MAHATMA GANDHI UNIVERSITY

KOTTAYAM

M Sc PROGRAMME

IN

COMPUTER SCIENCE

(Affiliated Colleges)

REGULATIONS, SCHEME AND SYLLABUS

(Effective from 2012 Admissions)

M.Sc. PROGRAMME IN COMPUTER SCIENCE

2012

(Affiliated Colleges)

1. Eligibility

The eligibility for admission to M Sc Computer Science programme in affiliated institutions under Mahatma Gandhi University is a B Sc Degree with Mathematics /Computer Science /Electronics as one of the subjects (Main or Subsidiary) or BCA/B.Tech degree with not less than 55% marks in optional subjects.

Note: Candidates having degree in computer science/Computer Application/IT/Electronics shall be given a weightage of 20% in their qualifying degree examination marks considered for ranking for admission to M Sc(Computer Science).

2. Admission

The admission to the M Sc programme shall be as per the rules and regulations of the University.
Students admitted under this programme are governed by the Regulations in force.

3. Programme Structure and Duration

The duration of the programme shall be 4 semesters. The duration of each semester shall be 90 working days. Odd semesters from June to October and even semesters from December to April. There shall be one month semester breaks each in November and May.

A student may be permitted to complete the programme, on valid reasons, within a period of 8 continuous semesters from the date of commencement of the first semester of the programme.

The programme shall include two types of courses, Core courses and Elective Courses .

There will be four core courses and one practical course per semester for the first three semesters. In the last semester there will be one core course, two elective courses to be selected from two separate groups and one project. At the end of the programme, there will be a comprehensive viva-voce which covers questions from all courses in the programme.

4. Attendance

The minimum requirement of aggregate attendance during a semester for appearing for the end semester examination shall be 75%. A student who does not satisfy the requirements of attendance shall not be permitted to take the end Semester examinations.

5. Promotion

A student who registers for the end semester examination shall be promoted to the next semester.

6. Examinations

There shall be University examination at the end of each semester.
Practical examinations shall be conducted by the University at the end of each semester.
Project evaluation and Viva -Voce shall be conducted at the end of the programme only.
Practical examination, Project evaluation and Viva-Voce shall be conducted by two external examiners and one internal examiner.
End-Semester Examinations: The examinations shall be normally at the end of each semester.
There shall be one end-semester examination of 3 hours duration in each lecture based course and practical course.

7. Evaluation and Grading

Evaluation: The evaluation scheme for each course shall contain two parts; (a) internal evaluation and (b) external evaluation. 25% weightage shall be given to internal evaluation and the remaining 75% to external evaluation and the ratio and weightage between internal and external is 1:3. Both internal and external evaluation shall be carried out using Direct grading system.

Internal evaluation: The internal evaluation shall be based on predetermined transparent system involving periodic written tests, assignments, seminars and attendance in respect of theory courses and based on written tests, lab skill/records/viva and attendance in respect of practical courses. The weightage assigned to various components for internal evaluation is as follows.

Components of Internal Evaluation

	Component	Weightage
i)	Assignment	1
ii)	Seminar	2
iii)	Attendance	1
iv)	Two Test Papers	2

Letter Grade	Performance	Grade Point (G)	Grade Range
A	Excellent	4	3.50 to 4.00
B	Very Good	3	2.50 to 3.49
C	Good	2	1.50 to 2.49
D	Average	1	0.50 to 1.49
E	Poor	0	0.0 o 0.49

Grades for Attendance

% of attendance	**Grade**
>90%	A
Between 85 and 90	B
Between 80 and below 85	C
Between 75 and below 80	D
< 75	E

Assignment

Components	Weight
Punctuality	1
Review	1
Content	2
Conclusion	1
Reference	1

Seminar

Components	Weights
Area / Topic selected	1

Review / Reference	1
Content	2
Presentation	2
Conclusion	1

Practical – Internal

Components	Weights
Attendance	1
Laboratory Involvement	2
Written / Lab Test	2
Record	2
Viva-voce / Quiz	1

Practical – External

Components	Weights
Design and Coding	2
Output	2
Record	2
Viva-voce	1

To ensure transparency of the evaluation process, the internal assessment grade awarded to the students in each course in a semester shall be published on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal grade.

The course teacher and the faculty advisor shall maintain the academic record of each student registered for the course which shall be forwarded to the University through the college Principal and a copy should be kept in the college for at least two years for verification.

External evaluation: The external Examination in theory courses is to be conducted by

the University with question papers set by external experts. The evaluation of the answer scripts shall be done by examiners based on a well-defined scheme of valuation. The external evaluation shall be done immediately after the examination preferably through Centralized Valuation

8. Direct Grading System

Direct Grading System based on a 5 - point scale is used to evaluate the performance (External and Internal Examination of students)

DIRECT GRADING SYSTEM

Letter Grade	Performance	Grade point(G)	Grade Range
A	Excellent	4	3.5 to 4.00
B	Very Good	3	2.5 to 3.49
C	Good	2	1.5 to 2.49
D	Average	1	0.5 to 1.49
E	Poor	0	0.00 to 0.49

The overall grade for a programme for certification shall be based on CGPA with a 7-point scale given below

CGPA	Grade
3.80 to 4.00	A+
3.50 to 3.79	A
3.00 to 3.49	B+
2.50 to 2.99	B
2.00 to 2.49	C+
1.50 to 1.99	C
1.00 to 1.49	D

.

A separate minimum of C Grade for Internal and External are required for a pass for a course. For a pass in a programme a separate minimum Grade C is required for all the courses and must score a minimum CGPA of 1.50 or an overall grade of C and above.

Each course is evaluated by assigning a letter grade (A, B, C, D or E) to that course by the method of direct grading. The internal (weightage =1) and external (weightage =3) components of a course are separately graded and then combined to get the grade of the course after taking into account of their weightage.

A separate minimum of C grade is required for a pass for both internal evaluation and external evaluation for every course.

A student who fails to secure a minimum grade for a pass in a course will be

permitted to write the examination along with the next batch.
There will be no supplementary examinations.

After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of semester, a student should pass all courses and score a minimum SGPA of **1.50.** However, a student is permitted to move to the next semester irrespective of her/his SGPA.

For instance, if a student has registered for 'n' courses of credits C1, C2 ……,Cn in a semester and if she/he has scored credit points P1, P2……,Pn respectively in these courses, then SGPA of the student in that semester is calculated using the formula.

SGPA= (P1+P2+…….+Pn)/ (C1+C2+……+Cn)

CGPA = [(SGPA)1*S1 + (SGPA)2*S2 + (SGPA)3*S3 + (SGPA)4*S4]/ (S1+S2+S3+S4)

Where S1, S2, S3, and S4 are the total credits in semester1, semester2, semester3 and semester4.

9. Pattern of Questions

Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. He/She shall also submit a detailed scheme of evaluation along with the question paper. A question paper shall be a judicious mix of short answer type, short essay type / problem solving type and long essay type questions.

Weight : Different types of questions shall be given different weights to quantify their range as follows :

Sl. No.	Type of Questions	Weight	Number of questions to be answered
1	Short Answer type questions (not exceeding 1 page)	1	5 out of 8
2	Short essay / problem solving type questions (not exceeding 2 pages)	2	5 out of 8
3	Long Essay Type questions	5	3 out of 6

The Final Grade Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme including those taken over and above the prescribed minimum credits for obtaining the degree. The Final Grade Card shall show the CGPA and the overall letter grade of a student for the entire programme.

CURRICULUM DESIGN ABSTRACT

Semester I

MCS 1C1	-	Mathematical Foundations of Computer Science
MCS 1C2	-	Advanced Computer Systems and Internet Programming
MCS 1C3	-	Digital Circuits Fundamentals and Computer Organization
MCS 1C4	-	Object Oriented Programming with C++
MCS 1P5	-	Lab I [C++ & Internet Programming]

Semester II

MCS 2C1	-	Data and File Structures
MCS 2C2	-	Computer Networks
MCS 2C3	-	Operating Systems and Systems Programming
MCS 2C4	-	Computer Graphics and Digital Image Processing
MCS 2P5	-	Lab II [DFS & Graphics]

Semester III

MCS 3C1	-	Database Management Systems
MCS 3C2	-	Java Programming
MCS 3C3	-	Design and Analysis of Algorithms
MCS 3C4	-	Software Engineering
MCS 3P5	-	Lab III [Java and DBMS]

Semester IV

MCS4C1	-	Data Mining
MCS 4EA*	-	Elective1
MCS 4EB*	-	Elective 2

Project

Viva-voce

ELECTIVE GROUP A

MCS 4EA1	-	Web Programming- LAMP
MCS4EA2	-	Distributed Systems
MCS4EA3	-	Compiler Construction
MCS4EA4	-	Computational Linguistics
MCS4EA5	-	Visual Programming
MCS4EA6	-	Visual C++

ELECTIVE GROUP B

MCS4EB1	-	Soft Computing
MCS4EB2	-	Systems Security
MCS4EB3	-	Advanced Java Programming
MCS4EB4	-	Database Administration using SQL Server
MCS4EB5	-	Microprocessors and Assembly Language Programming
MCS4EB6	-	Advanced Computer Architecture

Semester	Course	Teaching Hrs.		Credit	Total Credits
		Theory	Practicals		
I	MCS 1C1	5	-	4	19
	MCS 1C2	4	-	4	
	MCS 1C3	4	-	4	
	MCS 1C4	4	-	4	
	MCS 1P5	-	8	3	
II	MCS 2C1	4	-	4	19
	MCS 2C2	4	-	4	
	MCS 2C3	4	-	4	
	MCS 2C4	4	-	4	
	MCS 2P5	-	9	3	
III	MCS 3C1	4	-	4	19
	MCS 3C2	4	-	4	
	MCS 3C3	4	-	4	
	MCS 3C4	4	-	4	
	MCS 3P5	-	9	3	
IV	MCS 4C1	6	-	4	23
	MCS 4EA*	5	-	4	
	MCS 4EB*	5	-	4	
	Project	-	9	8	
	Viva-Voce	-		3	

SEMESTER I

MCS 1C1 Mathematical Foundations of Computer Science

Module 1 (Hours 25)

Propositional Calculus: Statements and notation, Connectives, Negation, Conjunction, Disjunction , Statement formulas and truth tables, Conditional and Biconditional, Well formed formulas, Tautologies, equivalence of formulas, tautological implications, Normal form, disjunctive and conjunctive normal forms, Theory of inference for statement calculus, Validity using truth tables, Rules of inference, sample problems
Predicate Calculus: Predicates, statement functions, variables and quantifiers, predicate formulae, free and bound variables, the universe of discourse, valid formulas and equivalences

Module 2 (Hours 18)

Graphs: Definition and examples , incidence and degree, isomorphism, sub graphs, walks, paths, and circuits, weighed graphs, shortest path algorithms, incidence and adjacency matrices and their properties, definition and properties of trees and binary trees. Definition of spanning tree, minimum spanning tree algorithms, Cut sets and cut vertices, maxflow mincut theorem , Digraphs, directed paths and connectedness, directed trees, arborescence , tournaments.

Module 3 (Hours 25)

Theory of Automata: Definition, Description of finite automata, Transition system and its properties, Acceptability of a string by a finite automata, NFA, Equivalence of DFA and NFA, Minimization of finite automata, Construction of minimum automaton.
Regular sets and Regular grammars: Regular expressions, identities for regular expressions, finite automata and regular expressions, transition system containing ^-moves, conversion of nondeterministic systems to deterministic systems, Algebraic method using Arden's theorem, Construction of finite automata equivalent to a regular expression.

Module 4 (Hours 14)

Languages and grammars: Basic definition and example, Definition of a grammar , derivation and the language generated by a grammar, Chomsky classification of languages, Context free languages and derivation trees

Module 5 (Hours 8)

Fuzzy logic: Introduction, Crisp Sets: an overview, Fuzzy sets: Basic types, Basic concepts, Characteristics and significance of the paradigm shift.

References

1. Tremblay JP &R Manohar Discrete mathwematical structures with Applications to Computer Science McGraw –Hil 1987

2. Deo Narsingh, Graph theory with aplciations to engineering and computer science , Prentice Hall of India 1981
3. Mishra KLP,N Chandra shekharan, Theroy of Computer science(Automata, Languages, and Computation),Prentice Hall of India ,1995
4. George J Klie and Bo Yuvan- Fuzzy sets and Fuzzy logic Theory and applications Prentice Hall of India Pvt Ltd. New Delhi 2000

MCS 1C2 Advanced Computer Systems and Internet Programming

Module 1 (Hours 15)

Microprocessor History. Processor Specifications-Data I/O Bus, Address Bus, Internal Registers. Hyper-Threading Technology. Multicore Technology.

Motherboard-Processor Sockets/Slots, Chipsets-Chipset Evolution, North/South Bridge Architecture, Hub Architecture. Super I/O Chip. System Bus Types-The Processor Bus(FSB). Types of I/O Buses-The ISA Bus, The Micro Channel Bus, The EISA Bus, Local Buses (VESA, PCI, PCI Express, AGP). USB. Thunderbolt.

Module 2 (Hours 15)

BIOS-Motherboard ROM BIOS. ROM Chip Types-ROM, PROM, EPROM, EEPROM. DRAM. SRAM(Cache Memory). RAM Types-FPM DRAM, EDO RAM, SDRAM, DDR SDRAM, DDR2 SDRAM, DDR3, RDRAM. Memory Modules-SIMMs, DIMMs and RIMMs.

Hard Disk Drive Components-Hard Disk Platters, R/W Heads, Head Actuator Mechanisms, Air Filters, Spindle Motor, Logic Board.

Removable Storages: Flash Memory Devices-Types. Optical Storage: CD - Construction and Technology, Mass Producing CDs. DVD – Construction and Technology, DVD Capacity (Sides and Layers). Blu-ray Disc. HD-DVD.

Module 3 (Hours 12)

Keyboard-Switch-Capacitive, Hall Effect, Opto-Electronic, Membrane,Mechanical. Keyboard Organization, Scanning, Debouncing, Encoding. Mouse- Mechanical Mouse, Opto-Mechanical Mouse, Optical Mouse.

LCD Technology- How LCD Displays Work, Active Matrix Displays, Benefits of LCD Panel, Drawbacks of LCD Panel. LED Backlit LCD. Tablet PCs.

Working of Dot Matrix Printer - Inkjet Printer- Laser Printer.

Module IV (Hours 15)

Internet-Introduction-Internet History-World Wide Web-http-URL.

HTML-Core Elements and Attributes-Basic Text Formatting-Presentational Elements-Lists-Basic Links-Adding Images using <img> element- Using Images as Links- Image Maps- Basic Table elements and Attributes- Advanced Tables- Forms- Form Controls-Text Input, Buttons, Checkboxes, Radio Buttons, Select Boxes, File Select Boxes.

Module V (Hours 15)

CSS- Introduction- The <Link> and <style> Elements- CSS Properties- Controlling Fonts- Text Formatting- Text Pseudo Classes- Selectors- Links- Backgrounds- Lists.

JavaScript- The Document Object Model- JavaScript Variables- Operators- Functions-Conditional Statements- Looping- Events- Built-in Objects- Writing JavaScript- Form Validation.

References

1. Scott Mueller, *Upgrading and Repairing PCs 19th Edition*, Pearson (QUE), 2010.
2. Jon Duckett, *Beginning Web Programming with HTML, XHTML, and CSS 2nd Edition*, Wiley India (Wrox), 2009.
3. Peter Norton, *Introduction to Computers, Tata McGraw Hill, 6th Edition, 2006*.
4. Lotia/Nair, *Modern All about Keyboard and Mouse, BPB.*
5. Lotia/Nair, *Modern All about Printers, BPB*.

MCS1C3 Digital Circuits Fundamentals and Computer Organization

Module 1 (Hours 18)

Boolean Algebra, Truth Tables, Logic gates and Map Simplification, Flip-flops, Design of Combinational and Sequential Circuits, Examples of Digital circuits –Adders, Multiplexers, Decoders, Counters, Shift Registers. Register transfer language and micro operations.

Module 2 (Hours 10)

Functional units of computer- Basic operational concepts.

Data Representation: Signed Number Representation-Sign and Magnitude, 1's Complement, 2's Complement, Floating point Number representation. Machine

Instructions: Classification- Function, Addresses, Size, Addressing Modes. Instruction Sequencing.

Module 3 (Hours 12)

Processing unit: Fundamental concepts, register transfers, performing arithmetic or logic operations, memory read and write, execution of a complete instruction, branch instruction, Single bus, two bus, three bus organization, a complete processor

Control unit: hardwired control, microprogrammed control, micro instructions-types.

Module 4 (Hours 16)

Arithmetic & Logic Unit: Addition of positive numbers – Fast Adders – Signed Addition and Subtraction- addition/subtraction logic unit –Multiplication of positive numbers –Array Multiplier, Sequential Multiplier-Signed number Multiplication-Multiplication using Booth's algorithm -Fast Multiplication – bit pair recording of multiplication, Division-restoring and non restoring algorithms, Floating point numbers and Operations.

Module 5 (Hours 16)

The Main Memory: Memory Hierarchy – Main memory – RAM,ROM-memory cells-cell organization-working – Performance Considerations- Cache Memory –Virtual Memory- Memory Management Requirements, Secondary storage – memory interleaving.

Input / Output Organization: Accessing I/O devices –Programmed I/O, Interrupt I/O Interrupts- Interrupt processing – hardware interrupts –programmable interrupt controller – Vectored Interrupts - Interrupt nesting - Daisy chaining - Direct memory access (DMA): DMA operations & DMA Controller ,Introduction to I/O interfaces, I/O channels, IO Processors.

References

1) V C Hamacher, “Computer Organization”, Mc-Graw Hill International Edition, Fifth Edition.

2) Morris Mano, “Digital logic and Computer design”, Prentice Hall of India,2004.
3) M Morris Mano ,”Computer System Architecture”, Prentice Hall, Third Edition.
4) William Stallings, “Computer Organization and Architecture”– Fifth Edition.
5) Andrew S Tanenbaum ,”Structured Computer Education”, Prentice Hall, Fourth Edition.

6) Floyd and Jain ,”Digital Fundamentals”, Pearson education, Eighth edition
7) Albert Paul Malvino ,Donald P Leach ,”Digital principles and Applications”, McGraw Hill, Fourth Edition.
8) Thomas C Bartee,”Digital computer Fundamentals”, McGraw Hill, Sixth Edition.

MCS 1C4 Object Oriented Programming with C++

Module 1 (15 hours)

Introduction to programming - Concepts of Programming, Concept of an algorithm; Introduction to object oriented concepts - features of object oriented programming;

C++ programming basics - data types, operators, precedence of operators, control flow, functions, arrays and strings, operations on arrays, string manipulations;

Pointers - memory management, new and delete, array of pointers, pointers to pointers.

Module 2 (15 hours)

Classes and objects, constructors, destructors, objects as function arguments, inline functions, friend functions, friend classes, array of objects, static members, pointers within a class, pointers to objects, array of pointers to objects, pointer to object members, this pointer.

Module 3 (10 hours)

Overloading - function overloading, operator overloading, overloading unary operators, overloading binary operators, data conversion.

Module 4 (18 hours)

Inheritance - Base class and derived class, forms of inheritance, modes of inheritance, constructors in derived class;

pointer to derived class objects;

Object Composition;

Polymorphism - virtual function, pure virtual function, abstract classes, early binding, late binding.

Module 5 (14 hours)

Files and streams - streams, predefined console streams, string I/O, object I/O, files, file modes, read/write pointers, file input/output;

command line arguments;

Templates - function template, class template;

Exception handling.

References

1. Robert Lafore, Object Oriented Programming in C++, Galgotia

2. Schaums Outline series, Programming in C++

3. Venugopal, Rajkumar, Ravishankar, Mastering C++, Mc Graw Hill

4. Stroustrup, Bjarne, The C++ Programming Language , Addison Wesley

5. Sourav Sahay, Object Oriented Programming with C++, Oxford University Press

6. E. Balaguruswamy, Object Oriented Programming in C++, McGraw Hill

MCS 1P5 Lab I (C++ and Internet Programming)

C++ (MCS1C4) 80 Hours

Simple Programs using OOP concept	6 hrs.
Inline and friend functions	4 hrs.
Constructors and destructors	6 hrs.
Array of objects	4 hrs.
Overloading	8 hrs.
Inheritance	10 hrs
Pointers and memory management	13 hrs
Virtual functions	5 hrs
Files	8 hrs
Command line arguments	4 hrs
Templates	8 hrs
Exception handling	4 hrs

Internet Programming (MCS1C2) 64 Hours

HTML	20 hrs
{List, Forms, Tables, Div}	
DHTML	14 hrs
{Cascading Style Sheet}	
JavaScript	30 hrs

{Form validation

Image Precaching, Interchangeable Images and Image Rollovers

Different Event Handlers

Important DOM Objects and related methods. (Window, Document, Location, Form, Form Elements, Body etc)}

SEMESTER II

MCS 2C1 Data and File Structures

Module 1 (Hours 14)

Concept of data structures, types of data structures ,examples.

Arrays : Organization, representation and implementation of arrays, examples.

Implementation of Stacks and Queues, Circular Queues (Sequential),

Priority Queues, Double ended queues, Multiple stack, Applications of stacks and queues.

Module 2 (Hours 22)

Lists: Representation and implementation of singly linked list, doubly linked list, circular lists, linked list representation of stacks and queues, examples.

Dynamic storage management: boundary tag system. Garbage collection and compaction.

Module 3 (Hours 12)

Trees: Representation and Implementation, Binary trees, insertion and deletion of nodes in binary tree, binary tree traversals, Binary search trees, Threaded Binary trees, Applications of binary trees, Balanced trees (AVL trees), B- trees- Insertion and Deletion of nodes.

Module 4 (Hours 14)

Search techniques: sequential (linear) search, binary search, Tree search, Multiway search tree

Sorting techniques: Bubble sort, quick sort, binary tree sort, selection sort, heap sort, simple insertion sort, shell sort, merge sort, radix sort.

Module 5 (Hours 10)

File Organizations : sequential, indexed sequential, random, linked organizations.

Hashing : Static hashing, hash tables, hash functions, overflow handling.

References

1. Aaron M Tenenbaum, Moshe J Augustein , Data structures using C & C++ (Second Edition) Pearson Education 1995
2. Ellis Horowitz, Sartaj Sahini , Dinesh Mehta Fundamentals of data structures Second Edition Galgotia publications Book Source, New Delhi , 2008
3. Robert Kruse, C. L. Tondo , Bruce Leung, Data Structures and Program Design in C (Second Edition), Pearson Education. September 2007
4. Tremblay and Sorenson., Introduction to data structures with applications, TMH (Second Edition), McGraw Hill Book Company, 1998

MCS 2C2 Computer Networks

Module 1 (Hours 12)

Introduction to networks – topology – LAN, MAN, WAN, Client-server model concepts – transmission media – guided, unguided – transmission impairments. Digital & analog signals, Concepts of ISO/OSI reference model (detailed study not required), TCP/IP reference model – comparison.

Module 2 (Hours 17)

Network Layer – Internet addressing – classless and classful - IP address – IP V4 and IPV6 – subnetting – subnet masking – address mapping – ARP, RARP, DHCP, ICMP, IGMP – DNS – networking & internetworking devices – NIC, hub, switch, bridge, router, gateway.

Module 3 (Hours 17)

Routing – routing algorithms – static & dynamic – shortest path routing, flooding, distance vector routing, link state routing.

Transport layer protocols – TCP, UDP, SCTP – protocols, uses, services.

Module 4 (Hours 14)

Application layer – email – SMTP, POP, IMAP, FTP, HTTP, TELNET – CSMA, CSMA/CD – Ethernet – gigabit networks, wireless network – wireless LAN, Bluetooth, GSM – 3G, introduction to 4G – entertainment networks – satellite TV, DTH technology, VOD services, VoIP services.

Module 5 (Hours 12)

Web security – SSL, TLS, SET – cryptography – encryption, RSA , DES – Digital signature – hacking – ethical hacking – uses – phishing – spoofing – cyber forensics.

References

1. Data communications & Networking, Behrouz A Forouzan, IV edition
2. Computer Networks, Andrew S Tanenbaum, V edition.
3. Data Communication by William Stallings

MCS 2C3 Operating Systems and Systems Programming

Module 1 (Hours 15)

Introduction to operating systems- Functions of operating system - Types of operating systems-Batch Operating System, Multi programming-Time sharing, Real time, distributed operating systems.

Processor Management- Job and process concept, Operating system view of process, process state,state transition diagram, PCB (Process control block), System state and process lists, process switch, threads, Multi-threading operating system, operating system services for process management.

Process Scheduling:-Types of schedulers, scheduling and performance criteria, scheduling algorithms, multiple processor scheduling.

Module 2 (Hours 12)

Inter process synchronization and communication-Concurrent Processes- need for inter process synchronization, critical section problem, mutual exclusion-mutual exclusion algorithms, semaphore definition, primitives, implementation of semaphores, monitors, inter process communication using messages.

Deadlocks: -Definition –Deadlock characterization-Resource allocation graph, methods for handling deadlocks, deadlock prevention, deadlock avoidance-safe state-resource allocation graph algorithm, Banker's algorithm, deadlock detection, recovery from deadlock.

Module 3 (Hours 14)

Memory Management:-Preliminaries-address binding , dynamic linking and loading, Overlays. logical versus physical address space, Swapping, Contiguous allocation – fragmentation – compaction - Paging-principles of page allocation.

structure of page table- hardware support, multi level paging, Segmentation-principles of operation, hardware, implementation of segment table, protection and sharing, fragmentation, segmentation with paging. Virtual Memory-Demand paging –Page replacement algorithms page allocation policies – Thrashing - hierarchical address translation tables - MMUS.

Module 4 (Hours 16)

File Management:-File structure, File types, File access, File attributes, File operations. Directories-Flat directory systems, hierarchical directory systems. File system implementation-Allocation methods, contiguous allocation, linked allocation, indexed allocation

Module 5 (Hours 15)

General concepts – system software and application software . Review of machine and assembly language programming. Assembly language statements – imperative declaration and assembler directives.

Assemblers – Two pass and one pass assembler

Linkers and loaders – Linker: translated, linked and load time address relocation and linking concepts – object module. Loader – absolute loader, , relocating loader

Compilers – Different phases of compilers

Case study of latest operating systems (To be taken as seminars)

References

1 Silberschatz, Galvin, Gagne: Operating System Concepts, 7th Edition

2 Milan Milenkovic 'Operating systems' TATA Mc GrawHill.

3 Andrew S. Tanenbaum, "Modern Operating System, Prentice Hall India

4 Dhamdhere, system software and operating systems – Tata Mc Graw Hill

5. H M Deitel An Introduction to Operating System – Adison Wesley

6. Tanenbaum, Modern Operating systems – Prentice Hall

7. Donovan, John J,System Programming – Mc Graw Hill

8. William Stallings, Operating Systems – Pearson Education

MCS 2C4 Computer Graphics and Digital Image Processing

Module 1 (Hours 20)

Introduction : Fundamentals of Graphics Systems, Display technologies, Graphics Software and Hardware. Various Graphic File formats, Two dimensional Graphics, Line Drawing Algorithms, Circle drawing algorithms, Clipping and windowing algorithms, Polygon Clipping. Transformations, Structures and hierarchical modeling – Concepts – Basic Structure functions- Basic Modeling concepts – Local Coordinates and Modeling Transformations, Interactive graphical techniques.

Module 2 (Hours 16)

Three Dimensional Graphics : Concepts, representation of objects with plane faces, transformations, viewing, Parallel Projection – Perspective Projection – Depth Cueing - Visible-surface detection methods – back –face detection, depth buffer, scan-line, depth-sorting and area subdivision methods, Illumination and surface rendering methods – Illumination models, polygon-rendering methods.

Module 3 (Hours 16)

Animation : Principles of Animation, Animation Techniques & File formats, Design of Animation sequences, raster animations, computer animation languages, key frame systems, motion specifications, Video File formats – NTSC, PAL, SECAM, MPEG, Analogue Video, Digital Video.

Module 4 (Hours 10)

Fundamentals of Image Processing : Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform.

Module 5 (Hours 10)

Image Enhancement Techniques : Spatial Domain methods: Enhancement by point processing- Simple intensity Transformations - Basic grey level transformation – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters –Image Compression –Elements of Information Theory - Lossless compression – Image compression models – Error Free compression - Lossy Compression.

References

1. Hearn D, M. P. Baker, *Computer Graphics*, Prentice Hall of India.
2. Rafael C. González, *Digital image processing*, Richard Eugene Woods, Prentice Hall.
3. Foley J. D, A. Van Dam, Feiner S.K., Hughes J.F., Computer Graphics, Pearson Education, 2006.
4. Harrington S, Computer Graphics a Programming Approach, 2nd Ed. Mc Graw Hill.

5. Jayaraman, Digital Image Processing.
6. Kanetkar Y, Graphics Under C, BPB Publications, New Delhi, 2002.

MCS2P5 Lab II (DFS and GRAPHICS in C++)

DFS(MCS2C1) 90 Hours

Module I – 22 Hours

Implementation of stacks and queues, Application programs

Implementation of circular queues

Module II – 24 Hours

Implementation of Singly linked list, Doubly linked list, Circular Linked list

Linked list representation of Stacks and Queues

Applications.

Module III – 24 Hours

Representation of binary trees, binary tree node insertion and deletion,

Tree traversals, Application programs.

Module IV – 20 Hours

Linear search, binary search, tree search, bubble sort, quick sort, binary tree sort,

Selection sort, heap sort, shell sort, merge sort.

Sample programs related to search and sort.

Graphics and Digital Image Processing (MCS2C4) 72 Hours

Module I - 18 Hours

Point Plotting – Line and Regular Figure Algorithms

Raster Scan line and Circle Drawing Algorithms

Module II – 18 Hours

Clipping and windowing algorithms for points, lines and polygons

2D /3D Transformations

Filling Algorithms

Module III - 16 Hours

Simple animation and morphing programmes

Graphical input programming with Keyboard and Mouse using interrupt calls

Module IV - 20 Hours

Mini Project : A mini project involving graphical user interaction, animation and sound.

SEMESTER III

MCS 3C1 Database Management Systems

Module 1: Basic concepts (14 hours)

Database, need for DBMS, users, architecture of DBMS, data models, views of data, data Independence, conventional data models & systems, ER model, attributes, relationship attributes, relationship set, generalization, aggregation, structure of relational Database and different types of keys, expressing M: N relation.

Module 2: Relational Model & Relational Database Design (16 hours)

Codd's rules, Relational data model & relational algebra, Relational model concept, Relational model constraints, relational algebra, relational database language, Data definition in SQL, Views and Queries in SQL, Specifying constraints, indexes in SQL, Specifying constraints management systems, ER to Relational, Functional dependencies, Normalization, multi-valued and other kinds of Dependencies.

Module 3: File Structure, Transaction And Concurrency control (16 hours)

Overview of physical storage media, Magnetic disk, RAID, Tertiary storage, Storage access, File organization, Organization of records in files, Data dictionary storage, Concept of transaction, ACID properties, serializibility, states of transaction, Concurrency control, Locking techniques, Time stamp based protocols, Granularity of data items, Deadlock.

Module 4: Crash Recovery and Backup (14 hours)

Failure classifications, storage structure, Recovery & atomicity, Log base recovery, Recovery with concurrent transactions, Database backup & recovery, Remote Backup System, Database security issues, Discretionary access control based on grant & revoking privilege, Mandatory access control and role based, access control for multilevel security, Encryption & public key infrastructures.

Module 5: Database system Architectures (12 hours)

Object Oriented Database, A brief introduction to XML database, a brief introduction to NOSQL, Distributed Data Bases, Parallel Database, New Applications, Web interfaces to Databases, E-commerce, DSS, Multimedia Database, Data mining, Data Ware Housing.

References

1. Avi Silberschatz,Henry F. Korth, S. Sudarshan," Database System Concepts", *Fifth Edition*, McGraw-Hill

2. Ramez Elmasri, Sham Navathe, "Fundamentals of Database Systems", Fifth edition,Pearson education

3. Raghu Ramakrishnan, Johannes Gehrke ,"Database Management systems", Third Edition,(McGraw-Hill)

MCS 3C2 Java Programming

Module 1 (Hours 12)

The Genesis of Java-overview of java-program structure-identifiers-operators-variables-literals-datatypes-control statements-iterative statements-jump statements.

Module 2 (Hours 14)

Introducing classes-declaration-object references-instantiation-method declaration-method calling-this operator-constructor-method overloading-constructor overloading – method overriding-inheritance-super class-dynamic method dispatch-final-static-abstract classes. Strings-Applet-applet tag-applet life cycle.

Module 3 (Hours 15)

Exception handling techniques-try-catch-throws clauses-Packages-creating packages-using packages-Interfaces-Multithreading creation of multithreaded program-thread classes-runnable interface-thread priorities-Event handling techniques-Events –Listeners-Event classes.

Module 4 (Hours 13)

AWT controls-Swing overview-Swing controls-Connecting JDBC with Swing.

Module 5 (Hours 18)

RMI-Define-implementing RMI-RMI interface-Define client and server-compile & execute client and server. Java Beans-overview-Bean Box-JAR files and JAR utilities-connecting beans with events in the bean box.

Servlets Technology Overview- HTTP GET and POST requests-Session tracking - Networking : establish client/ server connection using Sockets

References

1. Steven Holzner, 'Java 2 Black Book'
2. Herbert Schildt , 'Java 2 The Complete Reference'
3. Patrick Naughton, 'Java 2 The Complete Reference'
4. Reeta Sahoo, Gagan Sahoo, ' Java 2 The Complete Reference'
5. C Xavier , 'Programming with Java 2'
6. E.Balagurusamy, 'Programming with Java'

MCS 3C3 Design and Analysis of Algorithms

Module 1 (Hours 18)

Algorithm Analysis – Algorithm design techniques-Algorithm classification-complexity analysis of algorithms - Time Space Tradeoff - worst case and average case - Asymptotic notations and their significance – Recurrence equations – Analysis of linear search.

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort –.quick sort- performance measurement of quick sort and selection sort

Module 2 (Hours 12)

Greedy Algorithms: General Method – Container loading- Knapsack Problem-minimum cost spanning tree(Prism's algorithms, Kruskal's algorithms and an Optimal randomized algorithms)-.

Module 3 (Hours 12)

Dynamic Programming: General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

Module 4 (Hours 12)

Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

Module 5 (Hours 18)

Graph Traversals – Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness.

References

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.
2. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.

MCS 3C4 Software Engineering

Module 1 (Hours 12)

Introduction – The nature of software, Software engineering, The Software Process, Software Myths, Software Process Models – Generic Process Model, Prescriptive Process Model, Specialized Process Model, The Unified Process, Agile Development.

Module 2 (Hours 16)

Requirements Engineering – Principles that guide SE Practice; Understanding Requirements, Requirements Modeling- Requirements Analysis, Scenario based Modeling, UML Modeling, Data Modeling Concepts, Class Based Modeling, Flow-Oriented Modeling, Creating Behavioural Model.

Module 3 (Hours 17)

Software Design – The Design Process, Design Concepts, The Design Model; Architectural Design – Software Architecture, Architectural Styles and Designs, Architectural Mapping Using Data Flow; Component-level Design – Designing Class-Based Components and Traditional Components, Component-Based Development; User-Interface design.

Module 4 (Hours 12)

Testing – Software Testing Strategies, Testing Conventional Applications, Testing Object-Oriented applications.

Module 5 (Hours 15)

Quality Management – Software Quality Management, SCM – Software Configuration Management, The SCM Repository, The SCM Process; Product Metrics, Software Measurement, Metrics for Quality; Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object-Oriented Projects, Project Scheduling, Risk Management, Software Maintenance, Software Re-engineering.

Introduction to UML : Class Diagram, Deployment Diagram, Use-Case Diagram, Sequence Diagram, Communication Diagram, Activity Diagram, State Diagram

References

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", McGrawHill International Edition, 7th Edition, 2010
2. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli : "Fundamentals of Software Engineering" ,Second Edition.
3. Richard Fairley : "Software Engineering Concepts" , Tata McGraw Hill Edition 1997.
4. Martin L. Shooman : "Software Engineering- Design Reliability and Management" , McGraw Hill International Edition.

MCS 3P5 LAB III (JAVA and DBMS)

Java Programing(MCS3 C2) Hours 90

Module I Hours 15

Arrays-Method Overloading-Method Overriding –Constructor Overloading.

Module II Hours 20

Inheritance-Abstract Classes- Interfaces-Applets-Exception Handling.

Module III Hours 20

Package-Multithreading – Event Handling .

Module IV Hours 25

AWT-Swing-Database Connectivity.

Module V Hours 10

RMI

Database Management Systems (MCS 3C1) Hours 72

Module I-V Hours 72

Creating a new Database – Creating, Altering, Dropping a table, Adding, Updating and Deleting data - Retrieving data using basic SQL commands, Aggregate Functions – Group by and Having Clauses, Advanced Select statements – Joins – Subqueries. Setting relationships – Retrieving data from multiple tables. creating Users and setting privileges.

SEMESTER IV

MCS4C1 Data Mining

Module 1 (Hours 18)

Introduction: Data mining, Relational Databases, Data Warehouses**, Data Mining Functionalities,** Mining Frequent Patterns, Associations, and Correlations, Classification and Prediction, Cluster Analysis**, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining, Multidimensional Data Model,** From Tables and Spreadsheets to Data Cubes, Stars, Snowflakes and Fact Constellations, Schemas for Multidimensional Databases, Examples for Defining Star, Snowflake and Fact Constellation Schemas**, Data Warehouse Architecture,** Steps for the Design and Construction of Data Warehouses, A Three-Tier Data Warehouse Architecture**, From Data Warehousing to Data Mining,** Data Warehouse Usage, From On-Line Analytical Processing to On-Line Analytical Mining.

Module 2 (Hours 14)

Data Preprocessing: Needs of Preprocessing the Data, Data Cleaning, Missing Values, Noisy Data, Data Cleaning as a Process, **Data Integration and Transformation,** Data Integration, Data Transformation, **Data Reduction,** Attribute Subset Selection, Dimensionality Reduction, Numerosity Reduction, **Discretization and Concept Hierarchy Generation,** Binning, Histogram Analysis, Segmentation By Natural Partitioning**.**

Module 3 (Hours 22)

Mining Frequent Patterns, Associations, and correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, The Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation, Generating Association Rules from Frequent Itemsets**, From Association Mining to Correlation Analysis,** Strong Rules Are Not Necessarily Interesting: An Example, From Association Analysis to Correlation Analysis, **Constraint-Based Association Mining,** Metarule-Guided Mining of Association Rules, Constraint Pushing: Mining Guided by Rule Constraints.

Module 4 (Hours 28)

Classification and Prediction: Issues Regarding Classification and Prediction, Preparing the Data for Classification and Prediction, Comparing Classification and Prediction Methods **Classification by Decision Tree Induction,** Decision Tree Induction, Attribute Selection Measures, Tree Pruning, **Bayesian Classification,** Bayes' Theorem, Naïve Bayesian Classification, **Rule-based Classification,** Using IF-THEN Rules for Classification, Rule Extraction from a Decision, Rule Induction Using a Sequential Covering Algorithm, **Classification by Back propagation,** A Multilayer Feed-Forward Neural Network, Defining a Network Topology, Backpropagation, Inside the Black Box: Backpropagation and Interpretability, **Prediction,** Linear Regression, Nonlinear Regression, **Classifier Accuracy and Error Measures,** Classifier Accuracy Measures, Predictor Error Measures.

Module 5 (Hours 26)

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, Interval-Scaled Variables, Binary Variables, Categorical, Ordinal, and Ratio-Scaled Variables, Vector Objects, **A Categorization of Major Clustering Methods, Partitioning Methods,** Classical Partitioning Methods: *k*-Means and *k*-Medoids, **Hierarchical Methods,** Agglomerative and Divisive Hierarchical Clustering, ROCK: A Hierarchical Clustering Algorithm for Categorical Attributes, **Density-Based Methods,** DBSCAN: A Density-

Based Clustering Method Based on Connected Regions with Sufficiently High Density, OPTICS: Ordering Points to Identify the Clustering Structure, **Outlier Analysis,** Statistical Distribution-Based Outlier Detection, Distance-Based Outlier Detection.

References

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER,ELSEVIER, 2nd Edition.
2. Data Mining Techniques – ARUN K PUJARI, University Press
3. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..
4. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
5. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION
6. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

ELECTIVES GROUP A

MCS 4EA1 Web Programming (LAMP)

Module 1 (Hours 20)

Understanding Linux-overview of Linux features-advantages- directory and file system structure - bootloaders booting-Login-Shells-Kernel- types of users- file types- file permissions- chmod - -simple commands bash-wild card characters- grep, pipe, tee - shell variables - shell types –filters – pr, head, tail, cut, paste, sort, unique, nl, grep. Linux Editors-vi and emacs -communication & scheduling commands- mail, talk, write, wall, at, cron, crontab – process related commands- ps, kill, nohup, nice, time- archiving –tar, gzip, rpm, shell programming - control structures, operators, simple shell programs.

Module 2 (Hours 15)

System Administration-creating and deleting users - maintaining file systems- fsck,

fdisk, mkfs, mount, umount -changing passwords- passwd - network administration- netstat, ping, ifconfig, traceroute -remote login-telnet, ftp, X-windows- KDE- GNOME- Linux servers- apache- samba. Installing and configuring Linux, Apache, MySQL and PHP

Module 3 (Hours 15)

Introduction to MySql - features and advantages- data types - operators- DDL- DCL- DML commands-types and levels of privileges- Creating tables- adding data - displaying contents - update - deletion- manipulating tables - aggregate functions – subqueries – joins -cursors-functions – procedure - trigger views - and control structures.

Module 4 (Hours 20)

Introduction to php advantages- features - php syntax - php tags and styles - data types, variables, operators- type casting - array operators -control structures – Arrays - sorting arrays- using GET and POST input, Working with html forms – input validation – string manipulation functions and regular expression functions, date and time functions – require() and include() functions- file functions – user defined functions in php - connecting MySql with PHP - PHP frameworks.

Module 5 (Hours 20)

Object oriented-concepts in php- classes, objects, inheritance, overloading and overriding- interfaces - exception handling techniques- cookies and session control- PDO and PEAR.

Practical Sessions on 1) Linux commands and administration

2) MySQL and PHP programs

References

1. Special edition Using Linux : Jack Tacket Jr. & David Gunter - PHI

2. The Linux Bible: Christopher Negus, Willey India publications Ltd.

3.The complete reference Linux: Richard Peterson ,TMH publication.

4. Advanced PHP Programming: George Schlossnagle, Pearson Education

5. PHP and MYSQL Web Development- Luke Welling & Laura Thomson,

Pearson Education

6.Beginning PHP5 - 2005 edition-**wrox** publication.

MCS 4EA2 Distributed Computing

Module 1 (Hours 18)

Introduction:-Definition, Evolution, distributing computing system, Models, Goals, hardware and software concepts, Types-AMOEBA,

Message Passing-Introduction, features, issues, synchronisation, buffering.

Module 2 (Hours 18)

Communication in Distributed system-Remote Procedure Calls, Remote object invocation, Message oriented and stream oriented communication, Naming - Technologies and concepts, naming entities ,locating Mobile entities, Synchronization-clock synchronization ,Logical clocks, Election algorithms, Mutual exclusion.

Module 3 (Hours 18)

Distributed File System –Features, file Models, File accessing Models, Sun network File system, CODA, Other distributed file system-XFS, Distributed object based system-CORBA, DCOM, Distributed shared memory- Architecture-Design issues ,Trashing.

Module 4 (Hours 18)

Resource and process Management-Features of scheduling algorithm, Task assignment approach, Load assignment and Load banking ,Load sharing ,Process Migration ,Threats ,security-cryptography, authentication, access control digital signature, security management.

Module 5 (Hours 18)

Consistency & Replication-Data centric Consistency Models, Client centric consistency Models, Consistency protocols, Fault Tolerance-introduction, process resilience, Reliable client server communication, Reliable group communication, Distributed commit.

References

1. Andrew S Tanenbum and Marteen Vansteen, *Distributed System principles & paradigm,*

PHI publications

2. Pradeep k Sinha, *Distributed Operating System concepts and Design* ,PHI publications
3. Grag, Elements *of Distributed computing*-,Wiley publications
4. George colouris,Jean Delimore,Tim kind Berg, *Distributed system concepts & designing* –Pearson Education Associates.

MCS 4EA3 Compiler Construction

Module 1 Introduction to Compiling (Hours 13)

Compilers, Analysis of the source program, The phases of a compiler, Compiler Construction tools.

Module 2 Lexical Analysis (Hours 12)

Specification and Recognition of tokens, Regular Expressions and Finite

Automata, From a Regular Expression to an NFA, Design of a Lexical Analyser Generator.

Module 3 Syntax Analysis (Hours 18)

Parsing, Context Free Grammars, Top-down and Bottom-up Parsing, Operator precedence parsing, Predictive parsing, LR parsing, Parser Generators, Using Ambiguous Grammars, Abstract Syntax- Semantic Actions, Abstract Parsing, Syntax Directed Translation.

Module 4 Semantic Analysis (Hours 20)

Type Checking- Specification of a Simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators,

Polymorphic functions, An algorithm for Unification.

Run-time Environments- Source Language issues, Storage organization, Storage Allocation Strategies, Access to nonlocal names, Parameter passing, Symbol tables, Dynamic storage allocation techniques.

Module 5 Code Generation (Hours 20)

Translation to Intermediate Code- Declarations, Assignment statements, Boolean expressions, Control statements. Issues in the Design of a code generator- The target machine, Run-time storage management, Basic blocks and flow graphs, A simple code generator, Register allocation and Assignment, The dag representation of basic blocks, Peephole optimization, Generating code from dags, Dynamic programming code –generation algorithm, Code-generator generators.

Unit VI Code Optimization (Hours 20)

The principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Global data flow analysis, Code improving transformations, Efficient data flow algorithms, A tool for data flow analysis, Estimation of types, Symbolic debugging of optimized code.

Case study- Design and Development of a Compiler for a simple language.

References

1.V Aho ,A.,Ravi Sethi, D Ullman,J. *Compilers Principles,Techniques and Tools*, Pearson Education,2002.

2. W.Appel,Andrew, *Modern Compiler Implementation in C*, Cambridge University Press,1997.

MCS 4EA4 Computational Linguistics

Module 1 (Hours 14)

Words: Regular Expressions and Finite Automata-FSA to recognize patterns-Formal Languages-NFSA for recognition-Regular Languages and FSA's-Morphology and Finite State Transducers-Finite state morphological parsing-Porter Stemmer.

Module 2 (Hours 20)

Computational Phonology and Text to Speech-Phonology –Machine Learning –Mapping Text to TTS , Probabilistic Models of Pronunciation and Spelling-Spelling errors-detection-probabilistic models-Bayesian Method- Viterbi algorithm N gram Models of Syntax-Hidden Markov Models-Forward Backward Algorithm-EM algorithm.

Module 3 (Hours 20)

Syntax: Word classes and Part of Speech Tagging-Context-Free Grammars for English Parsing methods-Earley algorithm-Features and Unification-Lexicalized and Probabilistic Parsing-Language and complexity.

Module 4 (Hours 18)

Semantics-Representing meaning-First order Predicate Calculus-Semantic Analysis-Lexical Semantics-Homonymy- Polysemy- Synonymy-Hyponymy-WordNet-Metonymy Word Sense Disambiguation-approaches- Information Retrieval- IR models.

Module 5 (Hours 18)

Discourse-Reference Resolution—Text Coherence-Natural Language Generation.

Multilingual Processing-Machine Translation-Language Similarities and Differences-The transfer Metaphor-The Interlingua idea: Using Meaning-Direct Translation-Using Statistical Techniques-Usability and System Development.

References

1) Jurafsky and Martin “Speech and Language Processing” Prentice Hall; January 26, 2000
2) Manning and Schutze “Statistical Natural Language Processing” MIT Press; 1st Edition (June 18, 1999)
3) James Allen. “Natural Language Understanding”, The Benjamin/Cummings Publishing Company Inc. 1994.
4) Tom Mitchell. “Machine Learning”, McGraw Hill, 1997.
5) Cover, T.M and J.A. Thomas, “Elements of Information Theory”, Wiley. 1991.

6) Charniak, E, “Statistical Language Learning” The MIT Press. 1996.
7) Jelinek, F ,”Statistical Methods for Speech Recognition”, The MIT Press. 1998.

MCS 4EA5 Visual Programming

Module 1 (Hours 15)

The C# language – Introduction to C#, Writing C# program, Variables and expressions, Flow control, More about variables, Functions, Debugging and error Handling, Additional OOP techniques

Module 2 (Hours 18)

Windows Programming – Basic Windows Programming, Advanced Windows forms features, Deploying Windows Applications

Module 3 (Hours 22)

Basic web programming, Web services, Deploying web applications

Module 4 (Hours 20)

Data Access – File system Data, XML, Databases and ADO.NET, Data Binding

Module 5 (Hours 15)

Additional Techniques - .NET Assemblies, Attributes, Introduction to GDI+

References

Karli Watson, Christian Nagel, Jacob Hammer Pederson, Jon D Reid, Morgan Skinner, Eric White

Beginning Visual C# 2005, Wrox Publications

MCS 4EA6 Visual C++

Module 1 (Hours 15)

Windows Environment – a simple windows program – windows dialogs – creating and displaying window – painting and repainting.

Integrated Development Environment of Visual C++: Creating a simple program in VC++, Compilation and Execution of a program, How a program works?, AppWizard, ClassWizard, Adding new classes and functions,

Module 2 (Hours 15)

Microsoft Foundation Classes(MFC): Introduction to API, Main classes derived from Cobject – CcmdTarget - Cwindow – CmainFrame – CchildFrame – Cview - Cdocument, CDC- Graphics Classes- Controls – Data I/O , MFC Exception, colors – fonts - Modal and Modeless Dialogs.

Module 3 (Hours 16)

Document/View Architecture : What is Document/ View Architecture ? Cruntime Class Architecture, SDI Document/ View Architecture, The Icon, Menu and Accelerators, toolbars, status bars - Message routing in Document/ View Architecture – creating DLL's – dialog based applications.

Module 4 (Hours 14)

Single Document Interface and Multiple Document Interface : SDI and MDI Architecture, Document, View, Frame, Application Classes, Multiple Views and Documents in single application, Printing- Print Preview, Scrolling Applications.

Module 5 (Hours 30)

Advanced Programming in VC++ : Concepts of Threads – Programming Examples, Internet Programming- Socket Programming(Basic Concepts), WinInet Classes and simple programs, CHtmlView class in VC++ 6.0, Database Programming using VC++, Simple ActiveX and COM Control creation.

Practical Sessions on the above modules.

References

1. Pappas & Murray, The Complete Reference- Visual C++, McGraw Hill.
2. Kanetkar,Yeshvant and Saoji. Sudesh, VC++,COM and Beyond, BPB Pub.
3. Microsoft Press, Inside VC++
4. Robinson, Lyn, Database Programming with VC++, Techmedia Pub.

ELECTIVES GROUP B

MCS 4EB1 Soft Computing

Module 1 (Hours 18)

Neural Networks:- Basic Concepts of Neural Networks, Characteristics - Human Brain – Artificial Neural Network – Terminologies, Model of an Artificial Neuron –Architectures – Learning Methods, Some Application Domains .

Module 2 (Hours 22)

Functional Units for Pattern Recognition :- Pattern recognition problem, Basic functional units, Pattern recognition tasks by functional units.

Feedforward Neural Networks:-Analysis of pattern classification networks: Pattern Classification problem, Perceptron- Learning Law, Convergence Theorem, Representation problem.

Linear inseparability : - Hard problems, Geometrical Interpretation of Hard problems: Multilayer perceptrons. Back propagation- Learning: Features, Performance, Limitations.

Module 3 (Hours 18)

Fuzzy Logic:- Fuzzy Set Theory :- Fuzzy Versus Crisp – Crisp sets – Operations on Crisp Sets, Properties of Crisp Sets , Fuzzy Sets, Basic Fuzzy Set Operations, Properties of Fuzzy Sets – Crisp Relations, Operations on Crisp Relations - Fuzzy Relations –Operations on Fuzzy Relations , Properties, Membership Functions, Fuzzification, Defuzzification Methods.

Module 4 (Hours 18)

Fuzzy Systems:- Crisp Logic – Laws of Propositional Logic, Inference in Propositional Logic, Predicate Logic- Interpretations Of Predicate Logic Formula, Inference in Predicate Logic – Fuzzy Rule Base- Fuzzy Reasoning, Fuzzy Inference systems , Fuzzy Logic Control Systems, Applications.

Module 5 (Hours 14)

Genetic Algorithms:- History – Basic Concepts – Biological Background – Contrast with traditional methods , Terminologies, Operators – Encoding – Selection- Crossover- Mutation– Fitness Function – Reproduction- Advantages, Limitations and Applications of Genetic Algorithms.

References

1. Artificial Neural Networks - Yegnanarayana B, Prentice-Hall of India Pvt.Ltd
2. Principles of Soft Computing – S. N. Sivanandan and S. N. Deepa, Wiley India 2nd Ed, 2011.
3. Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications- S. Rajasekaran and G.A Vijayalakshmi Pai, Prentice-Hall of India Pvt.Ltd ,2004.
4. Fuzzy Logic –Intelligence, Control and Information, John Yen, Reza Langari, Pearson Education,2005.

MCS 4EB2 System Security

Module 1 (Hours 18)

Introduction to security – classification – external security, internal security – Data encryption – ciphers – symmetric cipher models – substitution cipher , transposition cipher – block cipher - steganography.

Database security- Security requirements – integrity of a database, auditability, access control, user authentication, availability – sensitive data – access decisions – proposals for multilevel security.

Module 2 (Hours 18)

Cryptographic algorithms-DES – IDEA – primitive operations – key expansions – one round, odd round, even round – AES – Basic structure – primitive operations – inverse cipher – key expansion rounds, inverse rounds.

Module 3 (Hours 22)

RSA functions – public key cryptography – RSA algorithm –Authentication – requirements, *protocols*, authentication functions – Hash functions – security of hash functions – digital signatures.

Operating System Security- Memory & address protection – fence, relocation, base/bounds registers, tagged architecture, segmentation, paging – access control – file protection – users, permissions- user authentication – passwords, authentication other than passwords – concept of trusted operating systems.

Module 4 (Hours 18)

Network security –Threats in network – eavesdropping & wiretapping – protocol flaws - spoofing – message threats – denial of service – network security controls – threat analysis, encryption, authentication, access controls, alarms and alerts, honeypots, traffic flow security – firewalls – design-types. Authentication -applications – Kerberos – email privacy – PGP – S/MIME. Web security – intruder detection , security protocols – hacking –TLS, SHTTP, 3D secure protocols.

Module 5 (Hours 14)

Program Security- Viruses and other malicious code – how virus gain control, virus signatures, source of virus, prevention – control against program threats. Types of viruses – WORMS – spywares, malwares.

References

1. Security in Computing IIIrd edition, Charles Pfleeger, Shari Lawrence Pfleeger, Prentice Hall.
2. Computer Security Arts and Science, Matt Bishop, Pearson Education.
3. Cryptography and Network Security, Second Edition, Atul Kahate.

MCS4EB3 Advanced Java Programming

Module 1 (Hours 18)

Java Servlet: Introduction, Characteristics of Servlet, Advantages of Servlet, Servlet Structure, Servlet Life cycle, HttpServlet class, HttpServletRequest interface, HttpServletResponse interface, service(), doGet (), doPost(), State and Session Management using Hidden form field, Rewitten URL, HttpSession & Cookies. Accessing JDBC using Servlets

Module 2 (Hours 14)

Java Server Pages: Overview, Advantages, Structure of JSP, Directives, Declaratives,Expressions,Scriptlets,Implicit Objects.Creating and using JSP Error Pages. State & Session Management in JSP. Accessing JDBC using JSP

Module 3 (Hours 20)

Android: Basic Building blocks like Activities, Views, Services, Broadcast Receivers & Content providers, Intents & Intent Filters. Downloading and Installing the SDK. Developing with Eclipse. ADT Plugin Dalvik Virtual Machine. Dalvik Debug Monitor Service (DDMS). The Android Debug Bridge (ADB) Activities and Activity lifecycle' Application Manifest. Uses-permission Assets Activities and Activity lifecycle. Resources & R.java.Layouts & Drawable Resources. String.xml

Module 4 (Hours 20)

Creating Activity User Interfaces with Views. Handling User Interaction Events. Defining an Activity. Menu. Menu Item Options. Creating Submenus. Using Context Menus. Implicit Intents, Explicit intents. Returning Results from Activities
Handling Sub-Activity Results. Array Adapter. Simple Cursor Adapter. ListView and ListActivity.Using Adapters for Data Binding. Using and Managing Dialogs

DatePickerDialog. TimePickerDialog. ProgressDialog.

Module 5 (Hours 18)

Introduction to Spring Frame Work:

Spring IDE**,** Inversion of Control (IoC), Spring Setter Injection, Spring Constructor Injection **,** Spring MVC Framework, Spring Simple Form Controller, Spring Annotation Based Controller ,Spring Form Tags, Spring Annotation, Spring Form Validation, Spring Interceptor, Spring Multi Action Controller, Spring JDBC, Spring Exception Handling

References

1. Patrick Naughton: Java 2 'The Complete Reference'
2. James GoodWill : Pure JSP
3. Dustin R Callaway: Inside Servlets.
4. James GoodWill : Developing Java Servlets
5. Nicolas Gramlich : Android Programming.
6. O'Reilly' : Learning Android
7. Rod Johnson :Professional Java Development with Spring Frame Work

MCS 4EB4 Database Administration using SQL Server

Module 1: Management Tools (Hours 10)

Introduction to SQL Server and Relational Database, SQL Server Management Studio ,Database Tuning Advisor ,SQL Server Management Objects (SMO) ,SQL Server System Views , Business Intelligence Development Studio (BIDS), SQL Server Profiler, Powershell, Microsoft recommended Online sources

Module 2: Managing SQL Server Databases (Hours 12)

Planning a Database, Configuration Options, Designing the Files and File-groups layout, Managing the Transaction Logs, Backup and Restore Strategies, Database Maintenance Plans, Managing Log Shipping, Managing Replicated Databases, Managing Mirrored databases, Multi-terabyte database considerations, Database Upgrade Considerations , SQL Server Error Logs and Windows Event Viewer

Module 3: Managing SQL Server Objects &Microsoft SQL Server 2008 R2 Security (Hours 14)

SQL Dependencies, Partitioned Tables and Indexes, Triggers, Functions and Stored Procedures, Start-up stored procedures, CLR Assemblies, Synonyms, Full-text catalogs, Change Data Capture and Change Tracking Objects ,SQL Server Data-tier Applications, SQL Server Security, ownership chains and Context switching, Instances and Database-level security, Transparent Database Encryption, Managing Certificates and Keys, SQL Server Features and security considerations.

Module 4: Managing TempDB & SQL Server Instances (Hours 16)

TempDB Usage, version Store considerations, TempDB Best Practices, Managing Local and Remote Servers, Manage SQL Server Configuration Options (sp_configure), sysprep utility, Configuring and Managing Central Management Server, Multi-Server Management, Automating Management Tasks, Virtualization Types, Planning for virtualization, Policy-based Management, Creating and Managing Policies.

Module 5: Workload Governance and managing data (Hours 38)

workload types, Understanding NUMA concepts, Managing a workload using UMA, Understanding Resource Governor concepts, Monitoring Resource Governor, Data Type Considerations, Data and Backup Compression, Bulk Import and Export Considerations, Managing Data Changes, Partition Switching, Replication Subscription Initialization, Managing File stream Data, Managing Spatial Data, Managing XML Schemas, Data Types, and Indexes , Managing Management Data Warehouse, Using Extended Events, Managing SQL Server Alerts.

Practical sessions on the above modules.

References

1. Microsoft SQL Server 2008 Bible,(John Wiley & Sons)Paul Nielsen, Mike White & Uttam Parui
2.Mastering Sql Server 2008 (John Wiley & Sons), Michael Lee, Gentry Bieker

MCS 4EB5 Microprocessors and Assembly Language Programming

Module 1 (Hours 20)

Intel 8086/8088: 8086/8088 architecture ,Intel operations, instructions format ,data transfer, arithmetic, branch,stack operations, I/O, loop,flagmanipulations,logical shift,

rotate instructions,delay program-delay calculation.strings,procedures and macros.Writing simple programs for 8086- Macro assembler.

Module 2 (Hours 20)

Interfacing: Interfacing keyboard,printer,steppermotor,seven segment display,A/D and D/A converters 8255,8253/8254,8251 programmable communication interface ,8257 DMA controller ,8259 programmable interrupt controller

Module 3 (Hours 20)

Other Processors

80286 Important features,memory management – real mode and protected mode of operation.

80386- Architecture and important features ,co-processor,memory management

80486 - Architecture and important features ,co-processor,memory management

Module 4 (Hours 12)

Pentium processor- Introduction to Pentium, Pentium pro, MMX,Pentium II,III,IV

Module 5 (Hours 18)

Advanced processors- Multi core processors- dual core and core 2 duo processors

Practical sessions on the above modules.

References

1. Barry B Brey. The Intel Microprocessors 8086/88,80186,80286,80386,80486 Architecture, Programming and Interfacing ,PHI.

2. Liu,Yu Cheng & Gibson, Glenn A, Microprocesor systems, architecture, programming and design PHI

3. Abel , Peter, IBM PC Assembly Language and Programming ,fifth edition, Pearson Education.

4. Scott Muller, Upgrading and repairing PC's, Pearson Education.

MCS 4EB6 Advanced Computer Architecture

Module 1(Hours 16)

Fundamentals-Computational models, Computer architecture, parallel processing, architectural classification schemes-Flynn's, Feng's and Handler's, parallel processing applications.

Module 2(Hours 18)

Instruction level parallel processors- pipeline processors- Basic concepts, classification of pipeline processors, Instruction and arithmetic pipeline processors, Design concepts, VLIW architecture

Module 3(Hours 18)

Instruction level data parallel architecture- introduction to data parallel architecture, SIMD array processors, SIMD interconnection networks, parallel algorithms for array processors, Associative and Neural architecture, Vector architecture

Module 4 (Hours 18)

Thread and Process level architecture- MIMD architecture,fuctional structure of multiprocessor system,Inter connection networks, Multi threaded architecture-Introduction, Von- Newman based multithreaded architecture, data flow architecture, Hybrid multi threaded architecture

Module 5 (Hours 20)

Shared memory architecture- Introduction, Uniform memory access machine, Non Uniform Memory Access Machine, Cache Only Memory Access machine, data diffusion machine, Grid computing-Introduction, Scope of grid computing, Infrastructure of hardware and software, Grid architecture

References

1. Dezo Sima,Terence Fountain, Peter Kacsuk, *Advanced Computer Architecture- A design approach, Addision- Wesley, 1997*
2. Kai Hwang and F A Briggs, *Computer architecture and parallel processing*
3. Kai Hwang , *Advanced computer Architecture(parallelism, scheduling, programmability)*
4. Joshy Joseph and Craig Fellesteen *Grid computing*