डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वित्तीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

..2..

[31]	B.Sc. Geology	Semester-III & IV,
[32]	B.A. Statistics with minor changes	Semester-I & II,
[33]	B.A. Statistics	Semester-III & IV,
[34]	B.Sc. Statistics with minor changes	Semester-I & II,
[35]	B.Sc. Statistics	Semester-III & IV,
[36]	B.Sc. Industrial Chemistry	Semester-III & IV,
[37]	B.Sc. Horticultural	Semester-I & II,
[38]	B.Sc. Dry land Agriculture	Semester-I & II,
[39]	B.Sc. Microbiology	Semester-III & IV,
[40]	M.Sc. Computer Science	Semester-I to IV,
[41]	M.Sc. Information Technology	Semester-I to IV.

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/
६५९९-७०२
दिनांक :- २७-०५-२०१४.

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संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

या परिपत्रकाची एक प्रत :-

१) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
२) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थळावर उपलब्ध करुण देण्यात यावेत.
४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

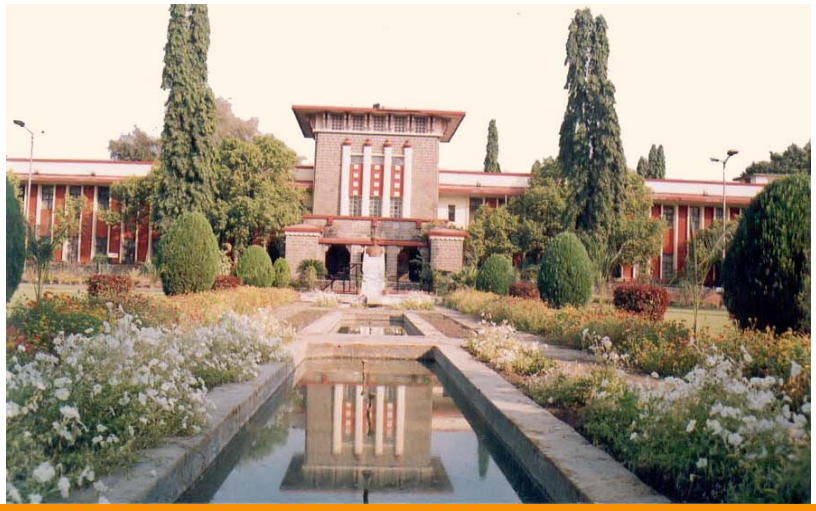
-=**=-

NAAC 'A' Accredition

Dr.Babasaheb Ambedkar Marathwada University
Aurangabad-431004

Revised Syllabus of

M.Sc.Information Technology
I to IV Semester
With effect from
June 2014
Run at college level



हे ज्ञानिची पवित्रता | ज्ञानीचि आथि ||

Dr. Babasaheb Ambedkar Marathwada University
Aurangabad-431004.
Tel.No. : 0240-2403400/431, Fax:0240-2403113
Website : www.bamu.ac.in, http://bamua.digitaluniversity.ac.in

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) shall 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	Cloud Computing	04	50	03
9	Database Management System	04	50	03
10	Web Based Programming using PHP	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	

M.Sc.(I.T.) – I Semester

Paper 1 - Operating Systems

UNIT – I

INTRODUCTION: What is an operating system? Operating system layered structure, Types of an operating system (Mainframe, Server operating, Personal computer system, Handheld operating system, Embedded, Sensor node, Real time, Smart card),Operating system as resources manager (Memory, Processor, Device, Information Management)

BASIC CONCEPT OF OPERATING SYSTEM: Review of Hardware, Processors, Memory, Disks, Tapes, I / O devices, Buses, Booting process, GUI, System calls.

UNIT- II

PROCESSOR MANAGEMENT : Introduction ,Definition of process, Process states, Process state transition ,The process control block, Operations on process, Evolution of multiprogramming, Context switching, Process scheduling, Types of schedulers,(Short term, Medium term and long term schedulers, Preemptive and Non preemptive, Scheduling algorithms FCFS, SJF, Priority & RR scheduling problems based on these algorithms ,scheduling criteria

DEAD LOCKS: Introduction, Graphical representation of a deadlock, Deadlock prerequisites, Mutual exclusion condition, Wait for condition, No preemption condition, Circular wait condition, Deadlock strategies(Ignore a deadlock, Detect a deadlock, Recover from Deadlock, Prevent a deadlock, Avoid a deadlock,)Bankers algorithm for deadlock avoidance (safe and unsafe state),Problems based on Bankers algorithm.

UNIT – III

BASICS OF STORAGE/MEMORY MANAGEMENT

Memory or storage Organisation, Storage management, Storage hierarchy, Storage management strategies memory allocation strategies(best fit, first fit , worst fit), Contiguous v/s non -contiguous storage allocation, Single user contiguous storage, Fixed partition multiprogramming, Variable partition multiprogramming, Multiprogramming with storage swapping,

Virtual Memory : Basic concept, Multilevel storage organization, Block mapping ,Paging : Basic concept, Paging address translation by direct mapping, Paging address translation by associating mapping, Paging Types(Demand, Anticipatory), Page fault, **Page replacement algorithms** FIFO, LRU , Optional page, problems based on these algorithms, thrashing, working set model.

UNIT – IV

Device management and File management

Device Management : Dedicated devices, Shared devices, Virtual devices, I/O Devices, Storage devices, types of storage devices(Serial Access, Completely Direct Access, Direct Access), Sharable &Non sharable devices and their management, Spooling concept, concept of virtual devices, device drivers.

Information Management: File concepts, Access methods, File system structure, Directory structure, and disk structure, disk space allocation methods(Continuous, Linked allocation, Indexed allocation), Disks Scheduling, disk scheduling algorithms (SSTF, FCFS, Scan methods, C-Scan), Free space management.

UNIT –V :

Distributed systems, security and protection

Network O S – Remote log in, Remote file transfer, Remote file access, Distributed O S, Distributed file transfer, Mutual exclusion in using centralized and distributed approach, Dead lock, Detection and Prevention.

Security and protection - Security threats, attack on security, computer worms and viruses Security design principles, authentication, protection mechanism.

References:

1. Modern Operating Systems 3rd edition, Andrew S. Tanenbaum,PHI Learning Private Limited.
2.Operating System Concepts 8th edition, Siberschatz, Galvin, Gagne, WSE Wiley.
3. Operating Systems 2nd edition, . Dietel H.M, Pearson Education.
4. Operating Systems 3rd edition, Achyut S. Godbole ,Atul Kahate, Tata Mc Graw Hill Education Private Limited.
5.Operating Systems , Stuart E. Madnick, John J. Donovan, Tata Mc Graw Hill Education Private Limited.
6. Operating Systems ,S.R.Sathe, Anil Mokhade, Mac Millan Publishers India Limited.

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.

Reference Book:

1. Object Oriented Programming In C + + Robert Lafore ,SAMS Publication , 4th Edition.
2. The Annotated C + + Reference Manual, Manaret Ellis & Bjarne Strousstrup.
3. C + + Printer Plus, Stephen Parata, Galgotia
4. Object Oriented Programming With C++ By Balagurusamy

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

Practical for Operating System:

1. Commands for files and directories cd, cp, mv, rm, mkdir, more, less
2. creating and viewing files, using cat, file comparisons, View files,
3. Disk related commands- checking disk free spaces, Essential linux commands.
4. batch commands, kill, ps, who, sleep,
5. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file,
6. file related commands - ws, sat, cut, grep, dd, etc.
7. Mathematical commands - bc, expr, factor, units. Vi, joe, vim editor.

Following programs should be implemented in C++.

8. Program for FCFS scheduling
9. Program for SJF Scheduling
10. Program for Priority scheduling
11. Program for Round Robin scheduling.
12. Program for pager replacement algorithms

Case Study: Android/ Windows 8 / LINUX.

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: Cloud Computing

Unit I

Cloud Computing Fundamental: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

Unit II

Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages

Unit III

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics : Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat)

Unit IV

Application Development: Service creation environments to develop cloud based applications. Development environment for service development; Amazon, Azure, Google App.

Unit V

Best Practice Cloud IT Model: Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership (TCO)

References

1 Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 978-0521137355]
2 Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach
[ISBN: 0071626948]
3 Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]
4 Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

Paper 9: Database Mangement System

Unit-I:

Overview of Database Concepts: Database and Need for DBMS , Characteristics of DBMS, Database Users, 3-tier architecture,(its advantages over 2-tier), Component of a database management System, Views of data: Data Abstraction & Instances and schemas, Codd's Rules, Constraints, Different types of keys.

Data Models: Traditional database models, Relational model**,** Object-Based Data Model, Semi-structured Data Model, Data modeling using the Entity-Relationship approach, Entities, Relationships, Attributes, Representation of entities, Mapping Cardinalities, E-R Features: Generalization & Aggregation.

Relational Model: Relational Model, Structure of Relational Database and Expressing Relation, Relational Algebra: Unary & binary Operation, Relational database languages.

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

Unit-II:

SQL Basic: Data types, Table Creation CREATE, ALTER, DROP, Adding constraints, INSERT, UPDATE, DELETE, Views, Index & Sequence, Functions: Aggregate, String, Date, Numeric, Queries: Sub-queries & Nested queries, grant/revoke privileges

PL/SQL: PL/SQL Definition, PL/SQL Block, function, procedure, cursor, trigger, exception handling.

Unit-III:

Indexing and Hashing: Basic Concepts, Ordered Indices- primary & secondary, B+ Tree Index Files, B- Tree Index Files, Static Hashing, Dynamic Hashing.

Query Processing: Introduction to Query Processing, Structure of Query processor, General Strategies for Query Processing, Transformation into an Equivalent Expression, Expected Size of Relations in the response: Selection; Projection; join, Query Improvement, Query Evaluation: One & Two Variable Expression (Nested Loop, Sort and Merge Method).

Transaction Management: Transaction: Concept, properties of Transaction, Transaction States, Implementation of Atomicity and Durability, Concurrent Execution, Serializability, Recoverability.

Concurrency Control: Lock-Based Protocol and Timestamp based Protocols, Multiple Granularity. Deadlock Handling: Deadlock Prevention, Detection and Recovery.

Unit-IV:

Database System Architecture: Centralized and Client – Server Architecture, Server System Architectures, Parallel System, Distributed Systems.

Distributed Database: Homogeneous and Heterogeneous databases, Architecture and design of distributed databases (DDBMS), Advantageous and Disadvantageous of DDBMS, Distributed data storage: Fragmentation & Replication, Transparency, Distributed Transactions, Commit Protocols (Two-phase Commit) for distributed databases.

Parallel Database: I/O Parallelism, Partitioning Techniques and its comparision, Handling of Skew, Interquery Parallelism, Intraquery Parallelism, Design of Parallel system.

Unit-V:

Object Oriented Databases(OODBMS): Characteristics of an Object-Oriented Data Model, Complex data types, Structured Types and Inheritance in SQL, Table Inheritance, Array & Multiset Types in SQL, Object Identity & Reference types in SQL, Implementing Object Relational features, Pros and Cons of OODBMS.

References:

1 Database System Concepts - by Silberschatz, Korth and Sudarshan- 5^{th}/6^{th} Edition
2 Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings;
3 Introduction to database systems by C. J .Date
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 Based Programming using PHP

Unit – 1: HTML

1. Basic concepts: Web standard: Standard Process, Advantage of Standard, Current Web Standard, Basic web designing: Introduction to web browser, architecture of web browser, web page, Static & dynamic web pages, home page, web-site. Web-servers & clients, Basic's of Internet, Internet Domain, Protocols definition, Overview of TCP/IP, Telnet, FTP, Communication between browser and web server

2. Introduction to HTML: Structure of HTML program, **HTML paired tags, Singular Tag, Text formatting:** paragraph, line break, headings , drawing lines, **Text styles:** Bold, italics, underline, **Centering & Spacing, Lists:** types of lists viz. unordered, ordered, definition lists, **Adding graphics:** image, background, border, using width and height attributes. **Tables:** creation and setting attributes of table, width & border attribute, Cell Padding, Cell Spacing, Colspan & Rowspan Attributes, background color. **Linking documents (Links):** External document references, internal document references. **Frames:** frameset and frame tag. **Forms in HTML:** Introduction to forms, FORM tag & it's attributes (Action, Method, Name), Simple form examples, Form controls: Text Field, Password Field, Multiline Text Area, Drop Down List ,Check Box, Radio Buttons, Scrolled List, Reset Button, Submit button.

Unit – 2: PHP

1. **Introduction to PHP:** What, Why and Evolution of PHP?, Installing PHP, Create PHP Script, Running PHP Script.
2. **Learning PHP Language:** Basic Building Blocks: Variable, Data Type, Operators & Expression, Constant, **Control Structures**: if, if else,if elseif..else, for,foreach, do-while, while, break, continue, switch.
3. **Arrays:** Anatomy of an Array: indexed and Associative Array, Creating Arrays, Accessing Array Elements, Looping through Array, Multidimensional Array, and Manipulating Array using array functions.

Unit – 3: Function & Class

4. **Functions:** What and why function, User-Defined Function, Function Arguments, Returning values, Calling Function, Variable Function, and Recursive Function.
5. **String & Date-Time**: Creating & Accessing String, String Manipulation using string functions, Date-Time: Understanding Timestamp, Getting current date & time, Extracting date time values, format character for date, Formatting Date String.
6. **Classes and Objects:** Introduction to OOPS Concepts, Visibility Controls, Creating Class and Object, Create and using properties & methods, Overloading, Constructor, Destructor, Object Inheritance.

Unit – 4: Web Basics & State of Form

7. **Handling FORM with PHP**: Capturing form Data with PHP, Dealing with Multi-value Fields, Validating Form Input, Generating Web Forms, Storing Variable in Forms, Working with Multipage Forms, Creating File Upload Forms, Redirecting form submission.

8. Preserving State in PHP: Understanding cookies, Session & Query String, Saving State with Query String, Working with cookies, PHP Session to store data.

Unit – 5: Database Access

9. **Database Connectivity & SQL:** Introduction to data storage, Understanding Relational Database, Setting Up MySQL, Connecting to MySQL from PHP, Retrieving Data from MySQL (Select), Manipulating MySQL Data with PHP (insertion,updation & deletion).

Reference Book:

1. Web Enabled commercial Application Development Using HTML, DHTML, JavaScript **by -Ivon Bayross.**
2. BEGINNING PHP 5.3 by ***MATT DOYLE*** WROX publication
3. PHP, MySQL and Apache All in One by Juliea C. Meloni, SAMS series
4. PHP Cookbook by ***Adam Trachtenberg and David Sklar.***

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

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 with having clause
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 indexing - Create index, synonyms
9. Implement Nested Queries/inner queries on multiple tables.
10. Practical Based on performing different operations on a view.
11. Practical Based on implementing use of function, triggers, cursors & procedures.

Practical Assignment based on Web based programming using PHP

1. Any 5 WebPage design using the HTML Tags.
2. Any 5 PHP Program based on using Building Blocks : Operators, Data types , Variables
2. Any 5 PHP Program based on using Array 2d & 3d , Functions
3. Any 5 PHP Program based on using String & Date-time functions, Class & Object
4. Any 5 PHP Program based on using State & Form Elements
5. Any 5 PHP Program based on using Database connectivity & SQL