI 2002.

MACE3 Object Oriented Programming Using Java

Unit 1

Introduction to Java, feature of Java, Object oriented concept, Lexical Issues, Data types, variables, arrays, Operators, Control statements, Classes, objects, Constructors, Overloading method, Access control, Static and fixed methods, Inner Classes, String Classes, Inheritance, Overriding methods, using super, abstract class

Unit 2

Packages, Access protection, Importing packages, Interfaces, Exception handling, Throw and Throws, Thread, Synchronization, Messaging, Runnable interface, Inter thread communication, Deadlock, Suspending, Resuming and stopping Threads, Multithreading.

Unit 3

I/O streams, File streams, Applets, Event Handling, String Objects, String Buffer, Char array, Java Utilities, Code Documentation.

Unit 4

Network basics, Socket programming, proxy server, TCP/IP sockets, Net address, URL, Datagrams, Working with windows using AWT classes, AWT controls, Lay out Managers and Menus, Jdbc, Connectivity,

Unit 5

Servelets, Environment and Role, Architectural role for servelets, HTML support, Generation, Server side, Installing servelets, servelet APT, servelet life cycle, HTML to servelet communication.

Reference Books

1. Cay Horstmann, Gary Cornell Core Java 2 Vol. 1- Fundementals.
2. R. Naughton and H. Schildt – Java2 (The complete reference) 3rd ed.
3. K. Arnold and J. Gosling – The Java Programming – 2nd
4. Kari Moss , Java Servelets, TMH
5. D.R. Callaway, Inside Servelets. Addison Wesley.

MCAE4 Design and Analysis of Algorithms

Unit 1

Introduction, recursive algorithms, time and space complexities, randomized algorithms, repeated element, primality testing.

Divide and conquer- general method, finding maximum and minimum, merge sort, quick sort, selection, Strassen's matrix multiplication, convex hull algorithm.

Unit 2

Greedy method : general method, knapsack problem, tree vertex splitting, job sequencing with dead lines, optimal storage on tapes.

Unit 3.

Dynamic programming : General method, multistage graphs, all pairs shortest paths, dfs, bfs, connected components, biconnected components and dfs.

Unit 4

Back tracking : general method, 8 queens, sum of subsets, graph colouring, Hamilton cycles.

Branch and bound : General method, traveling salesperson problem.

Unit 5

Lower bound theory, comparison trees, Oracles and advisory arguments, Lower bounds through reduction, Basic concepts of Np – Hard and Np – Complete problems.

Reference books:

1. Computer algorithms, Horowitz, Sahni & Rajasekaran, Galgotia.
2. The analysis and Design of computer algorithms, Aho, Hopcroft, Ullman, Addison Wesley.

MCAE5 Systems Programming & Compiler Design

Unit1

Assemblers: Elements of Assembly Language Programming, Overview of Assembly Process, Design of Two pass Assembler, Macros and Macro Processors, Macro definition, call and expansion , Nested Macro calls, Advanced Macro facilities, Design of Macro preprocessor.

Unit 2

Linkers, Linking and Relocation concepts, Design of linkers, Self relocating programs, Linking for over-lays, Loaders. Introduction to compilers, Different Phases. Lexical Analysis, input buffering, specification of tokens, Recognition of tokens, lexical Analyser generators, lex.

Unit 3.

Syntax Analysis. Context free grammar, writing a grammar, Top down parsing, Bottom Up Parsing, Operator precedence , LR parsers, LR parsing algorithms, LR grammars, Construction of SLR, Canonical and LALR parsing tables. Parser generators, Yacc.

Unit 4.
Run time Environment. Storage organization schemes, Activation records, Compile time layout. Storage allocation strategies, static allocation, stack allocation, heap allocation. Accessing non-local names. Parameter passing mechanisms.

Unit 5
Symbol tables, representing scope information. Intermediate code generation, intermediate languages, declaration and assignment statements. Code generation: Issues, target machine, run time storage management, instruction selection, register allocation. Runtime storage allocation, basic blocks and flow graphs. Code optimization: Principal sources of optimization.

Reference books

1. D.M. Dhamdhree, "Systems Programming and Operating Systems", TMH, 2003.
2. A.V. Aho, R. Sethi, J.D. Ullman, "Compilers – Principles, techniques and tools", Pearson Education, 2003
3. A.V. Aho and J.D. Ullman, " Principles of Compiler Design", Narosa , 2002

MCAE6 Probability & Statistics

Unit 1
Probability distributions : Random variables, Binomial distribution, Hyper geometric distribution, Mean and variance of probability distribution, Chebysheve's theorem, Poisson approximation to binomial, Poisson processes, Geometric distribution, Normal distribution, Normal approximation to Binomial distribution, Uniform distribution, Log-normal distribution, Gamma distribution, Beta distribution, Weibull distribution.

Unit 2
Sampling distributions and Inference Concerning Means :- Population and Samples, the sampling distribution of the mean (σ known and σ unknown), sampling distribution of variance, Point estimation, Bayesian estimation, Tests of Hypotheses, the null Hypotheses and the significance tests, Hypotheses concerning one mean, Operating characteristic curves, Inference concerning two means.

Unit 3
Inference concerning Variance and Proportions : Estimation of variances, Hypotheses concerning one variance, Hypotheses concerning two variances, Estimation of proportions, Bayesian estimation, Hypotheses concerning one proportion, Hypotheses concerning several proportions, analysis of rxc tables, Goodness of fit.

Unit 4
Correlation and Regression analysis : Curve fitting, the method of least squares, inference based on the lest square estimators, curvilinear regression, correlation, fisher's transformation, inference concerning correlation coefficient.

Unit 5
Analysis of variance :- General principles, Complexity randomized design, Randomized Block diagram, Multiple comparison, Some further experimental designs, Analysis of covariance.

Reference Books

1. Probability and Statistics for Engineers (V Edn), Johnson, Miller & Freund
2. Statistics for Management, Levin & Rubin, PHI
3. Probabilities in engineering and Computer Sciences, Milton & Arnold, MGH
4. Introduction to Probability and Statistics for engineers and Scientists, Ross, John Wiley & Sons
5. Statistics – concepts and Applications, frank & Althoen, Cambridge University press

MCAE7 Operation Research

Unit 1
Linear programming: Formulation, Graphical Solution-2 variables, Development of Simplex Method, Artificial Variable Techniques, Big- M method, Two-Phase method, Reversed Simplex method.

Unit 2

Duality in LPP and it's formulation, Dual Simplex Method, Bounded variable method, Applications of LPP, Transportation problems, Assignment Problem, Traveling Sales persons problem.

Unit 3

Integer Programming problem (IPP), Cutting Plane algorithm, Branch and method of solving IPP, Dynamic programming problems and it's characteristics, Deterministic Dynamic Programming Problem.

Unit 4

Sequencing Problem, Processing n jobs through two machines and their mechanics, Processing n jobs through m machines, Processing 2 jobs through m machines, Project scheduling by PERT / CPM, Difference between PERT / CPM, Constructing the network, Critical path analysis, Float of an activity, Three time estimated for PERT, project cost by CPM.

Unit 5

Stochastic process, Classification of stochastic process, Discrete parameter Markov chains, Continuous Parameter Markov Chains, Birth and Death Processes, Queuing model and it's characteristics, Classification of Queuing Model (M/M/1): FCFS(birth and death model.

Reference Books

1. Thaha H.A.- Operation Research- PHI,2003.
2. Sharm J.K Mathematical Models in Operation Research, TMGH, 1989.
3. Trivedi K. S. Probability, Statistics with Reliability, Queuing and Computer Science Applications. PHI 1994.

MCAE8 Graph theory & Combinatorics

Unit 1

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.

Unit 2

Trees, definition 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.

Unit 3

Disjkstra's shortest path algorithm, Bellman – Ford algorithm, all-pairs shortest paths, Floyed – Warshall algorithms, the max-flow min-cut theorem, maximum bipartite matching.

Unit 4

Fundamental principles of counting, permutations and combinations, binomial theorem, combinations with repetition, Combinatorial numbrs, Priciple of inclusion, derangements, arrangements with forbidden positions.

Unit 5

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.

Reference Books

1. Grimaldi R.P., "Discrete and Combinatorial Mathematics : an applied Introduction", 3e, Addison Wesley, 1994
2. Corman T. H., Leiserson C. E., Rivest R. L., "Introduction to algorithms:, Prentice Hall India, 1990
3. Mott J.L., Kandel A. and Baker T.P., "Discrete Mathematics for Computer Scientists and Mathematicians", 2e, PHI
4. Rosen K.H., "Discrete Mathematics and its Applications", 3e, McGraw Hill
5. Clark J. and Holton D. A., "A first look at Graph theory", World Scientific.

MCAE9 System Simulation and Modeling

Unit 1

Definition of system and simulation, Merits and demerits of simulation, Areas of application, Types of systems, various types of models to represent them, Discrete and Continuous systems. Stages of a typical simulation study, Simulation Examples, Concepts of system Clocks, Event scheduling Vs Time advance algorithms.

Unit 2

Random Numbers: Roles of random numbers in simulation, pseudo random number generation techniques- there properties, methods of testing PRN sequens. Random Varieties: Generation, Inverse transformation techniques- with exponential distributions and empirical continuous distributions, Direct transformations- with Normal distributions, Acceptance Rejection techniques, with Poisson distribution.

Unit 3

Simulation Languages: Needs of special purpose simulation Languages, Detailed study of CPSS, SIMULA, SIMSCRIPT. Introduction to Object oriented Simulation. Input Modeling: Data collection, Distribution functions such as Normal, Poisson, exponential Distributions, Goodness of fit tests, Chi square test. Input model with out data, Effect of covariance and correlation of the quality of data.

Unit 4

Verification and Validation of Models: Guidelines for verification of models, their calibration and Validation, Face validity, Validation of model assumptions, Validating input –output transformations, Use of historical Data.

Unit 5

Evaluation of Simulation Experiments: Length of simulation run, static and dynamic stochastic simulations, elimination of transients, Auto correlated observations, variance reduction techniques.

Reference books:

1. Jerry Banks, John S. Carson & Barry L. Nelson – Discrete Event system simulation PHI India 2001.
2. N.Deo System simulations with Digital computers, PHI 1979.
3. James A Payne Introduction to Simulation : Programming Techniques & Methods of Analysis MGH 1988.

MCAE10 Signals & systems

Unit. I

Mathematical description of signals and systems: continuous- time vs discrete- time functions, continuous-time signals functions , function and combinations of functions, continuous- time scaling and shifting transformations. Differentiations and integration of signals, continuous time even and odd functions, continuous time periodic functions , discretion and analysis of system: system characteristics, Eigen functions of continuous time functions , convolution sum, convolution integral.

Unit 2

Discrete time signals and systems: Discrete time signals, discrete time systems, analysis of discrete-time linear-time invariant systems, discrete time systems described by difference equations, implementation of discrete systems correlation of discrete time systems.

Unit 3

The Z transforms and its applications: Z transform, properties Z transform, rational Z transform, inversion of Z transform one sided Z transform analysis of linear time invariant systems in the Z domain.

Unit 4

Frequency analysis of signals and systems: frequency analysis of continuous time signals, frequency analysis of discrete time signals, properties of Fourier transformation for discrete time signals , frequency domain characteristics of linear time invariant systems, linear time invariant as frequency selective filters, inverse systems and de convolutions.

Unit 5

Discrete Fourier transform and application: Frequency domain sampling. Discrete Fourier Transform (DFT), properties of DFT, linear filtering methods based on DFT, frequency analysis of signals using DFT. Efficient computation of DFT; Fast Fourier Transform (FFT) algorithms, application of FFT algorithm, linear filtering approach to computation of DFT, quantization effects in computation of DFT.

References books:

1. Michael J. Robberts Signals and systems TMGH 2004
2. John G Proakis and Dimitres G Manolakis Digital Signal Processing PHI 2002

MCAE11 Digital Signal Processing

Unit 1

Implementation of discrete time systems: structure of FIR system, structure of IIR system, states space system analysis and structures, representation of numbers, quantization of filter coefficient, round of effect in digital filters.

Unit 2

Design of Digital filters: causality and its implications, characteristics of practical frequency selective filters, design of FIR filters , design of IIR filters from analog filters, frequency transformations, design of digital filters based on least square method.

Unit 3.

Multi rate digital signal processing: sampling of band pass signals, analog to digital conversion, digital to analog conversion, decimating by a factor D, interpolation by a factor I, sampling rate conversion by a rational factor I/D, filter design and implementation for sampling rate conversion , multi stage implementation of sampling rate conversion, sampling rate conversion of band pass signals, sampling rate conversion by a arbitrary factor, application of multi rate signal processing.

Unit 4

Linear prediction and optimum linear filters: innovations representation of a stationary random process, forward and backward linear predictions, solution of normal equations, properties of linear prediction error filters, AR Latice , and ARMA Latice- Ladder filters, Wiener filters for filtering and prediction.

Unit 5

Power system estimation: estimation of spectrum from finite duration Sequence, Non parametric methods for power spectrum estimation, Parametric methods for power spectrum estimation, minimum variant spectral estimation, Eigen analysis algorithm for spectrum estimation.

Reference books:

1. John G Proakis and Dimitres G Manolakis Digital Signal Processing PHI 2002
2. Michael J. Robberts Signals and systems TMGH 2004

MCAE12 Information Theory and Coding

Unit 1

Information Theory: Information and entropy, source encoding ,Noiseless coding, Shannon's first fundamental theorem, Sources with finite memory: Markov sources, Discrete channel with discrete, Shannon's second fundamental theorem on coding for memory less noisy channel, Discrete channel with continuous noise, continuous channel with continuous noise, Channel capacity theorem, Properties.

Unit 2

Error control coding: Galois fields,Vector spaces and metrics, Block codes, Binary cyclic codes, Multiple error correcting codes, Majority – logic decoding, convolutional codes, Burst error correcting codes, ARQ, Performance of codes.

Unit 3

Digital image characterization: image sampling and reconstruction concepts, Sampling systems, Reconstruction system, vector space image representation, Generalized two dimensional linear operator, image quantization, Scalar quantization, Processing quantized variables, Monochrome and color image quantization,

Unit 4

Discrete two dimensional linear processing: super position and Convolution, Finite area superposition and convolution, Circulant superposition and convolution, Unitary transforms, Generalized unitary transforms, Fourier transforms, Cosine,Sine & Hartely transforms, Hadamard, Har walsh hadamard, Karhanen- Loeve transforms, Linear processing techniques: Transform domain processing, transformed domain superposition, Fast Fourier Transformation convolution, Fourier transform filtering.

Unit 5

Image improvement: Image enhancement, Contrast manipulation noise cleaning, Edge crispening, color image enhancement, multi spectral image enhancement, Image restoration, Image restoration modes, Optical system models, Photographic process models, Discrete image restoration models,

Reference books:

1. Simon Haykin : Digital communications – John Willy & sons, 2003.
2. William K . Pratt : Digital image Processing John Willy & sons, 2003.

MCAE13 Digital Speech Processing

Unit 1

Auditory perception – Ear Physiology – Psycho acoustic – pitch perception – Speech perception and recognition.

Unit 2

Speech features – filter banks – spectrum – linear predictive coding of speech .

Unit 3

Fearute extraction for ASR, linguistic categories, deterministic sequence recognition.

Unit 4

Statistical sequence Recognition, Model training – Discriminant Acoustic Probability estimation – Speech understanding.

Unit 5
Speech synthesis – pitch detection – Vocoders – Low, Medium and High Vocoders.

Reference books:
1. Witten I. H., Principles of Computer Speech, Acdemic Press.
2. Gold and Morgan, Speech and Audio Signal processing, John Wiley and Sons, 2002
3. Rabiner and Jaung, Speech Recognition, Pearson Education, 2002

MCAE14 Natural Language Processing

Unit 1
Regular expressions and automata, Morphology and Finite State transducers, N – grams.
Unit 2
Word classes and part of speech tagging, Context free grammars for English, Parsing with context free grammars.
Unit 3
Features and Unifications, Lexicalized and Probabilistic parsing.
Unit 4
Semantics: Representing meaning, Semantic analysis, Lexical semantics, Word Scene Disambiguation and Information retrieval.
Unit 5
Pragmatics: Discourse, Dialog and Conversational Agents, Natural Language Generation, Machine Translation.

Reference books:
1. Daniel, Jurafsky and Martin, Speech and Language Processing, Pearson, 2003

MCAE15 Advanced Microprocessors

Unit 1
Organization of a microprocessor system, Overview and architecture of intel 8086. Hardware specifications. Instruction set and programming : 8086 instruction set, assembly level programming, interrupts, DMA.
Unit 2
Intel 80186, 80188 and 80286 Processors, Architecture, Programming enhancements, Real mode and protected mode of operations. Arithmetic coprocessors and MMX technology: 8087 and 80287 Architecture and Instruction set.
Unit 3
Special 80-386 registers, Memory management, Protected mode and virtual 8086 mode. The memory paging mechanism. Introduction to 80486 processor. Enhancement in architecture and instruction set.
Unit 4
Special Pentium registers, Pentium memory management, New Pentium instructions. Introduction to Pentium Pro and its features.
Unit 5
Pentium II, Pentium III and Pentium IV enhancements. Itanium Processor : Special architecture and new features, instruction set.

Reference books:
1. Berry B. Brey, The Intel Microprocessors, Architecture, Programming and Interfacing, PHI, 2003
2. J.L. Antonakos, The Pentium Microprocessor, Pearson Education, 2003.

MCAE16 Embedded Systems

Unit 1
Introduction : Application areas, Categories of Embedded systems; Standalone, Real-time systems, Networked information Appliances, Mobile devices. Overview of embedded system architecture, specialties of embedded systems; reliability, performances, power consumption, cost, size, Limited user interface, Software upgradation capability. Recent trends in embedded systems; Processor power, memory, Operating systems, application software, communication interfaces and networking capability, programming languages, Developing tools, Programmable hardware.
Unit 2
Architecture of embedded system : Hardware architecture; CPU, Memory, Clock circuitry, Watchdog Timer / Reset circuitry, Chip select, I/O devices, Debug port, Communication interfaces, Power supply units. Software architecture,

services provided by an operating system, architecture of embedded operating system, Categories of embedded operating systems. Application software, communication software. Development / Testing tools.

Unit 3

Hardware platforms : Types of hardware platforms; single board computers, PC add-on cards, custom-built hardware platforms. 89C51 : architecture, instruction set and programming. AVR micro controller development board, PIC microcontrollers. 16F84 architecture, instruction set and programming.

Unit 4

Communication interfaces : Need for communication interfaces, RS 232 / UART. RS422 / RS485. USB, Infrared, IEEE 1394, fire wire, IEEE 802.11, Blue tooth.

Unit 5

Embedded / real-time operating system concepts: Architecture of the kernel, Task and task scheduler, Interrupt Services routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, signals, Timers, Memory management, Priority inversion problem, Case studies : RT Linux.

Reference books:

1. Wim Wilhurt, Embedded Technology.
2. Wayne Wolf, Computers as Components – Principles of embedded Computing system Design.
3. David E. Simon, An Embedded software Primer, Pearson Education, 2002.

MCAE17 Advanced Computer Architecture

Unit 1

Pipelining : Linear Pipeline processor: nonlinear pipeline processor, Instruction pipeline design, Mechanism for instruction pipelining, dynamic instruction scheduling, Branch handling techniques, Arithmetic pipeline design.

Unit 2

Instruction level Parallelism : Super scalar processors, VLIW architecture.

Unit 3

Parallel Computer Models and Program Parallelism : Classification of machines, SISD, SIMD and MIMD, condition of parallelism, data and resource dependencies, hardware and software parallelism, program partitioning and scheduling, grain size latency, program flow mechanism, control flow vs data flow, data flow architectures, demand driven mechanisms, comparison of flow mechanisms.

Unit 4

Vector Processors and synchronous Parallel Processing **:** Vector instruction types, vector – access memory schemes, vector and symbolic processors.

SIMD architecture and programming principles.

Unit 5

Basic dataflow computers, Fault Tolerent architectures, Transputers, Optical Computing.

Reference books:

1. Hennessey & Paterson, “Computer Architecture: A quantitative approach”, MK Publisher, 2002
2. Hwang and Briggs, “Computer Architecture and Parallel Processing”, McGraw Hill
3. Ghose, Moona and Gupta, “Foundations of parallel processing”, Narosa Publication.

MCAE18 VHDL Programming

Unit 1

Introduction : VHDL terms, Entity : Architectures, Concurrent Signal Assignments, Event Scheduling, Statement concurrency, Structural designs, sequential behavior, process statements, process declaration region, process statement part, process execution, sequential statements, architecture selection, configuration Behavioral modeling: introduction, transport vs internal delay, simulation deltas, drivers, Generics, Block statements.

Unit 2

Sequential Processing : Process statements, signal assignment versus variable assignments, sequential statements; If, CASE, LOOP, N, EXIT; ASSERT, WAIT statements, concurrent assignment problem, passive process data types : Object types, signals, Variables, constants, Data types, Scalar Types, Composite types, Incomplete types, file type caveats, sub types.

Unit 3

Subprograms and packages : Subprograms; function, Conversion function, resolution function, Procedures. Packages; Package declaration, deferred constants. Subprogram declarations, package body. Predefined Attribute : value kind attribute Value type attribute, value array attribute, value block attribute. Function Kind attribute, signal kind attribute, type kind attribute, range kind attribute.

Unit 4

Configurations : Default configuration, component configuration, Mapping library entities, generics in configurations, Generic value specification in architecture, Generic specification in configurations, Board-socket-chip analogy, block configuration, architecture configurations. Advanced topics : Overloading, subprogram overloading, overloading operators, aliases, qualified expressions, user defined expressions, generate statements, text IO.

Unit 5

Synthesis : Register Transfer Level (RTL) Description, constraints, attributes, Technology libraries, Translation, Boolean optimization, Flattening, factoring, Mapping to fates, High Level Design Flow : RTL simulation, VHDL synthesis, functional gate level verification, place and route, post layout timing simulation, static simulation, static timing. CPU design examples.

Reference books:

1. Douglas L. Perry, "VHDL Programming by Examples", THH, 2003
2. Bhasker, "VHDL", Pearson Edn

MCAE19 Bio informatics Foundations

Unit 1

Introduction to Bio-informatics.

Unit 2

Elements of cell biology: Molecular logic of living system, Characteristics of living matter at molecular level. Origin of asymmetric biomolecules. Origin of life and origin of cells. Ultra structure of a typical cell. Processing and trafficking of biomolecules, Cell communication. Nuclear envelope, nuclear matrix, organization of chromatin, nucleosomes and higher order folding and organisation of chromosomes, Organisation of DNA, chromatin structure, Replication of DNA.

Unit 3

Biomolecular structure: Basic principles of nucleic acid structure: conformation of nucleotides, oligonucleotides, double helical structure, Watson-Crick model of DNA, base-paring and base stacking, Hoogsteen base-pairing, DNA polymorphism. Basic principles of protein structure: Asymmetric carbon, amino acids and peptides, main chain and side chain torsion angles, cis and trans peptides, primary, secondary, tertiary and quaternary structure of proteins, motifs and domains. Overview of instrumental techniques such as NMR spectroscopy, x-ray crystallography, Chromatography and Electrophoresis

Unit 4

Elements of genetics : Mendel and his contribution to Genetics. Monohybrid crosses and principle of segregation. Dihybrid crosses and principle of independent assortment. Rediscovery of Mendel's principles. Chromosome theory of inheritance, Genetic basis of cell differentiation. Chemical and functional nature of genes; their location and expression methods to analyze gene sequences and function in vitro

Unit 5

Introduction to Perl , Data structures and String Algorithms, Object oriented Programming in Perl, Sequence formats and Inheritance.

Sequence and strings: representing a sequence data, a programme to store a DNA sequence, concatenating DNA fragments, transcription- DNA to RNA, using perl documentation, calculating the reverse complement in perl. Protein, files and arrays, reading proteins in files, arrays, scalar and list context.

Reference books

1. Principles of Biochemistry – Lehninger
2. Introduction to Protein Structure, C. Branden and I. Tooz. , Garland Press, New York.
3. Principles of Protein Structure, G.E.Schulz & R.H.Schirmer, Springer Verlag, Berlin.
4. Principles of Nucleic Acid Structure , W. Saenger,
5. Basic Genetics. Robert F. Weaver II edn. Philip W. C. B 1995.
6. Molecular Biology by David Friefelder.
7. Genes V by Benjamin Lewin.
8. Molecular Biology of the gene by Watson et.al.
9. Old, R W and Primrose, S.B. – 1994 Principles of gene manipulation- An Introduction to Genetic Engineering. Fifth Edition. Blackwell Scientific Publications.
10. Mastering Perl for Bioinformatics, J. D. Tisdall, O'Reilly, 2004

MCAE20 Bioinformatics Using Perl

Unit 1

Gene expression control, Multiple alleles. Modification of dominance relationships. Gene interactions. Essential and lethal genes. Environmental impact on genes. Genetic linkage. Chromosomal exchange. Genetic maps. Tetrad analysis, Mitotic recombination. Chromosomal and gene mutations. *Cytosomic inheritance, Inheritance through mitochondria and chloroplasts and their mapping.* Genetic variation in populations and measuring. Inbreeding. Genetic Drift. Gene flow. Natural selection. Molecular evolution.

Unit 2

Transcription, Post transcriptional modification, messenger RNAs, Gene silencing, Genetic code and gene protein relationships, nonsense and missense mutations and suppressers, Translation, post-translational modification Preparation of Gene libraries, c DNA libraries and subtracted libraries, identification of desired clones Techniques in molecular genetics: cloning, PCR, DNA sequencing, DNA fingerprinting, Restriction difestion, Blotting.

Unit 3

Review of perl, Motifs and Loops: flow control, code layout, finding motifs, counting nucleotides exploding strings into arrays, operating on strings, writing to file. Subroutines and bugs: subroutines, scoping and subroutines, command line arguments and arrays, passing data to subroutines, modules and libraries of subroutines, fixing bugs in your code.

Unit 4

Mutations and randomization: random number generator, a program using randomization, a program to stimulate DNA mutation, generating random DNA, analyzing DNA. The genetic code: hashes, data structures and algorithms for biology, genetic code, translating DNA into proteins, reading DNA form files in FASTA format, reading frames.

Unit 5

Restriction maps and regular expressions: regular expressions, restriction map and restriction enzymes, perl operations. GenBank: GenBank files, GenBank libraries, separating sequence and annotations, parsing annotations, indexing GenBank with DBM.

Reference books :

1. Beginning perl for Bio Informatics- James Tisdall O'reilly 2003
2. Perl programming for Bioinformatics and Biologists- De Curtis Jamison a John Wiley and sons 2004

MCAE21 Bioinformatics Techniques

Unit 1

Sequence analysis, pair wise alignment and data base searching: Chemical composition of bio molecules, composition of DNA and RNA, Wartson and Crick solved the structure of DNA, development of DNA sequencing method, Genfinders and feature dictation in DNA, DNA translation, pair wise sequence comparison, sequence queries against biological data base, multi functional tools for sequence analysis. Multiple sequence alignment, trees and profiles: morphological to molecular, multiple sequence alignment, phylogenitic analysis, profiles, motives, nucleotides sequence data base, working with single DNA sequence.

Unit 2

Visualizing protein structure and computing structural properties: protein structure data, chemistry of proteins, web based protein structure tools, structure visualization, structure classification, structural alignment , structural analysis, solvent accessibility and interaction, compiling physio-chemical properties, structure optimization, protein resource data base, protein and specialized sequence data base.

Unit 3

Predicting protein structure and functions form sequence: determining the structure of Protein, predicting the structure of protein, form 3D to 1 D, feature detection in protein sequence, secondary structure prediction, predicting 3D structure, protein modeling project, working with single protein sequence data base, working with protein 3D structure.

Unit 4

Tools for Genomic and Proteomics: from sequencing Genes to sequencing Genomic, sequence assembly accessing Genome information on the web, annotating and analyzing whole genomic sequence, functional genomic- new data analysis challenges, proteomics biochemical pathway data base modeling kinetic and physiology, working with RNA, building Phylogenetic trees.

Unit 5

Visualization and Data Mining: preparing data, viewing graphics, sequence and visualization, networks and pathway visualization, working with numerical data, data mining and biological information. Biological research on web: using

search engine, finding scientific articles, public biological data bases, searching biological database, depositing data into public data basis, judging quality of information.

References books:

1. Bioinformatics computer skills- Cynthia Gibas & Per Gembeck O'reilly Publication 2002
2. Bioinformatics a Beginners Guide. Jean- Michel Claverie & Cedric Notredame , Wiley publishing 2003.

MCAE22 Sequence and Genome Analysis

Unit 1

Introduction: First sequence collected, DNA sequence databases, Sequence retrieval, dot or diagram method for comparing sequences, Alignment of sequences by dynamic programming, finding local alignments between sequences, multiple sequence alignments, transcription, prediction of RNA secondary structure, searching for similar sequences, FASTA, BLAST, sequence of protein, secondary structure prediction of proteins.

Unit 2

DNA sequencing, computer storage sequences, sequence formats, storage of information in a sequence database.

Unit 3

Use scoring matrices and Gap penalties in sequence alignments, assessing the significance of sequence alignments, sequence alignments and evolutionary distance estimation by Bayesian statistical methods.

Unit 4

Multiple sequence alignment: genome sequencing, uses, and multiple sequence alignment as an extension of pair alignment by dynamic programming, scoring multiple sequence alignments, progressive methods of multiple sequence alignment, iterative methods of multiple sequence alignment, statistical methods for aiding alignment, position specific scoring matrices, multiple sequence alignment editors and formatters.

Unit 5

RNA structure prediction, features, methods, relationship of phylogenetic analysis to sequence alignments, concept of evolutionary trees, maximum parsimony methods, database searching for similar sequences, database searching with Smith-Waterman dynamic programming method, Gene prediction, methods for gene prediction.

Reference:

1. Bioinformatics-sequence and Genome analysis, Davis W Mount
2. Principles of gnome analysis and Genomic, S.B, R M. Tumyan

MCAE23 Advanced Bioinformatics Algorithms

Unit 1

Restriction Mapping, A practical restriction mapping algorithm, Regulatory Motifs in DNA sequences, The Motif finding problem, search trees, finding motifs, finding a median string, Greedy Algorithms: genome rearrangements, sorting by reversals, Approximation algorithms, Greedy approach to motif finding.

Unit 2

Dynamic programming Algorithms, the power of DNA sequence comparison, The Manhattan tourist problem, Edit distance and alignments, longest common subsequences, Global sequence alignments, alignments with gap penalties, Multiple alignment, gene prediction, spliced alignment.

Unit 3

Divide and conquer algorithms: space efficient sequence alignment, block alignment and Four-Russian speedup, constructing alignment Subquadratic time.

Graph Algorithms: Graphs, graphs and genetics, shortest superstring problem, DNA arrays as an alternating sequencing technique, Sequencing by hybridization, SBH as a Hamiltonian path problem, SBH as an Eulerian path problem, Fragment assembly in DNA sequencing, Protein identification with database search, Spectral convolution, Spectral alignment

Unit 4

Pattern matching, repeat finding, Hash tables, exact pattern matching, clustering and trees.

Unit 5

Hidden Markov Models: CG-Islands and the "Fair Best Casino", the fair best Casino and Hidden Markov Models, Decoding algorithm, HMM parameter estimation, Profile HMM alignment, Randomized algorithms: The Sorting problem, Gibbs Sampling, Random projections.

Reference:

1. An Introduction to Bioinformatics Algorithms, Neil C. Jones and Pavel A. Pevzner.
2. Algorithms in Bioinformatics, Gary Benson.
3. Protein Bioinformatics- An Algorithmic approach to sequence and structural analysis, Ingvar Eidhammer, Inge Jonassen, William R. Tylor.

MCAE24 Neural Computing

Unit 1

Basics of Artificial Neural Networks (ANN) : Characteristics of Neural network, Historical development, ANN terminology, models of neurons, Topology, Basic learning laws, Activation dynamic models, Synaptic Dynamic models, Learning methods, stability and Convergence.

Unit 2

Functional Units of ANN for pattern recognition task : Pattern recognition problem, basic functional unit, Pattern recognition by functional units. Feed forward Neural network : analysis of pattern association network, Analysis of pattern classification network, Analysis of pattern mapping network.

Unit 3.

Feed back Neural Network : Analysis of Linear auto associative feed forward network. Analysis of pattern storage network, Stochastic network and simulated annealing, Boltzman machine.

Unit 4.

Competitive learning Neural Networks : Components of competitive learning network. Analysis of feed back layer for different output functions, analysis of pattern clustering Networks, analysis of feature mapping network.

Unit 5

Architecture of complex pattern recognition task : Associative memory, pattern mapping, Stability – plasticity dilemma, Adaptive resonant theory, Temporal patterns, pattern variability, Neocognitron.

Reference books:

1. Yegnanarayana B.., Artificial Neural Networks, PHI, 2003
2. Wsserman P.D., Neural computing – Theory and Practice, VNR

MCAE25 Fuzzy Sets and Systems

Unit 1

Classical sets and fuzzy sets, classical relation and fuzzy relation. Membership function.

Unit 2.

Fuzzy to crisp conversion, fuzzy arithmetic, Numbers, Vectors and Extension principles, classical Logic and fuzzy Logic.

Unit 3.

Fuzzy rule based systems, Fuzzy nonlinear simulation, Fuzzy decision making, fuzzy classification.

Unit 4.

Fuzzy Pattern Recognition, fuzzy Control systems.

Unit 5

Fuzzy measures – belief, Plausibility, Probability and possibility – fuzzy set Models in Operation Research.

Reference books:

1. Fuzzy Logic with Engineering applications, T J Ross, Mc Graw Hill, 1997.
2. Fuzzy set theory and Applications, Kluewer Academic Publishers, 1996.

MCAE26 Pattern Recognition

Unit 1

Introduction to statistical, syntactic and descriptive approaches, features and feature extraction, learning, Bayes decision theory – introduction, continuous case, 2 – category classification, minimum error rate classification, classifiers, descriminant functions, decision surfaces, error probabilities and integrals, normal density, discriminant functions for normal density.

Unit 2.

Parameter estimation and supervised learning – Maximum likelihood estimation, Bayes classifier, learning the mean of a normal density, general Bayesian lerning.

Unit 3.

Non parametric technique – density estimation, parzen windows, k-nearest neighbor estimation, estimation posterior probabilities, nearest – neighbor rule, k – nearest neighbor rule.

Unit 4

Linear discriminant functions, 2-category linearly separable case, non separable behavior, linear programming procedures, Clustering – data description and clustering, similarity measures, criterion functions for clustering.

Unit 5

Syntactic approach to PR – pattern grammars and languages, higher dimensional languages – tree, graph, Web, plex, shape grammars. Stochastic grammars, attribute grammars. Parsing techniques, grammatical inference.

Reference books:

1. Duba & Heart, Pattern classification and Scene analysis, John-Wiley and sons
2. Gonzalez & Thomson, Syntactic Pattern Recognition, Addison – Wesssley
3. Fu K. S., Syntactic Pattern Recognition and Applications, PHI

MCAE27 Digital Image Processing

Unit 1

Components of Image Processing system, Visual preliminaries, Image Formation, Digitization.

Unit 2.

Image processing – Image enhancement, restoration.

Unit 3.

Image compression, Registration. Image analysis – Segmentation..

Unit 4.

Edge and line detection, feature extraction.

Unit 5

Image description, Recognition.

Reference books:

1. Digital Image Processing and Analysis, Chanda & Majumdar, PHI
2. Digital Image Processing, Gonzalez and Woods, Pearson Edn.

MCAE28 Web Technology

Unit 1

Internet Basic, introduction to to HTML, List, Creating table, Linking document, Frames, Graphics to HTML Doc, Style sheet basic, Add style to document, Creating style sheet rules, Style sheet properties, Font, Text, List, Color and Background color Box display properties.

Unit 2

Introduction to Java Scripts, advantage of Java Scripts, Java Script syntax, datatype, variables, Array, operator and expressions, Looping constructor, Function Dialogue Box.

Unit 3

Java script document object model, Introduction, Object in HTML, Event handling, Window Object, Document object, Browser Object, Form object, Navigator object, Screen object, Built in object, User defined object, Cookies.

Unit 4

ASP, .NET, Language structure, Page structure, Page event, Properties & compiler directives. HTML server control, Anchor, Tables, Forms, Files. Basic web server controls, Label, Text box, Button, Image, Links, Checks & Radio button, Hyperlink, Data list web server control, Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

Unit 5

Request and response object, Cookies, Working with data, OLEDB connection class, Command class, Transaction class, data adapter class, Data set class. Advance issues, Email, Application issues, Working with IIS and page directives, Error handling. Security : Authentication, IP address, Secure by SSL & client certificate.

Reference Books

1. Bayross , Web enable Commercial Application development Using HTML, DHTML, Java scripts, Perl CGI- BPB publications 2000.
2. J. Jaworski, Mastering Java Scripts - BPB publications 1999.
3. T. A. Powell, Complete reference HTML , TMH 2002.
4. G. Buczek – ASP .NET Developers Guide, TMH 2002.

5. Richard Anderson, Professional ASP **.**NET – Wrox press Ltd.

MCAE29 Data Mining

Unit 1

.Introduction to data mining, need for data warehousing and data mining, application potential, keywords and techniques. Data Warehousing and On-line analytical Processing (OLAP): Aggregation operations, models for data warehousing, star schema, fact and dimension tables , conceptualization of data warehouse and multidimensional databases, Relationship between warehouse and mining.

Unit 2

Data mining primitives : Data preprocessing, data integration, data transformation. Definition and specification of a generic data mining task. Description of Data mining query language with examples.

Association analysis: Different methods for mining association rules in transaction based data bases. Illustration of confidence and support. Multidimensional and multilevel association rules. Classification of association rules. Association rule algorithms – A priori and frequent pattern growth.

Unit 3.

Classification and Prediction : Different classification algorithms. Use of genie index, decision tree induction, Bayesian classification, neural network technique of back propagation, fuzzy set theory and genetic algorithms.

Unit 4.

Clustering : Partition based clustering, hierarchical clustering, model based clustering for continuous and discrete data. Scalability of clustering algorithms. Parallel approaches for clustering.

Unit 5

Web mining : Web usage mining, web content mining, web log attributes.
Data mining issues in object oriented data bases, spatial data bases and multimedia data bases and text data bases.

Reference books:

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Harcourt India Pvt Ltd, 2001
2. M. Dunham, " Data Mining : introductory and Advanced Topics", Pearson Pub, 2003
3. A.K. Pujari, "Data Mining Techniques", Universities Press.

MCAE30 Multimedia Technology

Unit 1

Introduction, Medium, Main properties of a multimedia system, Traditional data stream characteristics, Sound, Music and Speech.

Unit 2.

Image and Graphics, Basic concepts, Computer Image Processing,

Unit 3.

Video and Animation, Basic concept, Television, Computer Based Animation, Data compression, JPEG, MPEG.

Unit 4.

Optical Storage media, Computer Technology, Multimedia Operating System.

Unit 5

Networking, Multimedia communication System, Multimedia server.

Reference books:

1. Ralf Steinmetz and Klara Nahrsted, Multimedia : computing communications and Applications. PHI 1995.
2. Guojun LU : Communication and computing for Multimedia systems. Artech House Inc-1996.

MCAE31 Linux Firewalls & IPV 6 Protocols

Unit I

Preliminary Concepts underlying Packet-Filtering firewalls- The TCP/IP reference networking model, Service ports, packets. Packet filtering concepts- A packet filtering firewall, Choosing a default packet- filtering policy, rejecting versus denying a packet, filtering incoming packets, filtering outgoing packets, private versus public network services; Building and installing firewalls- The Linux firewall administration program, initializing the firewall, filtering ICMP control and status messages, protecting services on assigned unprivileged ports, enabling basic, required internet services, enabling common TCP services, enabling common UDP services, logging denied incoming packets, denying access to problem sites up front, enabling LAN access, installing the firewall

Unit 2

LAN security issues, multiple, firewalls, and perimeter networks :- LAN, Configuration options for a trusted home LAN, configuration options for a larger or less trusted LAN, A formal screened-subnet firewall. Debugging the firewall rules-general firewall development tips, listing the firewall rules ,Checking the input, output, and forwarding rules, testing an individual packet against the firewall rules. System level security and monitoring- Checking the network interfaces with ifconfig, checking the network connection with ping, checking the network process with netstart, checking all process with ps-ax, interpreting the system logs, Security tools, Firewall tools;

Unit 3

IPV 6 Protocols:-Ipv6 versus Ipv4, history of Ipv6, overview of Ipv6, The Structure of the Ipv6 Protocol, Ipv6 header format, Extension Headers: extension header order, options, hop-by-hop option header , routing header, fragment header, destination option header, no text header; Packet size issues, Ipv6 Addressing, address format, address notation, address types, international registry services, and prefix allocation. ICMPv6, ICMPv6 message format, the ICMPv6 Error messages, Informational Messages, the ICMPv6 header in a trace file.

Unit 4

Security in Ipv6:- security concepts, requirements, and current solutions; IPSEC framework, security elements available in Ipv6 for authentication and encryption, Quality of Service in Ipv6, basic requirements and types of QoS ; different QoS architectures, resource reservation; Networking Aspects, Layer 2 support for Ipv6 (Ethernet, Token Ring, ATM, Frame Relay etc), multicast support and multicast routing, Mobile Ipv6; Routing Protocols, advanced routing features with Ipv6 , RIPng, OSPFv3 for Ipv6, BGP extensions for Ipv6, IS-IS, and EIGRPv6

Unit 5

Upper Layer Protocols:- changes for TCP and UDP & DHCPv6, DNS extensions for Ipv6, SLPv2 in Ipv6 networks, FTP, Telnet and Web servers.

Reference books:

1. Robert L. Ziegler, Linux Firewalls, New Riders 2001
2. Silvia Hagen ,Ipv6 Essentials , O'Reilly & Associates 2002.
3. Marcus Goncalves, Kitty Niles, Hands-On Ipv6, McGraw-Hill 2002