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Marathwada University, Aurangabad

Revised Syllabus of

M.Sc. (Information Technology)

With effective from
June 2009

Eligibility:

1. A candidate who has qualified any one of the following degree (a, b, c) with at least 50% marks (45% for reserved) of this University or any other university recognized as equivalent thereto shall be admitted to the first year of M.Sc. (Information Technology) Course (in the faculty of Science)

    a) B.Sc. having Mathematics as one of the subject at XII standard
    OR
    b) B.Sc. having Mathematics / Physics / Computer Science / I.T./ or any relevant Computer related recognized subject as one of the subject
    OR
    c) B.C.Sc. Graduate of Engineering and Technology

Confirmation of Degree:

The degree of Master of Science (Information Technology) shll be confirmed on a candidate who has pursed a regular course of study consisting of four semesters and has appeared and passed the examination prescribed for the masters degree course in the faculty of science.

Pattern of Examination:

There shall be a University examination at the end of each semester in the subject for which the candidate has registered and applied.

1. The degree of Master of Science (Information Technology) shall be conferred on the candidate who has perused a regular course of study consisting of *Four Semesters* and has appeared and passed the examination prescribed for the Master of Science (Information Technology) degree course in the faculty.
2. The College/Institute must have following faculties and non-teaching staff in the department.
    i. The Head/Coordinator should be full time and qualification should be as per the UGC rule and as per the University guidelines.
    ii. All teachers should be appointed as per the University procedure and the UGC guidelines.
    iii. One Lab Assistance and one Lab Attendant for each laboratory. One hardware engineer for computer and other h/w maintenance.
    iv. A clerk cum typist to assist the Head for maintenance of the office record/work

3. Scheme of Paper Setting:

Each theory paper is of 50 marks and is divided in 2 sections. Duration of the theory examination will be of *three* hours. The entire syllabus of every theory paper is divided in 5 units. There will be one question on each unit with internal or. The question paper should be set as follows:

i. There should be two parts, Part A (10 marks) and Part B (40 marks).

ii. Part A should have 10 objective type questions/one line answer question/true-false/fill in the blank type question with one mark each.

*iii. Part B should have five questions with internal choice and should be from each unit of the syllabus. Each question of this part will have 8 marks and divided into two bits (a and b). Each bit carry 4 marks each. The objective of **bit a** will be to test students regarding theoretical concepts. The questions should not be of general type, like discuss, and explain as far as possible. **Bit b** questions should be problem oriented. The questions should be designed to test students on applied nature of theoretical concepts.*

Q.No.	Format	Marks
1.	Multiple Choice/Fill in the blank/Match the pair/ one line answer. 1) 2) • • 10)	1 x 10 = 10
2.	a) b)	2 x 4 =8
3.	a) b)	2 x 4 =8
4.	a) b)	2 x 4 =8
5.	a) b)	2 x 4 =8
6.	a) b)	2 x 4 =8
	Total	**50**

4. The duration of the practical examination will be of four hours. There should be at least one external examiner for each practical examination.

5. Students are required to maintain a well documented signed with date journals for each practical. In journals, students must write the dates on which the practical has been performed.
6. The students must keep a diary for projects and seminar. In diary they must record the progress of the project and seminar and be signed by the concerned teacher/guide time to time.
7. Project Report: Two typed and duly bound copies of project report shall be submitted at least 3 weeks before commencement of the Theory/Practical examination which ever commences earlier.
8. The following shall be the Scheme of instruction and examinations of theory papers.

M.Sc Information Technology
Semester I

Paper No	Subject	Teaching Per Week Hrs	Marks	Exam Hrs.
1	Operating System	04	50	03
2	Parallel Computer Architecture	04	50	03
3	Data Management and File Structure	04	50	03
4	Object oriented programming in C++	04	50	03
5	Practical Paper 1 Based on theory paper no 1 & 2	08	50	04
6	Practical Paper 2 Based on theory paper no 3 & 4	08	50	04
			300	

Semester II

Paper No	Subject	Teaching Per Week Hrs	Marks	Exam Hrs.
7	Data Communication and Network	04	50	03
8	Operational Research	04	50	03
9	Database Management System	04	50	03
10	Web design and development	04	50	03
11	Practical Paper 3 Based on theory paper no 7 & 8	08	50	04
12	Practical Paper 4 Based on theory paper no 9 & 10	08	50	04
			300	

Semester III

Paper No	Subject	Teaching Per Week Hrs	Marks	Exam Hrs.
13	Web Development using VB.NET	04	50	03
14	Expert and Design Support System	04	50	03
15	Software Engineering & Testing	04	50	03
16	Elective – 1 1.1 C Sharp (C#) Programming 1.2 Fundamentals of Multimedia 1.3 Network Security	04	50	03
17	Practical Paper 5 based on theory paper no. 13 & 14	08	50	04
18	Practical Paper 6 based on theory paper no. 15 & 16.	08	50	04
			300	

Semester IV

The entire IV semester is reserved for Industrial Training and Seminar.

Paper No	Subject	Teaching Per Week Hrs	Marks	Exam Hrs.
19	Major Project	06	70	04
20	Seminar	03	30	04

M.Sc.(I.T.) – I Semester

Paper 1 - Operating Systems

Unit-I:

Introduction: A brief description of its functional behavior & responsibilities as a resource manager and as an interface between hardware and user. Logical View and User View, Operating system need and services, Classification and Evolution and organization of OS, Hierarchical/Layered Organization of OS..

Processor Management: Process concept, Process Control Block, Process operations, Scheduling algorithms. Short terms and long term process scheduling policies, Scheduling criteria, multiple processor scheduling, scheduling Algorithm, FCFS, SJF, Priority and round robin scheduling, critical section, semaphores. Asynchronous parallel process, multithreading at system/user level, Inter process communication, Process Synchronization & Deadlock, Monitors, Deadlock prevention & avoidance, Deadlock Detection and deadlock Recovery

Unit-II:

Memory Management: Memory Management Techniques; Single partition allocation, multiple partition allocation, Swapping, paging and segmentation, segmented-paged memory management techniques; logical and physical address space; address mapping. Demand paging, Virtual memory, protection and address mapping hardware, page fault, Page replacement and page removal algorithms.

Unit-III:

Device Management and I/O Programming: Classification of device according to speed, Disk structure, disk scheduling, FCFS scheduling SSTF scheduling, access method and storage capacity; sharable and non sharable devices and their management; spooling concept of virtual device, I/O Processor; CPU-IOP parallel operation, CPU-IOP Communication; Device drivers; I/O Programming.

Unit-IV:

Information Management & File System: Information-an important system resource, stored and maintained in files. File organization and access methods, logical and physical file structure; physical file system realized with device management function; file allocation methods, linked and index allocation, logical file implemented on physical file system. File protection and security, Directory structure, single level, two level, tree structure, Free Space Management, Allocation Methods, Efficiency & Performance, Recovery, FAT32, & NTFS.

Unit-V:

Distributed & Network Operating Systems: Introduction to distributed systems, special functions supported by corresponding OS. Network OS; Remote login; remote file transfer. Distributed OS; Transparent migration of process & data; remote procedure call, Detection and recovery from failures. Distributed file system; mutual exclusion/synchronization using centralized and distributed approaches; concurrency control, majority protocols and time stamping; deadlock detection/prevention.

Case Studies: Single User System – MS-DOS, Multi User System – LIUNX/ Solaris 2.0, Network OS-Novell Netware.

References:

1. James L. Peterson & A. Silberschatz: Operating System Concepts; 2nd Edn., Addison Wesley, World Student Edition
2. Andrew S. Tenenbaum : Modern Operating Systems; Prentice Hall, India
3. Dietel H.M.: An Introduction To Operating Systems; Addison Wesley, World Student Edition
4. Systems Programming & Operating Systems, 2nd Edn., Tata Mc Graw Hill

6.. Operating System : Achyut Godbole

7. System Programming & OS : D.M. Dhamdhere

8. Operating System : Galvin

9. Michael Budnick L.,Et Al., LAN Operating Systems; New Riders Publishing, Carmel, Indiana.

PAPER 2: Parallel computer Architecture

UNIT I:

Introduction to Digital Computer, Hardware and Software Components, Number Systems, Boolean Logic and Circuit Fundamentals, Digital System Building Blocks, Fixed and Floating Point Binary Arithmetic,

UNIT II:

Computer Memory Systems. Architecture of Digital Computer, Processor Design Principles, Control Unit Design: Conventional and Micro programmed, Input-Output System.

UNIT III:

Memory and I/O Organization: Interfacing with CPU; Main Memory, Auxiliary Memory, Cache Memories, Associative Memory and Virtual Memory. I/O Interfacing with CPU; Addressing Data Transfer Techniques. Flynn's taxonomy ,

UNIT IV:

Types of parallelism, Bit-level parallelism, Instruction-level parallelism ,Data parallelism 2.4 Task parallelism, Memory and communication, Classes of parallel computers , Multicore computing ,

UNIT V:

Symmetric multiprocessing ,Distributed computing ,Cluster computing, Massive parallel processing, Grid computing ,Specialized parallel computers

References :

1. Computer Architecture And Organization: Mcgraw Hill, 2nd Edition, John Hyaes.
2. Computer System Architecture: PHI, 3rd Edition, M.Morries Mano.
3. Computer Organization And Design: Prentice Hall Of India, Chaudhari P.P.
4. Perspective In Computer Architecture: Prentice Hall Of India, Rao P.V.S.
5. Computer System Architecture: Prentice Hall, Tannenbaum A.
6. Parallel Computer Architecture: A Hardware/Software Approach by David Culler

7. Parallel Computer Architecture: A Hardware/Software Approach by David Culler, J.P. Singh, Anoop Gupta .

PAPER- 3: Data Management and File Structures

Unit-I: Linear data structures

Introduction, types of data structure, Stack, Queue, Circular Queue, Link list, Circular Link list, Doubly Link list, Presentation using static and dynamic memory allocation Operations performed.

Unit-II: Non linear data structures

General Trees, Binary Trees, BST, Heap, Applications of trees Operations, Trees traversals, Operations on binary trees, Graphs,Representations Graph traversals, Spanning trees

Unit-III: Sorting

Insertion sort ,Selection sort ,Merge sort, Bubble sort, Quick sort, Heap sort Radix Sort

Unit-IV: Searching

Sequential search, Binary search, Search trees traversals, Binary trees Inserting and deleting nodes in a binary search tree, Balancing binary search Tree, Height balanced(AVL) tree: Concept and construction, Hashing Techniques Address calculation techniques, common hashing functions.

Unit-V: File Structures

File systems organization :Sequential, Relative, Indexed and Random access Sequential organization and access, Relative file organization files(ISAM) Concept of index, Levels of index ,Binary search trees as indexes, m-way search tree, Overview of B Trees and B+Trees

References:

1. "An introduction to data structures with applications"-Trembley and Manohar.
2. "Data Structure using C" AM Tanenbaum, Y Langsam and MJ Augenstein, Prentice- Hall, India, 1991.
3. “Data Structures with C++”, John R. Hubbard, Schaum’s Outline, Tata McGraw Hill
4. “Data structures, Algorithms, and Applications in Java”, Sahani, McGraw Hill
5. "Data Structure and Program Design in C" . RL Kruse, BP Leung and CL Tondo, Prentice Hall, 1991.
6. "Data Structures and Algorithm Analysis in C" . Weiss, Mark Allen,Addison Wesley

Paper – 4: Object Oriented Programming using C++

Unit-I

An overview of object oriented programming, Drawbacks of procedural programming, Concepts of OOP: Class, Object, Data abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. An overview of C++ programming: basic programming construction, program statements, cout & cin, preprocessor directives.

Variables, Constants and its types. escape sequence characters, input/output with cin and cout, cascading, expressions, the #define directive, Manipulators: the endl and setw manipulator, type conversions

Data types, Primitive, Derived & User defined data types, Type modifiers (long, short, signed, unsigned).Operators: Arithmetic, Relational, Logical, Assignment, Ternary, Bitwise, Unary Operators.

Decision Making Statements : if, if-else statement, nested if-else, else if ladder, switch-case statement. Conditional statement.

Unit-II

Loops: The while loop, do-while loop, the for loop, for loop variations

Arrays: Introductions, defining and initializing arrays, accessing array elements, Single and multidimensional arrays. Character array, string variables, reading multiple lines, arrays of strings.

Structures: Specifying the structure, accessing structure members, array of structures, nested structures, structures and classes, enumerated data types.

Functions: Function declaration and definition,, Calling the Function, comparison with library functions, passing arguments to functions: passing variables, passing by value, passing structure variables, Returning values from functions, returning structure variables, reference arguments

Unit-III

Objects and classes: Classes and objects, specifying the class, C++ object as data types, Constructors and destructors, objects as functions arguments, overloaded constructors, return objects from functions, objects and memory, static class data, array of objects. Friend Functions.

Pointers: address and pointers, the address of operator & pointer variables, accessing the variable pointed to pointers and arrays, pointers and functions, passing simple variables and arrays, string as function arguments, copying the string functions, library string functions, arrays of pointers to strings, memory management: new and delete operator, pointers to objects, referring to members, an array of pointers to objects..

Overloaded functions, different numbers and kinds of arguments, Inline functions. Default arguments, Storage classes, auto, extern, static variables.

Unit-IV

Operator overloading: Overloading unary operators, the operator keyword, operator return values, overloading binary operators, concatenating strings, multiple overloading, comparison operators, arithmetic assignment operators.

Inheritance: Derived Class and Base Class, specifying the derived class, accessing base class members, the protected access specifier, derived class constructors, overriding member functions, class hierarchies, “abstract” base class, constructors and member functions, multilevel, multiple inheritance, member functions in multiple inheritance, ambiguity and multiple inheritance. Virtual base class, Function overriding, Virtual functions & dynamic binding. .

Unit-V

Files and Streams: Streams, the stream class hierarchy, stream classes, header files, string I/O, writing strings, reading strings, detecting end-of-file, character I/O, object I/O writing an object to disk, binary versus character files, reading an object from disk, the stream class, the open function, file pointers, specifying the position, specifying the offset the tellg function, closing files, redirection, IOS flags, redirecting input and output, command-line arguments, overloading the extraction and insertion operators.

References:

1. Object Oriented Programming In C + + Robert Lafore, Galgotia
2. The Annotated C + + Reference Manual, Manaret Ellis & Bjarne Strousstrup.
3. C + + Printer Plus, Stephen Parata, Galgotia

Other Reference Books:

1. An Introduction To The OOP :K.V. Witt, Galgotia
2. Jamsa's 1001 C/C + + Tips, Kris Jamsa, Galgotia
3. A Treaties On Object Oriented Programming Using C + + - B. Chandra, Narosa Publishing House.

Paper-5 : Practical based on Paper-1 and Paper-2

Practical for Operating System:

Following programs should be implemented in C++.

1. Program for FCFS scheduling
2. Program for SJF Scheduling
3. Program for Priority scheduling
4. Program for Round Robin scheduling.
5. Program for pager replacement algorithms
6. Study of Network and Distributed OS.
7. Case study of Linux/ Novell Netware/Windows NT etc.
   (File handling Commands, Directory related commands, utility commands)

10 experiments on Parallel computer architecture. (paper-2)

Paper-6 : Practical based on Paper-3 and Paper-4

Data and file Structure:

Implementation of application programs based on (C++)

- Arrays • Records, Structure • Pointers • Multidimensional Arrays, • Stacks, Polish Notation • Queues • Deques
- Linked List, Circular Link List, Doubly Link List

Implementation of programs for sorting techniques

- Bubble sort • Selection sort • Insertion sort • Quick sort
- Merge sort • Heap sort

Implementation of programs based on Trees

- Binary Search Tree • Heap Tree • Balanced Binary Tree

Implementation of programs based on Graphs

- Depth First Traversal • Breadth First Traversal •Obtaining Shortest Path

List of Practical: OOP Using C++

1. Program to demonstrate encapsulation using of class.
2 Program to demonstrate use of array of objects
3 Program to demonstrate use of pointers
4 Program to demonstrate use of pointer to members of class
5 Program to demonstrate use of function overloading
6. Program to demonstrate inline function.
7 Program to demonstrate use of friend function

8. Program to demonstrate static data members & member functions of class.
9 Program to demonstrate use of different manipulations
10. Program to demonstrate objects as function arguments.
11. Program to demonstrate use of recursive function
12. Program to demonstrate use of constructor, constructor overloading & destructor
13. Program to demonstrate use of all types of Inheritance.
14. Program to demonstrate the virtual base class
15.. Program to demonstrate the constructors in derived class.
16. Program to demonstrate use of unary & binary operator overloading
17. Program to demonstrate use of polymorphism (virtual function)
18. Program for reading and writing operations on text file.
19. Program for read, write, append & modify operations on binary file.
20. Program to demonstrate command line arguments.

M.Sc. (I.T.) - II Semester

Paper 7: Data Communication & Networking

UNIT I:

Data Communication Concepts: Introduction, Communication System, Communication mode, Data encoding: Analog and Digital data, digital and analog signal, Communication Channels, Synchronous and asynchronous transmission. Bandwidth concepts, channel capacity.

Introduction to Networking: Computer network, Characteristic & advantages of networking, types of network, LAN, MAN, WAN.

UNIT II:

Transmission media & Network Topologies: Guided & Unguided media, Twisted pair, coaxial cable, Fiber optics, Radio. VHF and microwaves, Satellite link. Network topology, bus, star, ring, tree, mesh & hybrid topology. Advantages, disadvantages of each.

Multiplexing Channels and Concept of multi channeling and modulation, pulse code modulation (PCM) Frequency Division multiplexing, Time Division multiplexing, CODECS.

UNIT III:

Switching: Switching concept, Circuit Switching, Packet Switching, Virtual circuits & data grams, Message switching,

Network Standards: Introduction, Layered approach, OSI model (7 layer architecture), functions & responsibilities of each layer.

Internet: Concepts, definition, applications, Internet connections, dial-up, broadband, ISDN, leased line etc. Internet services providers, Internet Vs. Intranet, web brower, URL, E-mail, messengers, cookies, search engines, uploading & downloading.

UNIT IV:

Internetworking: Principles of internetworking, Connectivity Devices, Bridges, Routers, Routing with bridges, connectionless internetworking, router level protocol, connection oriented internetworking.

UNIT IV:

Network Protocols: Data link protocols, Ethernet and token rings, X.25. Transport protocols, transport services, protocol mechanism, network services, TCP /IP protocol, architecture, operations and applications, Internet and e-mail protocols: SMTP, SLIP, POP, PPP, FTP, HTTP.

References:

1. Introduction to Digital and Data Communications, Michal A Miller, JAICO pub.
2. Data and Computer Communication – Willam Staling, PHI pub.
3. Data Communication & Network – Forouzan (TMH)
4. Computer Networks – A. Tanenbaum, (PHI pub.)
5. Internetworking with TCP/IP Vol-I – Comer (PHI pub.)
6. Data Communications and distributed Networks-V.B, Black, (Prentice Hall pub.)

Paper 8: Operation Research

UNIT I:

Introduction: Introduction to O.R., Necessity of OR in Business and Industry, Scope of OR in modern management, O.R. and Decision Making.

Linear programming: Various definitions, statements of basic theorems and properties, Advantages, Limitations and Application areas of Linear Programming, Linear Programming – The Graphical method – Graphical Solution methods of Linear Programming problem, Maximization Linear Programming problem, Maximization Problem. Formulation, Identification of decision variables, Constructing Objective Functions and Constraints, Assumptions.

UNIT II:

Methods of Solution: Graphical Method, Simplex method.- Phase I and Phase II of the Simplex Method, The Revised Simplex method, Primal and Dual Simplex Method, Simplex Algorithm for maximization case, Simplex Algorithm for minimization case – Two phase method and the Big –M method.

UNIT III:

Duality theory and Sensitivity Analysis: Duality theory: Existence of Dual of a LP problem, Primal Dual relationships in formulation and their solutions. Sensitivity analyses or Post Optimality Analysis: Dual Simplex Method, Changes affecting feasibility, Changes affecting optimality.

UNIT IV:

Transportation and Assignment problems: The transportation algorithm: Formulation as a LP problem, Determination of Initial solutions, Stepwise Improvement to obtain optimal solution, Special cases Such as Multiple, Unbalanced, Degeneracy etc., The assignment model: Formulation as TP, The Hungarian method of solution.

UNIT V:

Network models: Critical Path Analysis (CAP): Network representation of simple projects, Critical path computation: Construction of time schedule, Crashing of project duration.

PERT & CPM: Basic differences between PERT and CPM. Arrow Networks, time estimates, earliest expected time, latest – allowable occurrences time, Forward

Pass Computation, Backward Pass Computation, Representation in Tabular Form Critical Path, Probability of meeting scheduled date of completion, Calculation on CPM network. Various floats for activities, Critical path updating projects. Operation time cost tradeoff Curve project, Time cost – tradeoff Curve- Selection of schedule based on Cost Analysis, Crashing the network.

Reference:

1. Introduction to Operations Research (Frederick S.Hiller, Gerald J.Lieberman), McGraw-Hill Companies
2. Operations Research An introduction by Hamdy A. Taha, Prentice-Hall
3. Quantitative Technoques, by L.C. Jhamb, Everest Publishing house
4. Operations Research by Kanti swarup, Gupta P.K. and ManMohan.
5. Optimization Methods in Operations Research and System Analysis by Mital K.V.
6. The Critical Path Method by Saffer L.R., Fitter J.B. and Meyer W.L.
7. Operation Research by J.K. Sharma
8. Introduction to Operation Research: A Computer Oriented Algorithm Approach by Filet B. E.

Paper 9: DBMS

Unit-I:

Overview of Database Concepts: Database and Need for DBMS , Characteristics of DBMS, Database Users, 3-tier architecture,(its advantages over 2-tier) Data Models, Views of data-schemes and instances, Independence, Data modeling using the Entity-Relationship approach, Entities, Relationships, Representation of entities, attributes, relationship, attributes, relationship set Generalization , aggregation:

Relational model: Traditional database models, Relational Model, Structure of relational DB and different types of keys, Expressing M:N relation, relational algebra, Codd's rules, Constraints, Relational database languages, SQL and embedded SQL, Data definition in SQL , Views and queries in SQL, database design including conceptual and logical design technique, Specifying constraints and indexes in SQL, Specifying constraints management systems Oracle, Ingres etc.

Unit-II:

Relational Database design: Functional dependencies, and Normalization Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF) Loss less joins and dependency preserving decomposition

Query Processing: Query Processing Stages, Query Interpretation, Equivalence of Expressions, Query Resource Utilization, Query Execution Statistics, Query Execution Plan, Estimation of Query Processing Cost, Table Scan, Sample Index Access, Fill Factor, Multiple Index Access, Methods for Joining Tables (Nested Loop, Merge Join, Hybrid Join, Multiple Join) Structure of a Query Optimizer,.

Unit-III:

Transaction Processing & Concurrency Control: Concept and definition of transaction, ACID properties, serializibility, Prioritization, states of transaction, Types of failure, desirable properties of transaction schedules and recoverability, serial usability of schedules, levels of transaction consistency, deadlocks, long duration

transactions, transaction performance, transaction processing as implemented in contemporary database, management system. Concurrency Control, locking techniques, techniques based on time-stamp ordering, multiple granularity.

Crash Recovery: failure classification, recovery concepts, database backup, recovery concepts based on deferred update and on immediate update. Shadow paging, check points, on-line backup during database updates, crash recovery techniques.

Unit-IV:

Distributed Database: Homogeneous and Heterogeneous databases, Architecture and design of distributed databases, Distributed data storage, Data fragmentation with reasons, Degree of fragmentation, Correctness, rules of fragmentation, horizontal, vertical and hybrid fragmentation, Distributed query processing, recovery in distributed systems, commit protocols for distributed databases, multi-database system.

Client/Server database: Evolution of client concept, Client/Server environment, characterization of Client/Server computing. Functions of clients server , application partitioning, the two-layer and three-layer architectures, communication between clients and servers.

Unit-V:

Object Oriented Databases: Complex data types, Array & Multiset Types in SQL, Object Identity & Reference types in SQL, Implementing Object Relational features, Persistent of Objects, Object Identity & Pointers, Object Relation Database, Object Oriented Vs. Object Relational.

Integrity, Security: Need for Database Integrity, Integrity Constraints, Non-Procedural and Procedural Integrity Constraints Specifications in SQL, Introduction to Database Security issues, Authorization and Use.

References:

1. Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings;
2. Introduction to database systems by C. J .Date
3. Database system concept by Korth
4. Principles of Database Management by James Martin
5. Relational database design for Micro computers Application by Prentice Hall (Jackson)
6. Database Management Systems by Bipin Desai

PAPER 10: Web design & development

UNIT-I:

Basic web designing: Introduction to web browser, architecture of web browser, web page, static & dynamic web pages, home page, web-site. Web-servers & clients. www.

Introduction to HTML: History, structure of HTML document, creating & executing HTML. Tags of HTML: Headings and Title, Character level and paragraph level formatting tags. <Center>, Text-level elements <B>, <U>, <I>, <PRE>, <BIG>, <STRIKE>, <SUB>, <SUP>, <BODY> Tag & its attributes. Changing Colors font, size using <FONT> Tag, Text alignment & paragraph <P> tag. <MARQUEE> Tag

Creating Lists & Links: <OL>, <UL> & <DT> tag. Creating links with <A Href> tag. Hyper text & hyper media. creating Bookmarks using <A Name>

Images: <IMG> tag, image as a link, Image maps.

Tables and Frames: Creating Table with <TABLE> tag,. spanning cells with rowspan, colspan attributes. <FRAMESET> & <FRAME> tag, it's attributes, using nested <frameset>tag, Inline frame.

UNIT-II:

Forms and CSS: Understanding Form, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. Creating CSS, applying CSS to HTML documents. Use of <META> Tag

JavaScript: Introduction: Scripting Language, The Use of JavaScript, Using Javascript in an HTML document, <SCRIPT> Tag. Overview of Javascript Programming**:** Variable, Scope pf variables, number & string , Operators Statements**:** if-else, for, while, break, continue, for-in, new, return. Arrays.

JavaScript Functions & Objects : Defining functions, calling function, passing a value to a function, returning a value from function., *Document Object Model (DOM)*, Hierarchy of objects. Properties & Methods of Objects: window, document, Date, Math, Form, String, Frame.

UNIT-III:

Event Handling & Form Validation: onClick, onChange, onLoad, onSelect, onSubmit, onMouseOver, onFocus, onBlur, Validation of text box entries, checkboxes, radio buttons, e-mail address validation, date validation.

VBScript and Active Server Pages (ASP)

VBScript : Introduction, keywords, empty, isempty, nothing, null, true, false. Variable, operators.

VBScript Statements: if…then..else, if..then…elseif.., select, for…next, for..each, do…while loop.

Arrays & Objects: declaring arrays, types of arrays, VBScript objects, VBScript layout statements, error handling, adding objects, Forms, Controls & managing transactions, VBScript event programming.

UNIT-IV:

Procedures & Functions: Sub procedures and functions, call to function. Date & Time function, Math functions, Conversion functions, String functions.

Active Server Pages (ASP):

Introduction: Working of ASP, ASP Objects & Components, Running ASP programs, Setting up PWS/ISS, Understanding ASP Scripts.Variables, Data types of ASP, Operators of VBScript.

Statements: if-then, if-then-else, select case, do while, do until, while-wend, for-next, for each-next, sub-endsub, msgbox function

Request & Response Objects: Response Object - buffering page, page caching, Request Object – QueryString collection, form collection, server-variables collection, working with HTML forms, retrieving form data suing text boxes, textareas, buttons, checkboxes, select lists. Form validation.

Session & Application Object: Application Object- global.asa file, creating & reading application variables, Session object – introduction, storing session

information, contents & identifying session, controlling when session ends, creating & reading cookies.

UNIT-V:

ASP with Databases: Connection and data sources, creating connections with OLEDB and ODBC, connecting to SQL server with OLEDB and ODBC, connection to MS-Access, closing an open connection, Executing SQL statements with connection object –creating, inserting, updating, deleting, selecting a database table, advance methods and properties.

Working with Recordset: Retrieving a recordset fields, recordset cursor & locking types, Advanced methods & properties of recordset object, record count, scrolling, paging.

File System Object(FSO) : File object, creating a text file, reading a text file, viewing the file information, copying a file, renaming a file, deleting a file. Folder object: creating a folder, copying, renaming & deleting folder.

References:

1. HTML 4.0, No Experience required – E. Stephen Macj, J. Platt (bpb)
2. Completer Reference HTML - Thomas A. Powell (TMH)
3. Dynamic HTML in action - Michele Petrovisjy (TMH)
4. Unleashed HTML - (Techmedia SAMS)
5. Mastering HTML 4.0 - Deborah S. Roy, Eric J. Roy (bpb)
6. JavaScript Bible
7. Learn advanced JavaScript Programming – Y. Shrianm Tomer Sharan (bpb)
8. HTML, DHTML, JavaScript, Perl & CGI – Ivon Bayross
9. VBScript in Nutshell – Paul Lomax (O'relly)
10. VBScript by example – Jerry Honeycutt Paperback (Macmillan computer pub)
11. Practical ASP - Ivan Bayross]
12. Teach yourself ASP programming in 21 days – Fleet, Warret, Hen Stojanovic (Techmedia)

Paper-11 : Practical based on Paper-7 and Paper-8

At least 10 practical should be conducted on each paper.

Paper-12 : Practical based on Paper-9 and Paper-10

Database Management System:

1. Creating database tables and using data types.
   • Create table, • Modify table, • Drop table
2. Practical Based on Data Manipulation.
   • Adding data with Insert, • Modify data with Update,
   • Deleting records with Delete
3. Practical Based on Implementing the Constraints.
   • NULL and NOT NULL, • Primary Key and Foreign Key Constraint
   • Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses.
   • Simple select clause, • Accessing specific data with Where, Ordered By,

Distinct and Group By

5. Practical Based on Aggregate Functions.
   • AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
6. Practical Based on implementing all String functions.
7. Practical Based on implementing Date and Time Functions.
8. Practical Based on implementing use of union, intersection, set difference.
9. Implement Nested Queries & JOIN operation.
10. Practical Based on performing different operations on a view.
12. Practical Based on implementing use of triggers, cursors & procedures.
13. Make a Database connectivity with front end tools like – VB, VC++,D2K.

Web Design & Development:

At least 10 practical should be conducted web design & development.

M.Sc.(I.T.) – III Semester

PAPER 13 : Web Development Using VB .NET

UNIT-I:

Introduction : Introduction to Internet, Web Client/Server Model, Protocols for Web Client/Server communication,

UNIT-II:

Components of .NET Framework, Overview of IIS, ISAPI Extensions, ISAPI Filters.

UNIT-III:

Overview of .NET Framework : Web Forms, Common Language Runtime and Class Library, Managed Components, Web Services, COM+ Component services.

UNIT-IV:

Crash Course in VB.NET : Data Types, Arrays, Functions, Flow Control, Exception Handling, Constructors and Destructors, Class Properties, Inheritance.

UNIT-V:

Polymorphism, Interfaces, Implementing polymorphism using Interfaces, Multithreaded Programming.

Reference :- 1. Visual Basic Programming 2005 Black Book, Steven Holzner et al, Dreamtech Press.

PAPER 14 : Expert and Design Support System

UNIT-I:

Management Support Systems: An Overview, Decision Making, Systems, Modeling, and Support, Decision Support Systems, Decision Support Systems: An Overview, Data Management: Warehousing, Access, and Visualization, Modeling and Analysis.

UNIT-II:

Knowledge-based Decision Support and Artificial Intelligence, User Interface and Decision Visualization Applications, Constructing a Decision Support System and DSS Research, Collaboration, Communication, and Enterprise Support Systems, Networked Decision Support:

UNIT-III:

The Internet, intranets, and Collaborative Technologies, Group Decision Support Systems, Executive Information and Support Systems, Fundamentals of Expert Systems and Intelligent Systems, Fundamentals of Expert Systems, Knowledge Acquisition and Validation, Knowledge Representation,

UNIT-IV

Inferences, Explanations, and Uncertainty, Building Expert Systems: Process and Tools, Cutting-Edge Decision Support Technologies, Neural Computing: The Basics, Neural Computing Applications, Genetic Algorithms, Fuzzy Logic.

UNIT-V:

Hybrid Intelligent Systems, Intelligent Agents and Creativity, Implementing and Integrating Management Support Systems, Organizational and Societal Impacts of Management Support Systems.

Reference:

1. Decision Support Systems and Intelligent Systems, Efraim Turban and Jay E. Aronson, Pearson Ed, Sixth Ed, ISBN: 81-7808-367-1.

Paper-15: Software Engineering and testing

Unit-I:

S/w Engineering Fundamentals: Definition of Software, The birth of s/w engineering, s/w Product:, Software development paradigms, software Characteristics and Application. Software Development life cycle, water fall model, Prototyping, Incremental & Spiral model, 4^{th} Generation Techniques.

Project Management: Concepts, Software Process and Project Metrics; Software Measurements; Software Projects Planning: Objectives, Scope and Resources. Software Project Estimating, Decomposition Techniques. Empirical Estimation Models: COCOMO Model, Software Equation. Project Scheduling and Tracking.

Unit-II:

Software Requirements and Analysis: System Engineering, Product Engineering: Characteristics of a Good SRS, Requirement analysis, Principal, Software prototyping,, Specification and its review. Analysis modeling: data modeling, mechanics for structured analysis, system analysis tools and techniques, DFD, ER- Diagrams. Data Dictionary (DD),

System Design: Design concept and principles and its elements, effective modular design, Cohesion & Coupling, Feature of modern graphics interface (GUI). Design Methods: data design, interface design guidelines, procedural design.

Unit-III:

Software Quality Assurance: Definition of Quality and factors, QA, SQA, Software Quality Metrics, Process and Product Quality, The SEI Process Capability

Maturity Model (CMM), ISO ,Six-Sigma. Software Quality Assurance, Need for SQA, SQA Activities, Building blocks of SQA, SQA Planning & Standards, Software Reliability, Reliability Measures.

Introduction to Software Testing: Need of s/w testing, Error, fault and failure. s/w Testing fundamentals, Testing objectives, test information flows, Testing lifecycle, Test Cases – Test case designing (Concept & introduction should be covered here)

Unit-IV:

Levels of Testing Unit Testing, Integration Testing, System Testing, Acceptance Testing, Alpha testing & Beta testing, Static vs. Dynamic testing, Manual vs. Automatic testing, Testers workbench, 11 steps of testing process (Only steps should be covered)

Different types of Testing: Installation Testing, Usability testing, Regression testing, Performance testing, Load testing, stress testing, Security testing, Static & Dynamic testing, Static testing techniques, Review types : Informal Review, Technical or peer review, Walkthrough, Inspection, static analysis, Review meeting and reporting , Review guidelines & Review checklist, Data flow analysis, Control flow analysis, Cyclometric Analysis, Dynamic testing – need & Advantages

Unit-V:

Black Box & White Box Testing (Test Case Design Techniques): *Functional Testing (Black Box)*, Equivalence partitioning, BVA, Decision table based testing, Cause-Effect graphing, Syntax testing (Concept & Test case generation only), *Structural Testing (White Box)*, Coverage testing, Statement coverage, Branch & decision coverage, Path coverage, Validation testing Activities, Low level testing, High level testing, Black box Vs. White Box

Object Oriented Testing: Issues in OO testing, class testing, GUI testing, Object Oriented Integration & system testing.

Computer Aided Software testing tools (CAST): Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools. e.g. WinRunner, LoadRunner, Rational ROBO.

References:

1. Software Engineering – A Practitioners Approach Roger S. Pressman, 3rd /4th Edition, Mcgraw Hill, International Education.
2. An Integrated Approach To S/w Engineering, Pankaj Jolote, 1st / 2nd Edition, Narosa.
3. Software Engineering – A Programming Approach, D. Belie I. Moray, J. Rough, PHI.
4. Software Testing Techniques, Barrios Bier, 2nd Edition, Van N Ostrand Reinhold.
5. Software Engineering Concepts-Richard Fairley, CDAC. Tata McGraw-Hill Series.
6. ISO-9000 Standards (Relevant To Software).
7. IEEE Standard For Software User Documentation, Std. 1063-1987.
8. Introducing Software Testing by Louise Tamres (Pearson pub)
9. Effective Methods for software Testing by William Perry
10. Software Testing in Real World by Edward Kit
11. Software Testing Techniques by Boris Beizer (Dreamtech pub)

12. Boris Beizer, "Software System Testing and Quality Assurance", Van Nostrand Reinhold, New York, 1984.
13. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York.

PAPER 16 : Elective-1

Elective 1.1: C Sharp (C#) Programming:

UNIT-I:

Introduction: Basic concepts, features, visual object system, .NET, common language specification, Next Generation Windows Services, IL & metadata.

C# Types: Value Types - Simple type, struct type, enumeration type. Reference Type - object type, class type, interfaces, delegates, string type, arrays. Boxing and unboxing conversions. Implicit, explicit, standard and user defined conversions.

UNIT-II:

Control Statements: Selection statements - if, switch. Iteration statements - for, for each, while, do statements.

Classes & Methods: Constructors & destructors. Methods - Parameters, overriding, hiding, class properties, indexes, modifiers, class member access, multicast delegates.

UNIT-III:

Inheritance & Polymorphism: Inheritance - Basic class and derived class. Polymorphism, base class with a virtual method, derived class with override methods.

Interfaces: Interfaces - Base interface, interface body, interface members, interface methods, interface properties, interface events, interface indexes, interface mapping, interface implementation.

UNIT-IV:

Exceptional Handling: Checked & unchecked statement, compiler setting for overflow checking, programmatic overflow checking. Exceptional handling statement - try & catch, try & finally, try-catch-finally. Throwing exception, re-throwing exception.

UNIT-V:

Configuration & Deployment: Conditional compilation - Processor usage, the conditional attribute. Documentation comments in XML - Describing an element, adding remarks and lists, examples, describing parameters, describing properties, documentation compiling, NGWS components.

Security: Code Access Security, verification of type security, permissions, standard permissions, identity permissions, role based security.

References :

1. Christopher Wille, Presenting C# - SAMS Tec media
2. Vijay Mukhi, C# The Basics - BPB Publications
3. Vijay Mukhi, C# The Nuts & Bolts - BPB Publications
4. C# Made Simple - BPB Publications
5. C# Programming – Wrox publication
6. C# Programming Black Book – Matt Telles (Dreamtech pub.)

Elective 1.2 : Fundamentals of Multimedia

UNIT-I:

Multimedia in Use: Introduction to multimedia, Definition, Elements of multimedia, Need of multimedia, Applications, Goal & Objectives, Multimedia building blocks, Users of multimedia, Benefits of Multimedia, Training, Sales, Communication, Medicine. Multimedia & Internet.

UNIT-II:

Multimedia Configuration: Converging technologies, Functions & subsystems (input, development & output). Multimedia PC workstation components. Multimedia platform, Multimedia H/w, System software, Multimedia OS File system (tiff, bmp, pcx, gif, jpeg etc.) Multimedia communication system.

Development Tools: Developing applications, commercial tools, standards. Image and application image capture, Compression, text conversion, vaporization, image compression, Standards for encoding images, Standards for compression bitonal images, JPEG, Fractals for compression.

UNIT-III:

Multimedia Graphics: 2D/3D animation fundamentals, color modules digital imaging, still and moving images, Video application, video capture, animation video, processing, video recovery techniques, Creating videos on the desktop, Television (Broadcast TV, HDTV), Compression standards, AVO, AVI file formats, NTSC, PAL, video/audio conferencing techniques and standards.

UNIT-IV:

Multimedia Audio: Basic sound concepts, audio, capture, music, speech sound processor, sound recovery technique, VOC and WAV file formats for sound. Compression standards (Audiovisual telephony & application)

Multimedia Devices: Mass storage systems for multimedia requirements, Magnetic devices, Optical devices, CD-ROM, DVD, scanners, types & specifications.

UNIT-V:

Multimedia in Real World: Multimedia on network, Multimedia databases (in Oracle), Windows support for sound, animation, movies, music. Training & education: need for training, multimedia in training and education. Multimedia for information and sales, Multimedia in office & home.

Impact of Multimedia – Developing Applications: Introduction, Methodology, design. Multimedia objects, different kinds of object, object technology, Sharing multimedia, working in groups, workflow management, collaborative computing.

References:

1. Multimedia in Practice – Judith Jeffcote (PHI)
2. Multimedia Computing, Communication & Applications – Ralf Steinmetz, Klara Nahrstedt (PH-PTR Innovative technology series)
3. Multimedia, Production, Planning & Delivery – John Villamil, Casanova (PHI)
4. Virtual Reality and Multimedia – Durano R. Begault (AP professionals)
5. Principles of Interactive Multimedia – Elsom, Cook (TMH)

6. Multimedia Authoring by Building and development documents – Scott Fisher (AP professioanal)
7. Multimedia Literacy – Fred T. Hofstetter (TMH)

Elective 1.3 : Network Security

UNIT-I:

Introduction, Security Concepts, Threats and Risks, Attacks – Passive and Active, Security Services, Confidentiality, Authentication, Non-Repudiation, Integrity, Access Control, Availability, Model for Internetwork Security, Internet Standards and RFCs Access Control Mechanisms ,Access Matrix, HRU, TAM, ACL and capabilities

UNIT-II:

Access Control Models, Chinese Wall, Clark-Wilson, Bell-LaPadula, Non-Interference and Role Base Model.

Cryptography, Secret Key and Public Key Cryptosystems, Symmetric Ciphers, Block Ciphers and Stream Ciphers, DES, IDEA and Key Escrow, RSA and ElGamal

UNIT-III:

Secure Hash and Key management, Digital Signature and Non-repudiation, cryptanalysis. Network Security, Objectives and Architectures, Internet Security Protocols, IP encapsulating Security Protocol, Network and Transport Layer Security

UNIT-IV:

Network Security Applications, Authentication Mechanisms: a) Passwords, b) Cryptographic authentication protocol, c) Smart Card, d) Biometrics,e) Digital Signatures and seals, f) Kerberos, g) X.509 LDAP Directory. Web Security : a) SSL Encryption b) TLS, SET

UNIT-V:

E-mail Security, PGPs / MIME, IP Security, Access and System Security , Intruders, Intrusion Detection and Prevention, Firewall a) Hardware Firewall b) Software Firewall c) Application Firewall d) Packet Filtering. e). Packet Analysis , Proxy Severs, Firewall setting in Proxy, ACL in Proxy

References :

1 William Stallings, "Network Security Essentials", Prentice-Hall.
2 Edward Amoroso, "Fundamentals of Computer Security Technology", Prentice-Hall.
3 Dorothy E. Denning, "Cryptography and Data Security", Addison-Wesley.
4 Peter J. Denning, "Computers under Attack", Addison-Wesley.
5 Douglas R. Stinson, "Cryptography: Theory and Practice", CRC Press.
6 D. Brent Chapman and Elizabeth D. Zwicky, "Building Internet Firewalls", O'Reilly and Associates

Paper-17 : Practical based on Paper-13 and Paper-14

At least 10 practical should be conducted on each paper.

Paper-18 : Practical based on Paper-15 and Paper-16

At least 10 practical should be conducted on each paper.

M.Sc.(I.T.) – IV Semester

Paper-19 : Major Project

Project Work	: 40
Project Report	: 20
Viva Voce	: 10
Total	: 70 marks

Paper-20 : Seminar

Seminar Report and presentation: 30 marks.