UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY

Syllabus

For

Post Graduate, Graduate, Post Graduate Diploma, Diploma and Certificate Courses

U. P. Rajarshi Tandan Open University

Sector – F, Shantipuram, Phaphamau,
Allahabad, Uttar Pradesh, 211021
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Syllabus Publication Committee

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Presentation:

Dr. Dinesh Kumar Gupta	Academic Consultant (Chemistry)
Dr. Anamika Srivastav	Academic Consultant (Environment Science)

The University

U.P. Rajarshi Tandon Open University has been established through the UP Act No. 10 of 1999 as passed by the Uttar Pradesh Legislature. This University was named after the name of Bharat Ratna Rajarshi Purushottam Das Tandon, an illustrious son of Mother India who made great sacrifices for Independence and dedicated himself to the cause of Hindi as a national language. The jurisdiction of the University is across the State of Uttar Pradesh. The university has carved a niche for itself among the premier academic institution of open learning and distance education. It has witnessed a very rapid expansion of its activities in various spheres of education. This University conducts its academic activities through a diversity of means of distance and continuing education, and function in co-operation with the existing Universities, colleges and institution of higher learning, and makes full use of the infrastructure of these organizations. The courses offered by UPRTOU are recognized by the joint committee of UGC-AICTE and DEC. The University offers wide range of educational programmes related to general education, training, research and extension work through open and distance learning. The University started functioning from the session 1999-2000 with 3344 distance learners. In the current session i.e. session 2016-2017 more than 50,000 distance learners were enrolled for 82 programmes at more than 650 study centers located in different parts of the state of Uttar Pradesh. These study centers are supervised by our 10 regional centers situated in Lucknow, Varanashi, Bareily, Gorakhpur, Agra, Meerut, Gaziabad, Kanpur, Jhashi and Allahabad. The head quarter of the university is at Shantipuram Sector-F, Phaphamau, Allahabad equipped with good infrastructure facility like Buildings Library, Wi-Fi network campus etc.

There are Five Schools are running:

1. School of Humanities
2. School of Social Sciences
3. School of Sciences
4. School of Education
5. School of Managemrnt Studies
6. School of Health Sciences
7. School of Computer and Information Sciences
8. School of Vocational Studies
9. School of Agricultural Sciences

SCHOOL OF COMPUTER AND INFORMATION SCIENCES

The School of Computer and Information Science was established with a view of Computer Education and make skilled professional in Computer world. The school objective is to demonstrate that an open learning approach to computer education is not only feasible but probably preferable, to increase both accessibility and acceptability of UPRTOU Computer Education Programmes in a coordinated way, ensuring high quality education at a number of levels and to disseminate learning and knowledge through an innovative multiple media teaching learning system. Computer Education programmes developed by the School have succeeded in keeping a balance between courses catering to the development of fundamental concepts, understanding of the principles of computer sciences, and the skills required in response to the needs of the market. To achieve this objective the following programme are running in School of Computer and Information Science, U.P. Rajarshi Tandon Open University, Allahabad.

Mission and Vision

The mission of School of Computer & Information Science is to prepare and educate undergraduate and graduate students as well as become a regional leader in providing high quality education and research in the area of computer and information science. The school also focuses on the fundamental concepts of the computer science discipline, to create and distribute knowledge and technology, and to use expertise in computing to help society. As part of its mission the program brings the latest research findings into courses and actively involves faculty in the research.

Faculty Members

1. Prof. (Dr.) Ashutosh Gupta , Director (Incharge), School of Science

The School of Computer And Information Sciences offers following programmes under the CBCS credit system:

Programme offered by School of Science

Post Graduate Programme

Master in Computer Application (M.C.A.)

Under Graduate Programme

Bachelor in Computer Application (B.C.A.)

Post Graduate Diploma Programme

Post Graduate Diploma Programme in Computer Application (PGDCA)

Diploma Programme

Diploma in Computer (D**IC)**
Diploma in Hardware Technology (DIHT)
Diploma in Computer office and Management (DCOM)
Diploma in Web Technology (DWT)

Certificate Programme

Basic Certificate course in Computer [CCC]

Certificate Programme in Computer Animation [CCLA]

A. Master of Computer Applications (MCA)

The broad objective of the MCA programme is to prepare graduate students for productive careers in software industry and academic by providing an outstanding environment for teaching and research in the core and emerging areas of the discipline. The programme's thrust is on giving the students a thorough and sound background in theoretical and application oriented courses relevant to the latest computer software development. The programme emphasizes the application of software technology to solve mathematical, computing, communications / networking and commercial problems. The minimum and maximum progarmme duration to pass the course is 03 years and 06 years respectively. The eligibility for this programme is Three year Bachelor Degree in any Discipline with Maths at 10+2 or 6 months computer course. The admission procedure in MCA follows Through entrance test conducted twice in a year with M.B.A. Test. The fee for the programme is Rs. 15000.00 p.a. and the course is offered only in English medium.

B. Bachelor of Computer Application(BCA)

The BCA programme provides an understanding and skills related to the use of computer and its application. The minimum and maximum progarmme duration to pass the course is 03 years and 06 years respectively. The eligibility for this programme is 10+2 with Mathematics or computer course of 6 months duration or CCC or equivalent. The fee for the programme is Rs. 12100.00 p.a. and the course is offered only in English medium.

C. Post Graduate Diploma in Computer Application (PGDCA)

Post Graduate Diploma in Computer Applications (PGDCA) Programme is a 1-year programme. The broad objective of this programme is to prepare graduate students for productive careers. The minimum and maximum progarmme duration to pass the course is 01 years and 03 years respectively. The eligibility for this programme is Graduation (Maths at 10+2 or six month computer course). The fee for the programme is Rs. 15100.00 p.a. and the course is offered only in English medium.

D. Diploma Programmes

The aim of this Programme is to provide a broad base foundation in the related area of Computer science as well as applied fields of sciences. The School of Computer and Information Science offers Diploma programme in:

1. Basic Diploma in Computer (DIC)
2. Diploma in Hardware Technology (DIHT)
3. Diploma in Computer Office Management (DCOM)
4. Diploma in Web Technology (DWT)

1. Basic Diploma in Computer (DIC)

The DIC provides a strong foundation needed for the use of computer application and at end of this course, a student will be able to identify and solve the application problems related to computers and computing. The minimum and maximum progarmme duration to pass the course is 01 years and 03 years respectively. The eligibility for this programme is 10 + 2. The fee for the programme is Rs. 8100.00 p.a. and the course is offered only in English.

2. Diploma in Hardware Technology (DIHT)

The broad objective of this programme is to prepare 10+2 students for careers in Computer Industry and outstanding environment for computer and its peripherals device maintenance. The minimum and maximum progarmme duration to pass the course is 01

years and 03 years respectively. The eligibility for this programme is 10 + 2. The fee for the programme is Rs. 8100.00 p.a. and the course is offered only in English medium.

3. Diploma in Computer Office Management (DCOM)

The Diploma in Computer Office Management (DCOM) provides an understanding of the use of computer in office environment and presentations of office documents. The minimum and maximum progarmme duration to pass the course is 01 years and 03 years respectively. The eligibility for this programme is 10 + 2. The fee for the programme is Rs. 8100.00 p.a. and the course is offered only in English medium.

4. Diploma in Web Technology (DWT)

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming with PHP and MySQL, ASP.NET and java scripting. This will also expose students to the basic tools and applications used in Web publishing. The minimum and maximum progarmme duration to pass the course is 01 years and 03 years respectively. The eligibility for this programme is 10 + 2 or Equivalent/3 year Diploma. The fee for the programme is Rs. 8100.00 p.a. and the course is offered only in English medium.

E. Certificate Courses

The School of Computer and Information Science offers Certificate programme in:

1. Certificate Course in Computer (CCC)

The CCC provides an opportunity for understanding the use of computer and its application. The minimum and maximum progarmme duration to pass the course is 1/2 years and 02 years respectively. The eligibility for this programme is 10 + 2 in any discipline. The fee for the programme is Rs. 5600.00 and the course is offered both in English and Hindi medium.

2. Certificate Course in Linux Administration (CCLA)

Linux is a high-performance operating system started in 1991. It is released under the GNU General Public License (GPL). It closely resembles UNIX but is superior to other UNIX like operating systems in several aspects. It is one of the most popular operating systems among IT professionals as it is available free of cost and also consumes less space. Linux skills are highly desirable for persons aspiring to become computer professionals and have become virtually mandatory. This course aims at providing six months training in Linux administration and shell programming and has a comprehensive coverage of Linux operating system, system calls networking features in Linux and shell programming. The minimum and maximum progarmme duration to pass the course is 1/2 years and 02 years respectively. The eligibility for this programme is 10 + 2 in any discipline. The fee for the programme is Rs. 5600.00 and the course is offered only in English medium.

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1. Master of Computer Application (MCA)

Course Code and Detail

Semester	Paper No.	Course Code	Title of Course	Credits	Compulsory/Elective
First Semester	**Compulsory Core Course**				
	3011	MCA-01	Discrete Mathematics	4	**Compulsory**
	3012	MCA-02	Problem Solving and Programming through C	4	
	3013	MCA-03	Computer Organization and Assembly Language Programming	4	
	3014	MCA-04	Lab-1 (Based on MCA 02)	4	
	Discipline Centric Elective Course				
	3015 OR 3016	MCA-E1 OR MCA-E2	Computer Architecture OR Microprocessor and its Applications	4 OR 4	**Elective**
Credits of First Semester					20
Second Semester	**Compulsory Core Course**				
	3017	MCA-05	Object oriented Programming with C++	4	**Compulsory**
	3018	MCA-06	Database Management System	4	
	3019	MCA-07A	Computer Fundamental and its organization	4	
	3020	MCA-08	Lab-2 (Based on C++)	4	
	Discipline Centric Elective Course				
	3021 or 3022	MCA-E3 OR MCA-E4	Data Warehouse and Mining OR System Analysis and Design	4 OR 4	**Elective**
Credits of Second Semester					20
Third Semester	**Compulsory Core Course**				
	3023	MCA-09	Software Engineering	4	**Compulsory**
	3024	MCA-10	Data Communication and Computer Networks	4	
	3025	MCA-11	Java Programming	4	
	3026	MCA-12	Lab-3 (Based on Java Programme)	4	
	Discipline Centric Elective Course				
	3027 OR 3028	MCA-E 5 OR MCA-E6	Mobile Computing OR Parallel Computing	4 OR 4	**Elective**
Credits of Third Semester					20
Fourth Semester	**Compulsory Core Course**				
	3029	MCA-13	Theory of Computation	4	**Compulsory**
	3030	MCA-14	RDBMS	4	
	3031	MCA-15	Operating System Concepts	4	
	3032	MCA-16	Lab-4 (Based on Oracle/REBM)	4	
	Discipline Centric Elective Course				
	3033 OR 3034	MCA-E 7 OR MCA-E 8	Artificial Intelligence OR Embedded System	4 OR 4	**Elective**
	Foundation Course (Non Credit)				
	2702 OR 2703	PGFGS OR PGFHR	Gandhian Thoughts &Peace Studies OR Human Right and Duties	Non Credit	**Elective**
Credits of Fourth Semester					20
Fifth Semester	**Compulsory Core Course**				
	3035	MCA-17	Unix Shell Programming	4	**Compulsory**
	3036	MCA-18	Numerical and Statistical Computing	4	
	3037	MCA-19	Design and Analysis of Algorithm	4	

	3038	MCA-20	Lab-5 (Based on Unix Shell programming)	4	
	Discipline Centric Elective Course				
	3039 OR 3040	MCA-E 9 OR MCA-E 10	Computer Graphics OR Operational Research	4 OR 4	**Elective**
Credits of Fifth Semester			**20**		
Sixth Semester	**Compulsory Core Course**				
	3041	MCA-21	Lab Based on MCA-23 (Web Technology	4	**Compulsory**
		MCA-22	Probability and Distribution	4	
		MCA-23	Web Technology	4	
		MCA-24	System Software	4	
	Discipline Centric Elective Course				
	3042 OR 3043	MCA-E 11 OR MCA-E 12	Object Oriented Analysis And Design OR Information and Network security	4 OR 4	**Elective**
Credits of Six Semester			**20**		
Total Credits			**120**		

Master of Computer Application (MCA)

Course Code and Detail

Semester	Paper No.	Course Code	Title of Course	Credits	Compulsory/Elective
First Semester	**Compulsory Core Course**				
	3011	MCA-01	Discrete Mathematics	4	**Compulsory**
	3012	MCA-02	Problem Solving and Programming through C	4	
	3013	MCA-03	Computer Organization and Assembly Language Programming	4	
	3014	MCA-04	Lab-1 (Based on MCA 02)	4	
	Discipline Centric Elective Course				
	3015 OR 3016	MCA-E1 OR MCA-E2	Computer Architecture OR Microprocessor and its Applications	4 OR 4	**Elective**
Credits of First Semester **20**					
Second Semester	**Compulsory Core Course**				
	3017	MCA-05	Object oriented Programming with C++	4	**Compulsory**
	3018	MCA-06	Database Management System	4	
	3019	MCA-07A	Computer Fundamental and its organization	4	
	3020	MCA-08	Lab-2 (Based on C++)	4	
	Discipline Centric Elective Course				
	3021 or 3022	MCA-E3 OR MCA-E4	Data Warehouse and Mining OR System Analysis and Design	4 OR 4	**Elective**
Credits of Second Semester **20**					
Third Semester	**Compulsory Core Course**				
	3023	MCA-09	Software Engineering	4	**Compulsory**
	3024	MCA-10	Data Communication and Computer Networks	4	

	3025	MCA-11	Java Programming	4	
	3026	MCA-12	Lab-3 (Based on Java Programme)	4	
	Discipline Centric Elective Course				
	3027 OR 3028	MCA-E5 OR MCA-E6	Mobile Computing OR Parallel Computing	4 OR 4	**Elective**
Credits of Third Semester					**20**
Fourth Semester	**Compulsory Core Course**				
	3029	MCA-13	Theory of Computation	4	**Compulsory**
	3030	MCA-14	RDBMS	4	
	3031	MCA-15	Operating System Concepts	4	
	3032	MCA-16	Lab-4 (Based on Oracle/REBM)	4	
	Discipline Centric Elective Course				
	3033 OR 3034	MCA-E7 OR MCA-E8	Artificial Intelligence OR Embedded System	4 OR 4	**Elective**
	Foundation Course (Non Credit)				
	2702 OR 2703	PGFGS OR PGFHR	Gandhian Thoughts &Peace Studies OR Human Right and Duties	Non Credit	**Elective**
Credits of Fourth Semester					**20**
Fifth Semester	**Compulsory Core Course**				
	3035	MCA-17	Unix Shell Programming	4	**Compulsory**
	3036	MCA-18	Numerical and Statistical Computing	4	
	3037	MCA-19	Design and Analysis of Algorithm	4	
	3038	MCA-20	Lab-5 (Based on Unix Shell programming)	4	
	Discipline Centric Elective Course				
	3039 OR 3040	MCA-E9 OR MCA-E10	Computer Graphics OR Operational Research	4 OR 4	**Elective**
Credits of Fifth Semester					**20**
Sixth Semester	**Compulsory Core Course**				
	3041	MCA-21	Lab Based on MCA-23 (Web Technology)	4	**Compulsory**
		MCA-22	Probability and Distribution	4	
		MCA-23	Web Technology	4	
		MCA-24	System Software	4	
	Discipline Centric Elective Course				
	3042 OR 3043	MCA-E 11 OR MCA-E 12	Object Oriented Analysis And Design OR Information and Network security	4 OR 4	**Elective**
Credits of Six Semester					**20**
Total Credits					**120**

MCA-01(Discrete Mathematics)

Elementary Logic

Propositional Calculus: Propositions, Logical Connectives, Logical Equivalence, Logical Quantifiers.

Methods of Proof: What is a proof? Different Methods of proof and Direct proof, Indirect proofs), Principle of induction.

Boolean algebra and Circuits: Boolean Algebras, Logic circuits, Boolean Functions.

Basic Combinatorics

Sets, Relations and Functions: Introducing Sets, Operations on sets, Relations, Functions.

Combinatorics – An Introduction: Multiplication and addition Principles, Permutations (Permutation of objects Not Necessarily distinct, circular permutation), Combinations, Binomial Coefficients, Combinatorial probability.

Some More Counting Principles: Pigeonhole principle, Inclusion – Exclusion Principle, Applications of inclusion exclusion.

Partitions and Distributions: Integer partitions, Distributions, distinguishable objects into Distinguishable Containers, Distinguishable objects into Indistinguishable containers, Indistinguishable objects into Distinguishable Containers, Indistinguishable objects into Indistinguishable Containers.

MCA-02 (Problem Solving and Programming through C)

An Introduction to C

Problem solving: Problem solving Techniques, Design of Algorithms, Analysis of Algorithm efficiency, Analysis of Algorithm Complexity, Flowcharts.

Basics of C: History of C, Salient features of C, Structure of a C Program, Compiling a C Program, Link and Run the C Program, Diagrammatic Representation of Program execution process.

Variables and Constants: Character set, Identifiers of Keywords, Data types and storage, Data type Qualifiers, Variables, Declaring variables, Constants, Symbolic Constants.

Expressions and Operators: Assignment Statement, Arithmetic operators, Relational Operators, Logical operators, Comma and Conditional Operators, Type Cast operator, Size of Operator, C shorthand, priority of operators,

Control Statements, Arrays and Functions

Decision and Loop Control Statements: The if statement, the switch statement, the while loop, the do... while Loop, The for loop, The Nested Loops, The goto statement, The break statement, The continue statement.

Arrays: Array Declaration, Initialization, Subscript, Multi- dimensional Arrays.

Strings: Declaration and Initialization of Strings, Display of Strings, using different formatting Techniques, Arrays of Strings, Built in String functions and Applications.

Functions: Definition of a function, Declaration of a function, Function prototypes, the return statement, Types of variables and storage classes, Types of function invoking, call by value, Recursion.

Structures, Pointers and File Handling

Structures and Unions: Declaration of Structures, Accessing the Members of a structure, Initializing structures, Structures as function Arguments, Structures and Arrays, unions.

Pointers: Pointers and their characteristics, the address and Indirection operators, Pointer type, Declaration and Assignment, Pointer Arithmetic, Passing Pointers to functions, Arrays and pointers, Arrays of Pointers, Pointers and strings.

The C Preprocessor: #define to implement Constants #define to create, functional Macros, conditional selection of Code using # if def. Predefined Names Defined by pre-processors, Macros vs Functions.

Files: File Handling in C using File pointers, Input and output using file pointers, string, input/output Functions, Formatted input/output Functions, Block input/output Functions, Sequential vs. Random Access Files, Positioning the file Pointer, the buffered I/O – The UNIX like file routines.

MCA-03 (Computer Organization and Assembly Language Programming)

Introduction to Digital Circuits

The Basic Computer: The Von Neumann Architecture, Instruction Execution, Instruction Cycle, Computers: Then and Now. Data Representation Number Systems, Decimal Representation in Computers, Alphanumeric Representation, Data Representation for Computation. Principles of Logic Circuits I Logic Gates, Logic Circuits, Combinational circuit (Address, Decoders, Encoders, ROM) Principles of Logic Circuits – II Sequential Circuits (Definition) Flip Flops(BasicFlip-Flops,ExcitationTables,MasterslaveFlip-Flop,Edge-TriggeredFlip-Flops), Sequential circuit Design (Registers, Counters Asynchronous Counters, synchronous counters, RAM) Design of a sample counter.

Basic Computer Organization

The Memory System: The Memory Hierarchy RAM, ROM, DRAM, FLASH Memory Secondary Memory and characteristics, Raid and its Levels, The concepts of High speed Memories, virtual memory, SIMM, DIMM. The input /Output System Input/output Devices, The input/output Interface, The Device Controllers and its structure, Device Drivers, Input – Output Techniques, Input Output Processors,

External Communication Interfaces

Secondary Storage Techniques: Secondary Storage Systems, Hard Drives, Removable Storage options. The I/O Technology: Keyboard, Mouse, Video Cards, Monitors (Cathode Ray Tubes, DPI, Interlacing, Bandwidth, Liquid Crystal Displays, Digital Camera, Sound Cards, Printers, Modems, Scanners, Power Supply. The Central Processing Unit, Instruction Set Architecture, Instruction set characteristics, Instruction set Design Considerations, Addressing Scheme (Immediate Addressing, Direct Addressing, Indirect Addressing, Register Addressing, Register Indirect Addressing, Indexed Addressing Scheme, Base Register Addressing, Relative Addressing Scheme, Stack Addressing), Instruction set and Format Design issues (MIPS 2000, Instruction Format), Registers Micro-Operations and Instruction Execution, Basic CPU Structure, Register Organization, General Registers in a processor, Micro-operation Concepts.

Instruction Executions, Instruction Pipelining

ALU Organization: ALU Organization, Arithmetic Processors

The Control Unit: The Control unit, the Hardwired Control, Wilkes Control, The Micro-programmed Control, The Micro instructions, The Execution of Micro Program Reduced Instruction set Computer Architecture Instruction to RISC, RISC Architecture, The use of Large register file, Comments on RISC, RISC pipelining.

Assembly Language Programming

Microprocessor Architecture: Microcomputer Architectures, Structure of 8086 CPU, Register set of 8086, Instruction set of 8086, Addressing modes.

Introduction to Assembly Language Programming: The Need and use of the Assembly language, Assembly program, Execution, An Assembly program and its components, Input/output in Assembly program, The types of Assembly programs.

Assembly language programming (Part-I): Simple Assembly programs, Programming with Loops and Comparisons, programming for Arithmetic and String operations.

Assembly language programming (Part-II): Use of Arrays in Assembly, Modular Programming, Interfacing, Assembly language Routines to High level language programs, Interrupts, Device Drivers in Assembly.

MCA-E1 (Computer Architecture)

Book: Computer Architecture and Parallel Processing.

By Kai Hwang (McGraw-Hill Education)

- Introduction to parallel processing
- Memory and input-output subsystems
- Principles of pipelining and vector processing
- Pipeline computers and vectorization methods
- Structures and algorithms for array processors
- SIMD computers and performance enhancement
- Multiprocessor architecture and programming
- Multiprocessing control and algorithms
- Example multiprocessor systems
- Data flow computers and VLSI computations.

MCA-E2 (Microprocessor and its Applications)

Book: Microprocessor and its Applications

By R. Theagarajan (New Age International Publication)

- Architecture and Pin Details of the 8085 Microprocessor
- Programming the Microprocessor-I
- Programming the Microprocessor-II
- Programming Exercises
- Interfacing Input and Output Devices
- Interrupts
- Memory in a Microprocessor Based System
- Programmable Peripheral Interface-8255

- Keyboard and Display Interface-8279
- Serial Communication Interface-8251
- Priority Interrupt Controller-8259
- Direct MemoryAccess-8257.
- Microprocessor Based Applications
- Other 8 Bit Microprocessors
- 16 Bit Microprocessors

MCA-05 (Object Oriented Programming with C++)

An Introduction to Object Oriented Programming

Object Oriented Programming: OOP Paradigm, the soul of OOP, OOP characteristics, Advantages of OOP, Applications of object Oriented Programming (System software, DBMS, Applications of OODBMS, Advantages and Disadvantages of OODBMS), The Object Orientation, OO Languages, Advantages of C++.

Object Oriented Programming System: What is OOPS?, Class, Inheritance, Abstraction (Procedural language, Object-oriented language), Mechanisms of Abstraction, Encapsulation and information hiding, Polymorphism, overloading,

Advancedconcepts: Dynamism(DynamicTyping,DynamicBinding,LateBinding,Dynamic Loading, Structuring programs, Reusability, Organizing Object-oriented Projects (Large scale designing, Separate Interface and Implementation, Modularizing, Simple Interface, Dynamic decisions, Inheritance of Generic Code, Reuse of tested code.

IntroductiontoObjectOrientedLanguages: Objective-C,Featuresofobjective-C,Python, Features of Python, C # (C SHAR), Features of C#, Eiffel, Modula-3, Features of modula-3, Small talk, object REXX, Java, Features of Java(Object Oriented, Distributed, Interpreted, Robust, Secure, Architecturally neutral, Portable High performance, Dynamic) , Beta various object oriented programming languages Comparativechart.

An Introduction to Unified Modelling Language (UML): UML (Goals, History, use), Definition, UML Diagrams (Use case, class, interaction diagrams), State diagrams, Activity Diagrams, Physical diagrams.

C++ — An Introduction

Overview of C++: Programming Paradigms (Procedural Programming, Modular Programming, Data Abstraction, Object Oriented Programming), Concepts of C++ functions and files.

Classes and Objects: Definition and Declaration of a class, Scope Resolution Operation, Private and Public member functions, Creating Objects, Accessing class data members and member functions, Arrays of objects, Objects as Function Arguments.

Operator overloading: Operator Functions, large objects, Assignment and initialization, Function Call, Increment, Decrement Operator, Friends.

Inheritance-Extending classes: Concept of inheritance, Base class and Derived class, visibility Modes, Single inheritance Multiple Inheritance, Nested classes, virtual functions.

Streams and Templates: Output, Input, Files Exception, handling and streams, Templates.

MCA-06 (Database Management System)

The Database Management System Concepts

Basic Concepts: Need for a database Management System, The logical DBMS Architecture, Physical DBMS Architecture, Commercial Database Architecture, Data Models.

Relational AND E-R Models: The Relational Model, Relational Constraints, Relational Algebra, Entity Relationship (ER) Model, E-R diagram, Conversion of ER diagram to Relational database.

Database integrity and Normalization: Relational Database integrity, Redundancy and Associated problems, Single – valued dependencies, single valued Normalization, desirable properties of decomposition, Rules of Data Normalization.

File organization in DBMS: Physical Database Design issues, storage of database on Hard disks, file organization and its types, types of indexes, Index and tree structure, Multi-key file organization, Importance of file organization on database.

Structured Query language and transaction Mgt

The Structured Query language:

SQL Data Definition language, DML, Data control, Database objects: Views sequences, Indexes and synonyms, table Handling, Nested Queries.

Transactions and Concurrency Management: The transactions, the concurrent transactions, the locking protocol, Deadlock and its prevention, optimistic concurrency control.

Database Recovery and Security: Recovery, Recovery Techniques, Security and Integrity, Authorization.

Distributed and Client Server Databases: Need for Distribution Database Systems, Structure of distributed Database, Advantages and Disadvantages of DDBMS, Design of Distributed database, client server Database.

Application Development: Development of A Hospital Management System, Needs to Develop HMS, Creating a database for HMS, Developing Front and forms, Reports, using Queries and Record set.

Study Centre Management System: A Case Study

A Introduction: Introduction to Software, Software Development process: Analysis, System Designing, Software Development, Testing and Maintenance.

MCA-07A (Computer Fundamentals and its Organization)

Computer Basks: Algorithms. A Simple Model of a Computer, Characteristics of Computers. Problem-solving Using Computers**.**

Data Representation: Representation of Characters in computers, Representation of Integers, Representation of Fractions. Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes. Input & Output Devices. Description of Computer Input Units, Other Input methods. Computer Output Units Printers. Plotters)

Computer Memory: Memory Cell. Memory Organization, Read Only Memory, Serial Access Memory. Physical Devices Used to Construct Memories. Magnetic Hard Disk, floppy Disk Drives. Compact Disk Read Only Memory, Magnetic Tape Drives.

Processor: Structure of Instructions, Description of a Processor. Machine Language and Instruction set Processors used in desktops and lap tops. Specification of a desktop and Lap top computer currently available in the market (Specifications of Processor. motherboard &chipset, memory. interface & capacity of hard disk & DVD drives, 1/0 ports).

Computer Architecture: Interconnection of Units. Processor to Memory communication. LO to Processor Communication. Interrupt Structures, Multiprogramming. Processor Features,

Reduced Instruction Set Computers (RISC), Virtual merman.

Software Concepts: Types of Software. Programming Languages. Software (Its Nature & Qualities). Programming Languages. Operating Systems: History and Evolution. Main functions of OS Multitasking. Multiprocessing. Time Sharing. Real Time Operating System with Examples

MCA-E3 (Data Warehouse and Mining)

Book: Data mining: concepts and techniques

By Han, Jiawei, Micheline Kamber, and Jian Pei. (Morgan Caufmann Publication)

- Introduction
- Data Preprocessing
- Data Warehouse and OLAP Technology: An Overview
- Data Cube Computation and Data Generalization
- Mining Frequent Patterns, Associations, and Correlations
- Classification and Prediction
- Cluster Analysis
- Mining Stream, Time-Series, and Sequence Data
- Graph Mining, Social Network Analysis, and Multirelational Data Mining
- Mining Object, Spatial, Multimedia, Text, and Web Data
- Applications and Trends in Data Mining

MCA-E4 (Systems Analysis and Design)

Introduction to Systems Development

Introduction to SAD: Fundamentals of Systems, Real Time Systems, Distributed Systems, Development of a successful System, various Approaches for Development of information systems (Model Driven, Accelerated approach, Joint Application Development.

System Analyst – A profession: Needs Systems Analysts, users, Analysts in various functional Areas (Systems Analyst in Traditional Business, Systems Analyst in Modern Business), Role of a Systems Analyst, Duties of a Systems Analysts, Qualification of a Systems Analyst.

Process of System Development: Systems Development Life Cycle, Phases of SDLC, Products of SDLC Phrases, Approaches to Development (Prototyping, Joint Application Design, Participatory Design), Case Study (College Library).

Introduction to documentation of Systems: Concepts and process of Documentation, Types of Documentation, Different Standards for Documentation, Documentation and Quality of Software.

Planning and Designing Systems

Process of Systems Planning: Fact Finding Techniques, Need for fact finding, Issues involved in Feasibility Study, Cost Benefit Analysis, Preparing Schedule, Gathering Requirements of System.

Modular and Structured Design: Design principles (Top Down Design, Bottom up Design), Structure Charts, Modularity (Goals of Design, Coupling, Cohesion).

System Design and Modeling: Logical and Physical Design, Process Modelling, Data Modeling (ER Diagram), Process specification Tools (Decision Tables, Decision Trees, Structured English Notation), Data Dictionary.

More Design Issues and Case Tools

Forms and Reports Design: Forms, Reports, Differences between forms and Reports, Process of Designing Forms and Reports, Deliverables and outcomes, Design specifications, Types of Information, General formatting Guidelines, Guidelines for Displaying Contents, Criteria for form Design, Criteria for Report Design.

Physical file Design and Database Design: Introduction to Database Design, Design of Database fields, Design of Physical Records, Design of Physical Files, Design of Database, Case Study (Employee database).

Case Tools for Systems Development: Use of Case Tools by Organizations, Advantages and Disadvantages of CASE Tools, Components of CASE, Types of CASE tools, classification of CASE Tools, Reverse and Forward Engineering, Visual and Emerging Case tools.

Implementation and Security of Systems & MIS

Implementation and Maintenance of Systems: Implementation of Systems, Maintenance of Systems.

Audit and Security of Computer Systems: Definition of Audit, Audit of Transactions on computer, Computer Assisted Audit Techniques, Computer System and Security Issues, Concurrent Audit Techniques.

Management Information Systems: Role of MIS in an organization, Different kinds of information systems, Expert Systems.

MCA-09 (Software Engineering)

Block 1: Overview of Software Engineering

Unit 1: Software Engineering and its models: Evolution of Software Engineering, Software development models, Capability maturity models, Software process technology.

Unit 2: Principles of Software Requirements Analysis: Engineering the product, Modelling the system architecture, Software prototyping and specification.

Unit 3: Software Design: Data design, Architectural design, Interface design, HCI design, Modular design.

Unit 4: Software testing: Testing techniques, Testing for specialized environments, Debugging.

BLOCK 2: Software Project Management

Unit 5: Software Project Planning: Different types of project metrics, Software project estimation, Models for estimation, automated tools for estimation

Unit 6: Risk management and Project Scheduling: Identification of Software risks, Monitoring of risks, Management of risks, Formulating a task set for the project, Choosing the tasks of software engineering, Scheduling methods, The Software project plan

Unit 7: Software Quality Assurance: Formal technical reviews, Software reliability, Software quality standards

Unit 8: Software change management: Baselines, Version control, Change control, Auditing and reporting

BLOCK 3: Advanced Software Engineering

Unit 9: Web Software Engineering: Different layers, Issues of management of web based projects, Metrics, Analysis, Design, Testing.

Unit 10: Mobile Software Engineering: Transition from design to coding of mobile applications, Elements of mobile applications, Approaches to the development of mobile applications

Unit 11: CASE tools: Analysis tools, Design tools, SQA tools, UI design tools, Software testing tools, Web engineering tools

Unit 12: Advanced Software Engineering: Clean room Software engineering, Component based Software engineering, Re-engineering, Reverse engineering

MCA-10 (Data Communication and Computer Networks)

Introduction to data Communication and computer network concepts Introduction to computer Networks: Network Goals and Motivations, classification of Networks, Network topology, Application of Network, Networking model, Network Architecture, ARPANET, Types of Networks, Advantages of Networks.

Data Transmission: Data communication Terminology, Models of Data Transmission, Analog and Digital data transmission, Transmission Impairments, Transmission Media and its Characteristics, wireless transmission, wireless LAN.

Data Encoding and Communication Technique: Encoding, Analog-to-Analog Modulation, Analog to Digital Modulation, Digital to Analog Modulation, Digital to Digital Encoding.

Multiplexing and Switching: Multiplexing, Digital Subscriber lines, ADSL Vs. CABLE, Switching.

Media Access Central and Data Link Layer

Data Link Layer Fundamentals: Farming, Basics of Error Detection, Forward error Correction, cyclic redundancy check Codes for error detection, Flow Control.

Retransmission Strategies: Stop & wait ARQ, GO-BACK ARQ, Selective Repeat ARQ pipelining, piggybacking.

Contention – Based Media Access Protocols: Advantages of Multiple Access sharing of channel Resources, Pure Aloha, Slotted Aloha, CSMA, CSMA/CD, Ethernet frame format (IEEE 802.3).

Wireless LAN and Data link layer switching: Introduction to wireless LAN, wireless LAN architecture (IEEE802.11), Hidden station and Exposed Station problems, wireless LAN Protocols: MACA and MACAW, IEEE 802.11 protocol stack, switching at Data link layer.

Network layer

Introduction to layer functionality and Design issues: Connection oriented vs. connectionless services, Implementation of the network layer services, comparison between virtual circuit and Datagram subnet, Addressing, concept of Congestion, Routing concept.

Routing Algorithms: Flooding, shortest path routing algorithm, Distance vector routing, Link state routing, Link state routing, Hierarchical routing, Broadcast routing, Multicast routing.

Congestion Control in Public Switched Network: Reasons for congestion in the network, congestion control vs flow control, congestion prevention mechanism, General principles of congestion prevention mechanism, General principles Congestion control, open loop control, congestion control in Packet-switched Network.

Internet working: Internet working, Network layer protocols, ICMP, OSPF, BGP.

Transport Layer and Application Layer Services

Transport Services and Mechanism: Transport services, Elements of transport layer protocols.

TCP/UDP: Services provided by internet transport protocols, Introduction to (UDP, TCP), TCP segment header TCP connection establishment, TCP connection Termination, TCP Flow control, TCP Congestion control, Remote procedure call.

Network Security-I: Cryptography, Symmetric key cryptography, public key cryptography, Mathematical background.

Network Security-II: Digital Signatures, Management of public Keys, Communication Security, Web Security.

MCA-11 (Java Programming)

Object Oriented Technology and Java

Object Oriented Methodology-1: Paradigms of Programming languages, Evolution of 00 Methodology, Basic Concepts of OO Approach, Comparison of object oriented and procedure – oriented Approaches, Benefits of OOPS, Applications of OOPS.

Object oriented Methodology-2: Classes and objects, Abstraction and Encapsulation, Inheritance, Method overriding and Polymorphism.

Java Language Basics: Introduction to Java, Primitive Data Type and Variables, Java Operators.

Expressions Statements and Arrays: Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump statements, Arrays.

Object oriented concepts and Exceptions Handling

Class and objects: Class Fundamentals, Introducing Methods, this Keyword, Using objects as Parameters, Method overloading, Garbage collection, the finalize (), Method.

Inheritance and Polymorphism: Inheritance Basics, Access, Multilevel, inheritance, Method overriding Abstract classes, Polymorphism, Final Keyword.

Packages and interfaces: Package, Accessibility of Packages, using Package members, Interfaces, Implementing interfaces, interface and Abstract classes, Extends and Implements together.

Exceptions Handling: Exception, Handling of Exception, Types of Exceptions, Throwing, Exceptions, writing Exception subclasses.

Multithreading, I/O, and Strings Handling

Multithreaded Programming: Multithreading, The Main thread, JAVA Thread Model, Thread Priorities, Synchronization in JAVA, Inter thread Communication.

I/O In Java: I/O Basics, Streams and stream, Classes, the predefined streams, Reading from and writing to console, reading and writing files, the transient and volatile Modifiers, using instance of Native Methods.

Strings and Characters: Fundamental of Characters and Strings, the String class, String operations, Data Conversion using value of () Methods, Strings Buffer and Methods.

Exploring Java I/O: Java I/O classes and interfaces, Stream classes, Text streams, Stream Tokenizer, Serialization, Buffered stream, print stream, Random Access file.

Graphics and user interfaces

Applets: The applet class, Applet architecture, An applet Skeleton: Initialization and Termination, Handling events, HTML Applet TAG.

Graphics and user interfaces: Graphics contests and Graphics objects, user interface components, Building user interface with AWT, Swing – Based GUI, Layouts and layouts and layout Manager, Container.

Networking Features: Socket overview, Reserved parts and proxy servers, Internet Addressing: Domain Naming Services (DNS), Java and The Net: URL, TCP/IP Sockets, Datagrams.

Advance Java: Java database connectivity, an overview of RMI Application, Java Servlets, Java Beans.

MCA-E5 (Mobile Computing)

- Mobile Communications: An Overview
- Mobile Devices and Systems
- GSM and Other 2GArchitectures
- Wireless Medium access Control, CDMA, 3G and 4GCommunication
- Mobile IP network layer
- Mobile Transport Layer

- Databases and Mobile Computing
- Data Dissemination and Systems for Broadcasting
- Data Synchronization in Mobile Computing Systems
- Mobile Devices: Application Servers and Management
- Mobile Ad-hoc and Wireless Sensor Networks
- Mobile Wireless Short range Networks and Mobile Internet
- Mobile Application Languages- XML, Java, J2ME, and Java Card
- Mobile Application Development Platforms

MCA-E6 (Parallel Computing)

Block –I Elements of Parallel Computing and Architecture

Unit 1 Introduction to Parallel Computing: Basic concepts about program/process/ thread concurrent Execution Parallel Execution, , granularity, Potential of Parallelism, Need of Parallel Computation, Levels of parallel processing, Parallel processing Vs. Parallel computing, Dataflow Computing concept, Applications of parallel processing: Scientific Applications / Image processing, Engineering ,Application, Database query / Answering applications, A I Applications, Mathematical simulations and modeling.

Unit 2 Classification of Parallel Computers: Types of Classification, Flynn's/ Handler classification, UMA / NUMA /COMA, Loosely coupled / tightly coupled, Classification based grain size and Instruction level parallelism.

Unit 3 Interconnection Network: Need of Interconnection Network, Concept Bandwidth Nod degree diameter bisection bandwidth, In degree and Out degree, Static and Dynamic Interconnection network, Omega, Parallel Shifter, Bens, permutation, hypercube, butterfly, Shuffle exchange Network.

Unit 4 Parallel Computer Architecture: Introduction to various computer architecture, Pipeline processing, Vector / Array processing, VLIW and Super scalar architecture, Associative architecture: Multithreaded architecture.

Block 2 Parallel Algorithm & Parallel Programming

Unit 1 Parallel Algorithm: Introduction to Parallel Algorithms, Analysis of Parallel Algorithms, Different models of computation: Combinational circuit, Permutation Circuit, Sorting circuit, Matrix computation.

Unit –2 PRAM Algorithms: Message passage programming: Shared memory, Message passing libraries, Data Parallel programming, Data Structures for parallel algorithms: Link list, Arrays pointers, Hypercube network.

Unit 3 Parallel Programming: Introduction to Parallel Programming, Types of parallel programming: Programming based on message passing, Programming based on data parallelism, Programming for shared memory systems, Example programs for parallel systems

Block –3 Advanced Topics

Unit 1 Operating System for Parallel Computers: Basic issues of Operating Systems for Parallel Computers, Process Management, Resource Management, Memory management, I/O Management, Inter-Processor Communication, Vectorization Compiler.

Unit 2 Performance Evaluation: Introduction to performance evaluation, Metric of Parallel overhead, Law Speedup, Measurement Tools

Unit 3 Recent Trends for Parallel Computer: Development of last 3 years, Multicomponent CPU, Apex architecture IA, Hyperthreading.

MCA-13 (Theory of Computation)

Finite Automata and Formal Languages

Finite Automata and Languages: Regular Expressions (Introduction to Defining of languages, Kleene closure Definition, Formal Definition of Regular, Expressions, Algebra of Regular Expressions), Regular languages, Finite automata, Mealy and Moore Machines. Non Deterministic Finite Automata Equivalence of NFA and DFA, Pumping Lemma, Closure properties (Regular Languages and Finite Automata), Equivalence of Regular expression and

Finite Automata.

Context Free Grammar: Grammar and its classification, Chomsky, Classification for Grammar, Context free grammar, pushdown Automata (PDA), Non-Context free languages, Pumping Lemma for context free Languages, Equivalence of CFG and PDA.

Turing Machine and Recursive Functions

Turing Machine: Prelude to formal definition, Instantaneous Description and transition diagrams, Turing Machines as Computer of functions, Modular Construction of Complex turing machines, Symbol Writing machines, Right/Left head moving machines.

Turing Machine Miscellany: Extensions –cum-Equivalents of Turing Machine, Universal Turing Machine (UTM), Languages Accepted/Decided by TM, The diagonal language and the universal language, Chomsky Hierarchy.

Recursive Function Theory: Recursive Function Theory Recursive Definitions, Partial, Total and Constant Functions, Primitive Recursive Functions, Intuitive Introduction to primitive recursion, Primitive Recursion is weak Technique, The Techniques of unbounded minimization, Partial Recursion and u-Recursion.

Complexity of Computability

Computability/Decidability: Decidable and undecidable problems, The halting, problem, Reduction to another undecidable problem, decidability of post correspondence problem, undecidable problems for context free languages.

Complexity: Notations for Growth rates of functions (The Constant Factor in Complexity Measure, Asymptotic considerations, well known Asymptotic growth rate Notations, The 0Notation, The Notation ϑ, The Notation ω, classification of problems, Reduction, NP-Complete and NP- Hard Problems, Establishing NP-Completeness of problems.

Applications: Applications of Finite Automata, Applications of Regular Expressions, Application of Context free grammars (Definition of C-type small language, Definition of Part of HTML), ACM Code of Ethics and Professional Conduct.

MCA-14 (RDBMS)

RDBMS Design

RDBMS Terminology: Introduction, Database, Database management system, Instances and Schemas, Traditional File Oriented Approach, Benefits of Conventional or Centralized DBMS, Data Independence, Data Dictionary, Database Security, Domain Definition, A Relation, Relational data integrity, Candidate keys, primary key, Foreign keys, Referential Integrity, Candidate keys and Nulls, Data dictionary checklist.

Overview of Logical Database Design: Introduction, The Steps of Database design, Conceptual Design, Schema Refinement, Physical database Design and Tuning, ER Model, ER Model basics (Entity, Entity type and Entity set), Attributes (Attribute, key Attributes in Entity types, Composite vs. Simple attributes, Single vs. Multi valued Attributes, Derived vs. Stored Attributes, Null values, value sets of Attributes, Relationship, Degree of Relationship type, Structural Constraints, weak entities, Components of an E-R Diagram, ER Diagram Development examples.

Overview of Normalization: Introduction, Redundancy and associated problems, Role of Normalization, Single valued dependencies, single valued normalizations, (1NF, 2NF, 3NF,BC NF), Desirable properties of decompositions (Attribute Preservation, Lossless-Join Decomposition,DependencyPreservation,LackofRedundancy,DerivingBCNF),Multivalueddepe ndencies, Multivalued Normalization – Fourth Normal Form, The fifth Normal form, Rules of

data Normalization.

Practical on RDBMS: Introduction, DBMS and file oriented approach, Relational Databases and Integrity Constraints Entity- Relationship diagram, Functional dependency and Normalization, Normalization Structured Query Language (SQL), Microsoft-Access, views and Security using SQL.

RDBMS Lab: Introduction to MS Access

Introducing Microsoft Access: Introduction, DBMS, Microsoft Access database, tables and Queries, forms and Reports,

Microsoft Access Basics: Introduction, Starting and Quilting Microsoft Access, Opening a database, The database window, objects of the Access database.

Working with database: Introduction, creating a Microsoft Access database, Creating objects, set toolbars to your working style.

Creating a table: Introduction, Plan fields and data types, create a table, set field properties, save and close a table, Add and save records, Edit records and close a table, Modify fields in a table, Modify Columns and rows in datasheet, Attach validation rule to a field.

Finding Data: Introduction, Find a value, find and replace, create and apply a filter, specify criteria, sort Records.

Creating a Query: Create a Query, The Query Window, Join tables, select fields, specify criteria sort Records, Calculate Totals, Modify a Query, Save a Query.

Creating a form: Introduction, Create a form with a form wizard, view records in a form, Add, Delete and save Records, Save and close a form.

Customizing your form: Introduction, Change a form's design select and Resize controls, Move and Delete Controls, Change Fonts, Size and color of text.

Showing data from more than one table on a form: Introduction, create a form that contains a sub form, use a Query to include fields from more than one table.

Creating Reports and mailing labels: Introduction, Use Reports to present data, create a Report, preview, print and save a Report, A Report in design view, create and print mailing labels.

MCA-15 (Operating Systems Concepts)

BLOCK 1 Introduction to Operating Systems, Process Management

Unit 1 Operating System-An Overview, What is an Operating System (OS)?, Goals of an Operating System, Generations of Operating Systems, Types of Operating Systems, Desirable Qualities of OS, Operating Systems : Some Examples, Functions of OS.

Unit 2 Processes: Concept of Process, System Calls for Process Management, Process Scheduling, Scheduling Algorithms, First Come First serve (FCFS), Shortest Job First (SJF), Round Robin (RR), Shortest remaining time next (SRTN), Priority Based Scheduling or Event Driven (ED) scheduling , Performance evaluation of the Scheduling Algorithms.

Unit 3: Interprocess Communication and Synchronization: Interprocess Communication, Interprocess Synchronization, Semaphores, Classical problems in concurrent programming, Locks, Monitors and Conditional Variables.

Unit 4: Deadlocks: Characterization of a Deadlock, A Resource Allocation Graph, Dealing with Deadlock Situations, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery Deadlock detection and recovery, Deadlock Prevention, Havender's Algorithm, Deadlock Avoidance, Banker's Algorithm.

BLOCK 2: Memory Management, File Management and Security

Unit 1: Memory Management: Overlays and Swapping, Logical and Physical Address Space, Single Process, Monitor, Contiguous Memory Methods Paging , Principles of operation , Page allocation , Hardware Support for Paging , Protection and Sharing Segmentation , Principles of operation , Address Translation , Protection and Sharing

Unit 2: Virtual Memory Virtual Memory , Principles of operation , Virtual Memory management , Protection and sharing Demand paging Page Replacement policies Thrashing , Working Set Model , Page Fault Rate Demand Segmentation Combined Systems , Segmented paging , Paged segmentation

Unit 3: I/O and File Management: Organization of the I/O function, I/O Buffering, Disk Organization, Disk Scheduling, RAID Disk, Cache, Command language, user‘s view of File System, The System programmer‘s view of the file System, The Operating systems ‘view of file Management, Directories, Disk Space Management, Disk address translation, File related system services, Asynchronous Input / Output.

Unit 4: Security and Protection Security Threats: Security Policies and Mechanisms, Authentication, Passwords, Alternative Forms of Authentication Protection in Computer Systems Security Models, Access-Control Matrix, Mandatory Access Control, Discretionary Access Control, Rule-Based Access Control, Role-Based Access Control, The Take-grant Model, Multilevel Models.

BLOCK 3: Advanced Topics and Case Studies

Unit 1: Multiprocessor Systems: Multiprocessor and Processor Coupling , Multiprocessor Interconnections, Bus-Oriented Systems, Crossbar-Connected systems, Hypercubes, Multistage Switch-based systems, Types of Multiprocessor Operating System, Separate Supervisors, Master/Slave, Symmetric Multiprocessor OS, Functions and Requirements, Multiprocessor Synchronization , Test and set, Compare and swap, Fetch and Add.

Unit 2: Distributed Operating Systems, History of Distributed Computing, Distributed Systems, Key features and Advantages of a Distributed System, Design Goals of Distributed Systems, Design Issues Involved in Distributed Systems, Distributed System Structure, Mutual Exclusion in Distributed Systems, Remote Procedure Calls, Other Middleware Technologies

Unit 3: Case Study - UNIX

Unit 4: Case Study – WINDOWS 2000

MCA-E7 (Artificial Intelligence)

Block 1: INTRODUCTION TO A.I.

Unit 1: Introduction To Intelligence And Artificial Intelligence: Some Simple Definition of A.I., Definition by Eliane Rich, Definition by Buchanin and Shortliffe, Another Definition by Elaine Rich, Definition by Barr and Feigenbaum, Definition by Shalkoff.

Unit 2: THE PROPOSITIONAL LOGIC: Introduction, Logical Study of Valid and Sound Arguments, Non-Logical Operators, Syntax of Propositional Logic, Semantics/Meaning in Propositional Logic, Interpretations of Formulas, Validity and Inconsistency of Propositions, Equivalent forms in the Prepositional Logic (PL), Normal Forms, Logical Deduction, Applications.

Block-2 Knowledge Representation

Unit-1 The First Order Predicate Logic (FOPL)**:** Syntax of Predicate Logic, Prenex Normal Form (PNF), (Skolem) Standard Form, Applications of FOPL.

Unit-2 Deductive Inference Rules and Methods**:** Basic Inference Rules and Application in PL, Basic Inference Rules and Application in FOPL, Resolution Method in PL, Resolution Method in FOPL.
Unit-3 Systems For Imprecise/Incomplete Knowledge**:** Fuzzy Systems, Relations on Fuzzy Sets, Operations on Fuzzy Sets, Operations Unique to Fuzzy Sets, Non-Monotonic Reasoning Systems, Default Reasoning Systems, Closed World Assumption Systems, Other Non-Deductive Systems.

Block 3: A.I. Programming Languages

Unit-1 A.I. Languages-1: LISP**,** Basics of LISP, Data Structures and Data Values, The EVAL Function and Some Evaluations, Evaluation of Primitive Functions, Primitive List Manipulation Functions, Built-in Predicates, Logical Operators: AND, OR and NOT, Evaluation of Special Forms involving DEFUN and COND, The special forms DO and LET, Input/Output, Primitives, Recursion in LISP, Association List and Property List, Lambda Expression, APPLY, FUNCALL and MAPCAR, Symbol, Object, Variable, Representation and Dotted Pair, Destructive Updates, RPLACE, RPLACD and SETF, Arrays, Strings and Structures**.**
Unit-2 A.I. Languages-2: PROLOG, Foundations of Prolog, Notations in Prolog for Building Blocks, How Prolog System Solves Problems, Back Tracking, Data Types and Structures in Prolog, Operations on Lists in Prolog, The Equality Predicate '=', Arithmetic in Prolog, The Operator Cut, Cut and Fail.

BLOCK 4: Applications of Artificial Intelligence

Unit 1: Expert Systems: Introduction and Concept of Planning, Representing and Using Domain Knowledge, Expert System, Shells Knowledge Acquisition
Unit 2: Intelligent Agents: Agents and environments, Rationality and other performance measures, Nature of environments, Structure of agents

MCA-E8 (Embedded Systems)

- Introduction to Embedded Systems
- 8051 and Advanced Processer Architectures Memory Organization and Real world Interfacing
- Devices and Communication Buses for Devices Networks
- Device Drivers and Interrupts Service Mechanism
- Programming Concepts and Embedded Programming in C, C++ and Java
- Program Modelling Concepts
- Interprocess Communication and Synchronization of Processes Threads and Tasks
- Real Time Operating System Programming II Windows CE OSEK and Real Time Linux Functions
- Design Examples and Case Studies of Program Modelling and Programming with RTOS1
- Design Examples and Cases Studies of Program Modelling and Programming with RTOS2
- Embedded Software Development Process and Tools
- Testing Simulation and Debugging Techniques and Tools
- Real Time Operating Systems
- Real Time Operating System Programming I MicroCOSII and VxWorks

MCA-17 (UNIX Shell Programming)

Book: UNIX Shell Programming

By Yashwant kanitkar (BPB Publications)

- Communication – Unix Style
- Shell Programming - The First Step
- Taking Decisions
- The Loop Control Structure
- Shell Meta characters
- Tricks of The Trade
- Shell Miscellany
- System Administration
- Shell Programming Project

MCA-18 (Numerical and Statistical Computing)

BLOCK-1 Numerical Computing-I

Unit 1 Floating Point Arithmetic and Errors, Floating Point Representation, Sources of Errors, Propagated Errors.

Unit 2 Solution of Non-Linear Equations, Bisection Method, Regula-Falsi Method, Secant Method, Newton-Raphson Method, Successive Iteration Method.

Unit 3 Solution of Linear Algebraic Equations, Direct Method, Gauss Elimination Method (without and with Pivoting), LU-Decomposition Method, Iterative Method, Jacobi Method, Gauss Seidel Method, Successive Over Relaxation Method.

BLOCK-2 Numerical Computing-II

Unit 1 Interpolation Differences – Forward and Backward Differences, Newton's – Forward and Backward Difference Formulas, Lagrange's Interpolation.

Unit 2 Numerical Integration Newton – Cotes Formulas, Composite Formulas, Gaussian Quadrature.

Unit 3 Numerical Solution of ODE, Euler's Method, Runge Kutta Method.

BLOCK-3 Statistical Computing

Unit 1 Probability Distribution: Discrete Distribution, Binomial Distribution, Poisson Distribution, Continuous Distribution, Uniform Distribution, Exponential Distribution, Normal Distribution, Chi-square Distribution

Unit 2 Pseudo Random Number Generation: Uniform Distribution, Method of Generation (Discrete Case), Inversion Method (Exponential Distribution), Acceptance and Rejection.

Unit 3 Regression: Linear Regression Model, Least Square for Parameter Estimation, Goodness-of-Fit, Residual Analysis, Non-Linear Regression.

MCA-19 (Design and Analysis of Algorithm)

ELEMEMTARY ALGORITHMICS Structure : Introduction, Objectives, Example of an Algorithm, Problems and Instances, Characteristics of an Algorithm, Problems, Available Tools & Algorithms, Building Blocks of Algorithms, Basic Actions & Instructions, Control Mechanisms and Control Structures, Procedure and Recursion, Outline of Algorithmic, Understanding the Problem, Analyzing the Problem, Capabilities of the Computer System, Approximate vs Exact Solution, Choice of Appropriate Data Structures, Choice of Appropriate Design Technology, Specification Methods for Algorithms, Proving Correctness of an

Algorithm, Analyzing an Algorithm, Coding the Algorithm

SOME PRE-REQUISITES AND ASYMPTOTIC BOUNDS Structure: Some Useful Mathematical Functions & Notations, Functions & Notations, Modular Arithmetic/Mod Function, Mathematical Expectation, Principle of Mathematical Induction, Concept of Efficiency of an Algorithm, Well Known Asymptotic Functions & Notations, Enumerate the Five Well-Known Approximation Functions and How These are Pronounced, The Notation O, The Notation ω, The ϑ Notation, The Notation o, The Notation w.

BASICS OF ANALYSIS: Structure, Introduction, Objectives, Analysis of Algorithms Simple Examples, Well Known Sorting Algorithms, Insertion Sort, Bubble Sort, Selection Sort, Shell Sort, HeapSort, Divide and Conquer Technique, MergeSort, QuickSort, Comparison of Sorting Algorithms, Best-Case and Worst-Case Analyses, Various Analyses of Algorithms, Worst-Case Analysis, Best-Case Analysis, Analysis of Non-Recursive Control Structures, Sequencing, For Construct, While and Repeat Constructs, Recursive Constructs, Solving Recurrences, Method of Forward Substitution, Solving Linear Second-Order Recurrences with Constant Coefficients, Average-Case and Amortized Analyses, Average-Case Analysis 3.8.2 Amortized Analysis.

DIVIDE-AND-CONQUER: Introduction,Objectives,GeneralIssuesinDivide-and-Conquer, Integer Multiplication, Binary Search, Sorting, Merge Sort, Quick Sort, Randomization Quick- sort, Finding the Median, Matrix Multiplication, Exponentiation.

GRAPH ALGORITHMS: Introduction, Objectives, Examples, NIM/Marienbad Game, Function For Computing Winning Nodes, Traversing Trees, Depth-First Search, Breadth-First Search, Algorithm of Breadth First Search, Modified Algorithm, Best-First Search & Minimax Principle, Topological Sort

DYNAMIC PROGRAMMING: Introduction, Objectives, The Problem of Making Change, The Principle of Optimality, Chained Matrix Multiplication, Matrix 'Multiplication Using Dynamic Programming.

GREEDY TECHNIQUES: Introduction, Objectives, Some Examples, Formalization of Greedy Technique, Function Greedy- Structure (GV: set): Set, Minimum Spinning Tree, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.

MODELS FOR EXECUTING ALGORITHMS-I: FA: Regular Expressions, Introduction to Defining of Languages, Kleene Closure Definition, Formal Definition of Regular Expressions, Algebra of Regular Expressions, Regular Languages, Finite Automata, Definition, Another Method to Describe FA.

MODELS FOR EXECUTING ALGORITHMS-II: PDFA & CFG: Formal Language & Grammar, Context Free Grammar (CFG), Pushdown Automata (PDA).

MODELS FOR EXECUTING ALGORITHMS - III : TM: Prelude to Formal Definition, Turing Machine: Formal Definition and Examples, Instantaneous Description and Transition Diagram, Instantaneous Description, Transition Diagrams, Some Formal Definitions, Observations, Turing Machine as a Computer of Functions.

ALGORITHMICALLY UNSOLVABLE PROBLEMS: Decidable and Undecidable Problems, The Halting Problem, Reduction to Another Undecidable Problem, Undecidability of Post Correspondence Problem, Undecidable Problems for Context Free Languages, Other Undecidable Problems.

COMPLEXITY OF ALGORITHMS: Notations for the Growth Rates of Functions, The Constant Factor in Complexity Measure, Asymptotic Considerations, Well Known Asymptotic Growth Rate Notations, The Notation O, The Notation ω, The Notation θ, The Notation o, The Notation w), Classification of Problems, Reduction, NP-Complete and NP-Hard Problems, Establishing NP-Completeness of Problems.

MCA-E9 (Computer Graphics)

BLOCK 1: Raster Graphics and Clipping

Unit 1: Introduction to Computer Graphics What is Computer Graphics? Application of Computer Graphics , Presentation Graphics , Painting and Drawing , Photo Editing , Scientific Visualization 68 , Image Processing , Digital Art , Education, training, Entertainment and CAD , Simulation , Animation and Games Graphics Hardware Input and Output Devices , Touch Panel , Light Pens , Graphic Tablets , Plotters , Film Recorders Display Devices Refreshing Display Devices , Raster-Scan, Random-Scan Plasma Panel and LCD panels

Unit 2: Graphics Primitives Points and Lines Line-drawing Algorithms, DDA Algorithm , Bresenham's line Algorithm Circle-generating Algorithm , Properties of Circles , Midpoint Circle of Algorithm Polygon Filling Algorithm: Scan-Line

Unit 3: 2-D Viewing and Clipping Point Clipping Line Clipping, Cohen-Sutherland Line Clippings, Cyrus-Beck Line Clipping Algorithm Polygon Clipping: Sutherland Hodgman Algorithm, Windowing Transformation.

BLOCK 2: Transformations

Unit 4: 2-D and 3-D Transformations Basic Transformations , Translation , Rotation, Scaling , Shear Composite Transformations o Rotations about a point, Reflection about a line Homogeneous Coordinate Systems 3-D Transformations

Unit 5: Viewing Transformation Projections, Parallel Projection, Orthographic & Oblique Projections, Isometric Projections Perspective Projections

BLOCK 3: Modelling & Rendering

Unit 6: Curves and Surfaces Polygon Representation Methods, Polygon Surfaces, Polygon Tables, Plane Equations, Polygon Meshes Bezier Curves and Surfaces, Bezier Curves, Properties of Bezier Curves, Bezier Surfaces Surface of Revolution

Unit 7: Visible – Surface Detection Depth Buffer Method Scan-Line Method Area-Subdivision Method

Unit 8: Polygon Rendering and Ray Tracing Methods Illumination Model, Ambient Reflection, Diffuse Reflection, Specular Reflection Shading, Gouraud Shading, Phong Shading Ray Tracing, Basic Ray-Tracing Algorithm

BLOCK 4: Multimedia and Animation

Unit 9: Computer Animation Basic of Animation Types of Animation Simulating Accelerations Computer Animation Tools Applications

Unit 10: Multimedia Concepts and Applications Concepts of Hypertext/Hypermedia Multimedia Applications, Education, Video Conferencing, Training, Entertainment, Electronic Encyclopaedia Images Audio and Video, Analog and Digital Sound and Video, Mpeg, mpi, wav, etc. Multimedia Tools

MCA-E10 (Operations Research)

Introduction to Operations Research

Operation Research – An Overview: History, Approach, Techniques and Tools, Relation- ship Between O.R. specialist and Manager, Applications of OR., Phases and Processes of O.R., Study, Limitations of operation Research,

Decision and Loop Control Statements: Review of Probability and Statistics Random Experiment and Probability, Random variable, Probability distribution, Standard Discrete Probability distributions, Continuous Probability Distributions.

Programming Techniques – Linear Programming and Applications: Linear Programming – Graphical Method: Formulation of a linear programming problem, Formulation with

Different types of constraints, Graphical Analysis, Graphical Solution, Multiple, unbounded solution and infeasible problems, Application of linear programming in Business and Industry, self-Assessment Exercises.

Linear Programming – Simplex Method: Principle of Simplex Method, Computational Aspect of simplex Method, Simplex Method with Several Decision Variables, Two phase and M-Method, Multiple, unbounded solutions and infeasible problems, sensitivity Analysis, Dual Linear Programming problem.

Transportation Problem: Basic Feasible solution of a transportation problem (The North West Corner Rule, Matrix Minimum Method, Vogel Approximation Method (VAM), Modified Distribution (MODI) Method stepping store Method, Unbalanced Transportation problem, Degenerate Transportation problem, Transhipment problem, Maximization in a transportation problem,

Assignment problem: Unbalance Assignment problem, Problem with some infeasible Assignments, Maximization in an Assignment problem. Crew Assignment problem.

Programming Techniques Further Applications

Goal Programming: Concepts of Goal Programming, Goal Programming Model Formulation, Graphical Method of goal programming, the simplex Method of Goal Programming, Application Area of Goal Programming,

Integer Programming: Integer Programming Formulation Techniques, Unimodularity, cut- ting plane method, Branch and Bound.

Dynamic Programming: Dynamic Programming Methodology, Definitions and Notations, D.P. Applications.

Non-Linear Programming: Solution of a Non-linear Programming problem, Convex and Concave function, KUHN TUCKER conditions for constrained optimization, Quadratic Programming, Separable Programming.

Inventory and Waiting Line Models

Inventory Control – Deterministic Models: Inventory: An Essential Requirement, objectives of inventory, Functions of inventory, Classifications of inventory, Factors Affecting inventory, Inventory Modelling, Deterministic single item inventory models Deterministic Multi item inventory Models.

Inventory Control : Probabilistic Models: Inventory Model with probabilistic Demand, Single period probabilistic Models, Multi-period probabilistic Models, Inventory Control systems, Fixed Order, Quantity system, Periodic Review System, other variants of probabilistic Models.

Queueing Models: Characteristics of A Queueing Model, Notations and symbols, Statistical Methods, in Queueing, The M/M/I System, The M/M/C system, The M/E k /I System, Decision Problems in Queueing.

Game Theory and Simulation

Competitive situations: Game Theory: Definitions and Explanation of some important terms saddle points, dominance, mixed strategies: Games without saddle points, 2 x n Games, Exploiting an Opponents and Mistakes.

Simulation: Reasons for using simulation, limitations of simulation, steps in the simulation process, Practical Applications of simulation, Hospital Simulation, Simulation and Inventory Control, Computer Simulation.

Case Studies:

Case 1: Insulator India Limited.

Case 2: Use of Operations Research Techniques: A Case Study of ECS Corporation.

MCA-22 (Probability and Distribution)

Unit 1: Probability measure and distribution functions

Probability space of a random experiment .probability measures, random variables as a measurable function. Field induced by a sequence of random variables, decomposition of distribution functions in purely discrete, absolutely continuous and singular components.

Unit 2: Probability Inequalities

CR-inequality, Cauchy-Schwartz inequality, Holder inequality, Minkowski inequality, Jensen inequality, Lyapunov inequality, Kolmogorov inequality, Hajck-Renyki inequality.

Unit 3: Convergence

Sequences of distribution functions, Helly - Bray theorem, Different types of convergence of sequence of random variables distribution function of random vectors, Weak and strong law of large numbers, Khinchin. Borel and Kolmogorav theorems.

Unit 4: Characteristic function and central limit theorems

Borel-Cantelli lemmas and zero-one law, Characteristic function, Inversion theorem, Continuity theorem, One dimensional central limit problem: lindeberg-levy, Lyapunov, Lindeberg-Feller theorems.

MCA-23 (Web Technology)

UNIT- I

History of the Internet and World Wide Web -III ML 4 protocols - RCM, SMTP, POP), MIME, IMAP. Introduction to JAVA Scripts - Object Based Scripting for the web, Structures - Functions - Arrays - Objects.

UNIT- II

Introduction - Object refers, Collectors all and Children. Dynamic style, Dynamic position, frames. navigator, Event Model - On check - On load - Onenor - Main rel - Form process - Event Bubblers- filters -Transport with the Filter - Creating Images Adding shadows - Creating Gradients - Creating Motion with Bar-Data Binding - Simple Data Binding - Moving with a record set - Sorting table data, binding of an image and table

UNIT- III

database, Relational Database model - Overview, SQL - ASP - Working of ASP - Objects - File System Objects - Session tracking and cookies - ADO - Access a Database from ASP - Server side Active-X Components - Web Resources - XMIL - Structure in Data Name spaces - D7D-Vocabularies - DOM methods.

UNIT -IV

Introduction, Servlet, Overview Architecture - Dandling II P Request - Go and post request - redirecting request multi-tier applications - ISP - Overviews - Objects - scripting - Standard Actions - Directives. Brief survey of Web 2.0 technologies, introduction to Semantic web and other current technologies

MCA-24 System Software

Block 1: Introduction to System Software and software tools

Unit 1: Language Processors: Introduction, Language Processing Activities, Fundamentals of Language Processing & Language Specification, Language Processor Development Tools.

Unit 2: Data Structures for Language Processing: Search Data structures, Allocation Data Structures.

Unit 3: Software Tools: Software Tools for Program Development, Editors, Debug Monitors, Programming Environments, and User Interfaces.

Unit 4: Assemblers: Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of a Two Pass Assembler, A single pass Assembler for IBM PC.

Unit 5: Macro Processors: Macros and Macro Processors: Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a Macro Preprocessor.

Block 2: Compilers and Interpreters

UNIT 6 COMPILER- LEXICAL ANALYSIS

Introduction to NFA and DFA, Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, Finite Automata, Designing a lexical analyzer generator, Pattern matching based on NFA's.

UNIT 7 COMPILER- SYNTAX ANALYSIS

Syntax Analysis: Role of Parser, Top-down parsing, recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.(First and follow technique for generating a parse table is to be taught), Phases of the Compiler, Aspects of compilation, Memory allocation. Compilation of expressions and control structures.

UNIT 8 COMPILER- CODE GENERATION

Intermediate languages: graphical representations, DAGs, Three address code, types of three address statements, syntax directed translation into three address code, implementation of three address statements.

UNIT 9 COMPILER- OPTIMIZATION Code Optimization: Machine dependent and machine independent code generation: Sources of optimization-Code Generation-Semantic stacks, evaluation of expressions, control structures, and procedure calls.

Unit 10: Interpreters: Use and overview of interpreters, pure and impure interpreters

Block 3: Linker, Loaders and device Drivers

Unit 11: Loaders and Linkers

Basic loader functions: Design of an Absolute Loader – A Simple Bootstrap Loader, Machine dependent loader features Relocation – Program Linking – Algorithm and Data Structures for Linking Loader. Machine-independent loader features – Automatic Library Search – Loader Options Loader design options – Linkage Editors – Dynamic Linking – Bootstrap Loaders. Implementation examples: MSDOS linker.

Unit 12: Device drivers

Design and anatomy of UNIX device driver, Types of device driver, General design of UNIX character device driver, General design of UNIX block device driver, UNIX device driver installation.

MCA-E11 (Object Oriented Analysis and Design)

INTRODUCTION TO OBJECT ORIENTED MODELING: Introduction, Objectives, Object Oriented Modeling, Basic Philosophy of Object Orientation, Characteristics Object Oriented Modeling, Class and Objects, Links and Association, Generalization and

Inheritance, An Object Model, Benefits of OO Modeling, Introduction to OOA& Design Tools.

OBJECT ORIENTED ANALYSIS: Introduction, Objectives, Object Oriented Analysis, Problem Statement: An Example, Differences between Structured Analysis and Object Oriented Analysis, Analysis Techniques t, Object Modeling, Dynamic Modeling, Functional Modeling, Adding Operations, Analysis Iteration, Refining the Ratio Analysis, Restating the Requirements

USING UML: Introduction, Objectives, UML: Introduction, Object Modeling Notations: Ba- sic Concepts, Structural Diagram, Class Diagram, Object Diagram, Component Diagram, Deployment Diagram, Behavioral Diagrams, Use Case Diagram, Interaction Diagram, Activity Diagram, Statechart Diagram, Modeling with Objects, Summary.

SYSTEM DESIGN: Introduction, Objectives, System Design: An Object Oriented Approach, Breaking into Subsystems, Concurrency identification, Management of a Data Store, Controlling Events Between Objects, Handling Boundary Conditions

OBJECT DESIGN: Introduction, Objectives, Object Design for Processing, Object Design Steps, Choosing Algorithms, Selecting Data Structure, Defining Internal Classes and Operations, Assigning Responsibility for Operation, Design Optimization, implementation of Control, State as Location within a Program, State Machine Engine, Control as Concurrent Tasks, Adjustment of Inheritance, Rearranging Classes and Operations, Abstracting Out Common Behavior, Design of Associations, Analyzing Association Traversal, One-way Associations, Two-way Associations **ADVANCE OBJECT DESIGN:** Introduction, Objectives, Control awl its Implementation, Control as a Stake within Program, Control as a State Machine Engine, Control as Concurrent Task, Inheritance Adjustment, Association: Design, Object Representation, Design Optimization, Design Documentation.

OBJECT MODELING: Introduction, Objectives, Advanced Modeling Concepts, Aggregation, Abstract Class Multiple Inheritance, Generalization and Specialization, Meta Data and Keys, Integrity Constraints, An Object Model

DYNAMIC MODELING: Introduction, Objectives, Events, State and State Diagram, Elements of a State Diagram, Advanced Concepts in Dynamic Modeling, Concurrency - A Dynamic Model.

FUNCTIONAL MODELING: Introduction, Objectives, Functional Models, Data Flow Diagrams, Features of a DFD, Processes, Data Flows, Actors, Data Stores, Constraints, Control Flows, Design Flaws in DFD, A Sample Functional Model, Relation of Functional to Object and Dynamic Model

IMPLEMENTATION STRATEGIES: Introduction, Objectives, Implementation Associations, Unidirectional Implementations, Optional Associations, One-to-One Associations, Associations with Multiplicity 'Many', Bi-directional Implementations, One-to-One and Optional Associations, One-to-Many Associations, Immutable Associations, Implementing Associations as Classes, Implementing Constraints, Implementing State Charts, Persistency.

OBJECT MAPPING WITH DATABASE: Introduction, Objectives, Relational Database Schema for Object Modes, General DBMS Concepts, Relational DBMS Concepts, RDBMS Logical Data Structure, Object Classes to Database Tables, Extended Three Schema Architecture for Object Models, The use of Object IDs, Mapping Object Classes to Tables, Mapping Associations to Tables, Mapping Binary Associations to Tables, Mapping Many-to-Many Association to Tables, Mapping Ternary Associations to Tables, Mapping Generalizations to Tables, Interfacing to Databases,

CASE STUDY: INVENTORY CONTROL SYSTEM: Introduction, Objectives, Class Diagram, Object Diagram, Generalization and Association Diagram, Collaboration Diagram, Activity Diagram and Events, Use Case Diagram, Deployment Diagram.

MCA-E12 (Information and Network Security)

Book: Cryptography and Network Security, by, William Stallings Or Book by, Atul Kahate

- Classical Encryption Techniques
- Block Ciphers
- Finite Fields
- Advanced Encryption Standard
- Confidentiality Using Symmetric Encryption
- Number Theory
- Public-Key Cryptography and RSA
- Other Public-Key Cryptosystems
- Hash Algorithms
- Digital Signatures
- Authentication Applications
- Electronic Mail Security
- IP Security
- Web Security
- Intruders
- Malicious Software
- Firewalls

2. Bachelor In Computer Application (BCA)

Course Code and Details

Semester	Paper No.	Course Code	Title of Course	Credits	Compulsory/Elective
First Semester	**Compulsory Core Course**				
	2851	BCA-1.1	Computer fundamental and PC Software	4	**Compulsory**
	2852	BCA-1.2	'C' Programming and Data Structure	4	
	2853	BCA-1.3	Basic Mathematics	4	
	2854	BCA-1.4	Lab-1 Based on 'C' Programming and Data Structure	4	
	Discipline Centric Elective Course				
	2855 or 2856	BCA-E1 OR BCA-E2	Design and analysis of Algorithms OR Theory of Computation	4 OR 4	**Elective**
	Compulsory Foundation Course				
	2700	UGFODL	Foundation Course in Open Distance Learning	Non Credit	**Compulsory**
Credits of First Semester			**20**		
Second Semester	**Compulsory Core Course**				
	2857	BCA-1.5	Database Management System	4	**Compulsory**
	2858	BCA-1.6	RDBMS	4	
	2859	BCA-1.7	Basic Electronics	4	
	2860	BCA-1.8	Lab-2 (Based on Oracle)	4	
	Discipline Centric Elective Course				
	2861 or 2862	BAC-E3 OR BCA-E4	Data Mining OR E-Commerce	4 OR 4	**Elective**
	Elective Foundation Course (Select any one paper out of four papers)				
	002 OR 007 OR 010 OR 009	UGFST OR AOCHE OR AOCOM OR AOCNC	Foundation Course in Science and Technology OR Foundation Course in Human Environment OR Office Orgarnisation & Mnagement OR Foundation Course in Nutrition for the Community	4 OR 4 OR 4 OR 4	**Elective**
Credits of Second Semester			**24**		
Third Semester	**Compulsory Core Course**				
	2863	BCA-1.9	C++ and Object oriented Programming	4	**Compulsory**
	2864	BCA-1.10	Multimedia	4	
	2865	BCA-1.11	System analysis and Design	4	
	2866	BCA-1.12	Lab-3 (Based on C++)	4	
	Discipline Centric Elective Course				
	2867 or 2868	BCA-E 5 OR BCA-E6	Object oriented analysis and Design OR JAVA Programming	4 OR 4	**Elective**

	Compulsory Foundation Course				
	012	CHEQ/EA	Foundation Course in Environmental Awareness	Non Credit	
Credits of Third Semester			**20**		
Fourth Semester	**Compulsory Core Course**				
	2869	BCA-1.13	Computer Networks	4	**Compulsory**
	2870	BCA-1.14	Operating System	4	
	2871	BCA-1.15	Windows Programming	4	
	2872	BCA-1.16	Lab-4 (Based on Windows Programming)	4	
	Discipline Centric Elective Course				
	2873 or 2874	BCA-E 7 OR BCA-E 8	Network Programming OR Mobile Computing	4 OR 4	**Elective**
	Elective Foundation Course (Select any one paper out of four papers)				
	002 OR 007 OR 010 OR 009	UGFST OR AOCHE OR AOCOM OR AOCNC	Foundation Course in Science and Technology OR Foundation Course in Human Environment OR Office Orgarnisation & Mnagement OR Foundation Course in Nutrition for the Community	4 OR 4 OR 4 OR 4	**Elective**
Credits of Fourth Semester			**24**		
Fifth Semester	**Compulsory Core Course**				
	2875	BCA-1.17	Software Engineering	4	**Compulsory**
	2876	BCA-1.18	System Software	4	
	2877	BCA-1.19	Computer Graphics	4	
	2878	BCA-1.20	Lab-5 (Based on Computer Graphics)	4	
	Discipline Centric Elective Course				
	2879 or 2880	BCA-E 9 OR BCA-E 10	Web Technology OR Client Server Technology	4 OR 4	**Elective**
	Compulsory Foundation Course				
	2501	DM	Foundation Course in Disaster Management	Non Credit	**Compulsory**
Credits of Fifth Semester			**20**		
Sixth Semester	**Compulsory Core Course**				
	2881	BCA-1.21	Principle of Programming Language	4	**Compulsory**
	2882	BCA-1.22	Computer Organization	4	
	2883	BCA-1.23	Computer Oriented Numerical Techniques	4	
	2884	BCA-1.24L	Practical Lab based on BCA-1.23	4	
	Discipline Centric Elective Course				
	2885 or 2886	BCA-E 11 OR BCA-E 12	Computer Architecture OR Microprocessor and its applications	4 OR 4	**Elective**
	Elective Foundation Course (Select any one paper out of four papers)				

	002 OR 007 OR 010 OR 009	UGFST OR AOCHE OR AOCOM OR AOCNC	Foundation Course in Science and Technology OR Foundation Course in Human Environment OR Office Orgarnisation & Mnagement OR Foundation Course in Nutrition for the Community	4 OR 4 OR 4 OR 4	**Elective**
Credits of Six Semester			**24**		
Total Credits **132**					

BCA-1.1 (Computer Fundamentals and PC Software)

Computer Fundamentals: Hardware & Software

Computer and Memory System: Computer, IC, Classification of Computers, Memory System, Characteristics terms for various Memory Devices, Primary storage, Auxiliary memory, Cache memory.

input/output Organization & New Technologies:input/output Devices, input/output Module Interface, External interfaces, parallel processing, pipelining, vector processing, Introduction to Risc.

Software Concepts and Terminology: Computer Software (System/Application Software) Categories of languages, (Machine, Assembly, High Level, 4-GL), Elements of a Programming language (variable, constants, Data type, Array and Expressions, input/output statement, Conditional and Looping Statement, Subroutine andFunctions).

Opening System Concepts: Definition, Evolution, Serial Processing, Batch Processing,Multiprogramming, Types of O.S. (Batch, Multiprogramming, Network,Distributed).

Computer Fundamentals: Communication, Networking, Security:

Fundamentals of Data Communication: Definitions, Concept of Data Communication, Data Communication modes (Synchronous and Asynchronous Transmission, Simplex, Half- duplexandFull-duplexCommunication),CommunicationHardware(SenderandReceiverHardware,Communicationdevices,CommunicationChannels).

Introduction to Computer Networks and Emerging Trends: Network Concept and classification, LAN (Star, Bus, Ring), WAN (Switching techniques WAN Devices/Hardware, Applications (E-mail, EDI), Networking Scenario (Internet, Bitnet, Compuserve, ISDN, NICNET). **The Management of Computer Security and Principles of Cryptography:** Definitions, Security Status on PC, Breaches of Security, Security Measures, (Physical, Software, Network, Password Security), Cryptography (Cipher Systems, DES), Cryptanalysis.

Computer Virus: The Evolution of virus, the process of infection, classification of viruses (BootInfectors,SystemInfectors,COMorEXEinfectors). Prevention,Thecure.

A Graphical User Interface:

Introduction to GUI: GUI, Evolution of the human and machine interaction, Common GUI terms(Pointingdevices,Bit-mappeddisplays,windows,menus,dialogboxes,Icons),MS-Windows, Windows-95.

Manage System in Windows 95: My Computer, System settings, Backup, your data, Disk Drive utilities, Add/Remove Applications, Set up windows for Multiple Users DOS Prompt.

Files and Folders: Windows Explorer Working with files working with Folders, Recycle Bin.

Program and Accessories: Run your programs, Windows 95, Accessories, Briefcase.

Communication through Network: Network setup & configurations logging, Onto the Network, mapping network Drives Network Browsing, Sharing Folders and printers.

Multimedia in windows 95: Multimedia Add-ons, Media types (Audio, Visual), Multimedia tools (CD player, Media player, Sound Recorder, Volume Control).

Sample GUI oriented Applications:

MS Word Basics: The word screen Getting to word documents typing and Revising text, Finding and Replacing, Editing and Proofing tools,

Formatting text: Formatting text characters, Formatting Paragraph, Document templates.

Page Design and layout: Page set up, tables.

Mail Merge and document Management: Mail Merge, Macros, protecting documents, printing a document.

Presentation graphics and power point: What is business graphics, (Types of Business Graphics How to make an effective presentation? Physical aspects of presentation), Apresentation graphics Package. PowerPoint, Creating a presentation, working with tools, slideshow.

BCA-1.2 ('C' Programming and Data Structures)

Introduction

Introductory: An overview of C, Escape sequences, Getting A "feel" forC.
Data types in "C": Variables of type (out, char, float, double,), Enumerated types, the typed of statement, Identifiers.
Operators and Expressions Inc: Elementary Arithmetic operations and operators, Expressions, L values and P values, Promotion and Demotion of variable types: The cast operator, Print f ( ) and Scan f ( ) functions.
Decision Structures in 'C': Boolean operators and Expressions The goto statement, the if (), Statement, the if ( ) – else statement,

Control structures – I: The do – while( ) and while Loops, the Comma Operator, the transfer of Central from within loops, Ternary operator, The Switch case default statement.

Programming in C

Control Structures II: 'The for (;;) loop, one-dimensional Arrays, The sizeof operator, storage classless and scope.
Pointers and arrays: Pointer variables and pointer Arithmetic, Pointers, Arrays and the subscript operator, A Digression on Scan f(), Multidimensional Arrays.
Functions: Function Prototypes and Declarations, Functions and Scope, Pointers as Function Arguments, String Functions, Multi-Dimensional Arrays as Function Arguments.
FunctionsII: Recursivefunctions,Macros,ConditionalCompilation,MacroswithParameters, CommandlineArguments,VariablelengthArgumentlists,ComplicatedDeclarations,Dynamic MemoryAllocation.
Files and Structs, Unions and Bit-Fields: Files and File 70, Structs, the DOT Operator, Extructs and files : f seek ( ), Structs and Function and unions, The Bitwise operators.

Data Structures:

Introduction to Data Structures: Array: Program Analysis, Arrays, Array Declaration, Storage of arrays in Main memory, sparse arrays.

Lists: BasicTerminology,Staticimplementationoflists,Pointerimplementationoflists,Doubly linkedlists,circularlinkedlist,StorageAllocation,StoragePools,GarbageCollection,Fragmentation, Relocation andCompaction.
Stacks and Queues: Defining stack and Queue, stack operations and Implementations, stack Applications, Queues: Operations and implementation, Queue Application, priority Queues.
Graphs: Defining graph, Basic, Terminology, Graph Representation, Graph traversal (DFS, BFS), shortest path problem, Minimum spanningtree.

Trees and File Organization

Trees: BasicTerminology,Binary,trees,TraversalsofaBinarytree,BinarysearchTrees(BST).
AVL-Tree and B-Tree: Height Balanced tree, Building Height Balanced tree, B-Tree ,B-Tree of order5.
Files: Terminology, File organization, sequential files, Direct, File organization, Indexed Sequential file organization.

Searching and Sorting Techniques:

Searching Techniques: Sequential search, Binary Search,

Sorting Techniques-I: Internal Sort (insertion Sort, Bubble Sort, Quick Sort, way merge sort Heap sort), Sorting on Several keys.

SortingTechniques-II: Datastorage(MagneticTapes,Disks),sortingwithDisks,k-waymerging, Buffering, Sorting, withtapes.

BCA-1.3 (Basic Mathematics)

Elements of Differential Calculus

Real Numbers and Functions: Basic properties of R, Absolute value, intervals on the real line, Functions, new Functions from OLD, Types of Functions. Units and continuity - Basic propertiesofR.continuity.Differentiation-Thederivativeofafunction,Algebraofderivatives, continuity versus Derivability. Derivatives of Trigonometric Functions - Derivatives ofinverse functions,derivativesofinverseTrigonometricFunctions,useofTransformations.Derivativeso f some standard functions - Exponential functions, Derivatives of Logarithmic functions, HyperbolicFunctionsMethodsofDifferentiation.

Drawing Curves

Higher Order Derivatives: Second and third order derivatives, nth order derivatives, Leib niz Theorem, Taylor's series and Maclaurin's series The Ups and Downs : Maxima-Minima of functions, Mean value theorems (Rolle's Theorem, Lagrange's Mean value theorem), sufficient conditions for the existence of Extreme points.

Geometricalpropertiesofcurves: EquationsofTangentsandNormals,Angleofintersection of Two curves, singular points,asymptotes.

Curve Tracing: Graphing a function and curve tracing tracing a curve: Cartesian Equation, Parametric Equation, Polar Equation.

Integral Calculus

Deftnite Integral: Preliminaries, Definite integral, fundamental theorem of calculus.

Methods of Integrtion: Basic Definitions, Integration by Substitution, Integration by Parts. **Reduction Formulas:**Integrals involving Trigonometric function, Integrals involving productions of trigonometric functions, Hyperbolic,Functions.

Integration of Rational and Irrational functions: Integrations of Rational Trigonometric functions, Irrational Functions.

Applications of Calculus

Applications of Differential Calculus: Monotonic functions Inequalities, Approximate values.

Area under a curve: Cartesian equation, polar form parametric form, Numerical integration, (Trapezoidal,Simpson's).ApplicationsofIntegralCalculus-Lengthofaplanecurve,volume ofasolidofRevolution,AreaofSurfaceofRevolution.

Solutions of Polynomial Equation

Sets: Set, subsets, venn diagrams, operations on sets, laws Relating operations, Cartesian prod uct. Complex number's - Geometrical Representation, Aalgebraic operations, De Moivre's Theorem.

Cubic and Biquadratic Equations: Linear equations, Quadratic Equations CubicEquations,
BiquadraticEquations,Ferrari'ssolution,DescartessolutionRootsandtheirRelationwithcoeffi cients.

Equations and Inequalities

Systems of Linear Equations: Linear systems, solving By substitution solving by elimination.

Cramer's Rule: Matrix, Determinants, Cramer'sRule

Inequalities: Inequalities known to the Ancients, Cauchy Schwarz Inequality weierstrass' Inequalities, Tehebychev's Inequalities.

Conics

Preliminaries in plane Geometry: Equations of a straight line, symmetry, change of Axes, Polar Coordinates.

The Standard Conics: Focus Directrix Property, Parabola, Ellipse, Hyperbola, Polar Equation of Conics.

General Theory of Conics: General Second Degree Equation, Central and Non Central Conics, Tracing a Conic, Tangents, Intersection of Conics. The Sphere Cone and Cylinder
Preliminaries in Three Dimensional Geometry: Points, Planes, The Sphere - Equations of a sphere, tangent lines and planes, Intersection of Spheres.

Cones and Cylinders: Cones, Tangent planes cylinders. Conicaids

General Theory of Conicoids: Conicoid, change of Axes, Reduction to standard form.
Central Conicoids: A conicoids centre, classification of Central Conicoids, Ellipsoid, HyperboloidofonesheetHyperboloidoftwosheetsIntersectionwithALineorPlane.
Paraboloids: Standard Equations of a Paraboloid, Tracing, Paraboloids, Intersection with a line or a plane.

BCA-1.5 (Database Management Systems)

Introductory Concepts of Data Base Management Systems

Basic Concepts: Introduction, Traditional file Oriented approach, Motivation for database approach, database basics, three views of data, The three level Architecture of DBMS Mapping between different levels database Management System facilities, DDL, DML, Elementsof a database Management System (DML Pre Compiler, DDL Compiler, File Manager, Database Manager, query Processor, database Administrator, Data dictionary) , Advantages and disadvantages of database managementsystem.
Data base Models and its Implementation: Introduction, File Management System Entity, Relationship (E-R) Model, The hierarchical model, DBTG set, the network model, The Relational model, Advantages and Disadvantages of Relational Approach, Difference between Relational and othermodels.
FileOrganizationforConventionalDBMS: Introduction,FileOrganization,Sequentialfile organization,Index-sequentialfileorganization(TypesofIndexes,StructureofIndexSequential Files, VSAM, Implementation of Indexing through Tree- Structure), Direct file organization, Multi key file Organization (Need for the multiple Access path, multicost , File organization, InvertedfileorganizationcellularPartitions,comparisonandTradeoffintheDesignofMultikey file).
Management Considerations: Introduction, Organizational Resistance to DBMS Tools (Political observation, Information transparency, Fear of future potential, Reasons for Success), Conversion from An Old system to a new system, Evaluation of a DBMS, Administration of a database Management System.
Enterprise Wide Information System of the Times of India: Group (A Case Study) Introduction, organization and the operating environment unique nature of the Business, Information System goals and how to achieve the Goal, The Response System and Respnet Choices, Benefits.

RDBMS and DBMS

Relational Model: Concepts, Formal Definition of a Relation, the Codd, Commandments, Relational Algebra, Relational Completeness.

Normalization: Functional dependency, Anomalies in a database, Properties of Normalized Relations, 1st NF, 2nd NF, 3rd NF, BCNF, Fifth Normal form examples of Database Design.

Structured Query Language: Categories of SRL Commands Data Definition, DataManipulation ,views.

Distributed Databases: Structure of Distributed database Trade-OFFS in distributing the database, Design of Distributed Databases.

Emerging Trends in DBMS

Introduction to object oriented Database Management System: Next Generation database System, New database applications, object oriented database Management system,

PromisesandAdvantagesofobjectorientedDatabaseMgt.system,DifferencebetweenRDBMS and OODBMS, Alternative object oriented Databasestrategies.

Introduction to client/Server Database: Evaluation of client/Server, Emergence of client server Architecture, the client/server Computing, the critical products, Developing on Application, SQL (DDL, DML), Client/Server. Where to Next?

Introduction to Knowledge Databases: Definition and Importance of knowledge, Knowledgebasesystem,Differencebetweenaknowledgebasesystemandadatabasesystem,knowledge RepresentationSchemes.

BCA-1.6 (RDBMS)

RDBMS Design

RDBMS Terminology: Introduction, Database, Database management system, Instances and Schemas, Traditional File Oriented Approach, Benefits of Conventional or Centralized DBMS, Data Independence, Data Dictionary, Database Security, Domain Definition, A Relation, Relational data integrity, Candidate keys, primary key, Foreign keys, Referential Integrity, Candidate keys and Nulls, Data dictionary checklist.

Overview of Logical Database Design: Introduction, The Steps of Database design, Conceptual Design, Schema Refinement, Physical database Design and Tuning, ER Model, ER Model basics (Entity, Entity type and Entity set), Attributes (Attribute, key Attributes in Entity types, Composite vs. Simple attributes, Single vs. Multivalued Attributes, Derived vs. Stored Attributes, Null values, value sets of Attributes, Relationship, Degree of Relationship type, Structural Constraints, weak entities, Components of an E-R Diagram, ER Diagram Developmentexamples.

Overview of Normalization: Introduction, Redundancy and associated problems, Role of Normalization, Single valued dependencies, single valued normalizations, (1NF, 2NF, 3NF,BC NF), Desirable properties of decompositions (Attribute Preservation, Lossless-Join

Decomposition,DependencyPreservation,LackofRedundancy,DerivingBCNF),Multivalue ddependencies, Multivalued Normalization – Fourth Normal Form, The fifth Normal form, Rules of data Normalization.

Practical on RDBMS: Introduction, DBMS and file oriented approach, Relational Databases and Integrity Constraints Entity- Relationship diagram, Functional dependency and Normalization , Normalization Structured Query Language (SQL), Microsoft-Access, views and Security using SQL.

RDBMS Lab: Introduction to MSAccess

Introducing Microsoft Access: Introduction, DBMS, Microsoft Access database, tables and Queries, forms and Reports,

Microsoft Access Basics: Introduction, Starting and Quilting Microsoft Access, Opening a database, The database window, objects of the Access database.

Working with database: Introduction, creating a Microsoft Access database, Creating objects, set toolbars to your working style.

Creating a table: Introduction, Plan fields and data types, create a table, set field properties, save and close a table, Add and save records, Edit records and close a table, Modify fields in a table, Modify Columns and rows in datasheet, Attach validation rule to a field.

Finding Data: Introduction, Find a value, find and replace, create and apply a filter, specify criteria, sort Records.

Creating a Qurey: Create a Query, The Query Window, Join tables, select fields, specify criteria sort Records, Calculate Totals, Modify a Query, Save aQuery.

Creating a form: Introduction, Create a form with a form wizard, view records in a form, Add, Delete and save Records, Save and close a form.

Customizing your form: Introduction, Change a form's design select and Resize controls, Move and Delete Controls, Change Fonts, Size and color of text.

Showing data from more than one table on a form: Introduction, create a form that contains a sub form, use a Query to include fields from more than one table.

SCreating Reports and mailing labels: Introduction, Use Reports to present data, create a Report, preview, print and save a Report, A Report in design view, create and print mailing labels.

BCA-1.7 (Basic Electronics)

Book: Basic Electronics

By V.K Mehta (S Chand Publication)

- ElectronEmission
- VacuumTubes
- Vaccum TubeRectifiers
- Vacuum TubeAmplifiers
- Gas-FilledTubes
- AtomicStructure
- SemiconductorPhysics
- SemiconductorDiode
- Transistors
- TransistorBiasing
- Single Stage Transistor Amplifiers
- Multi Stage TransistorAmplifiers
- Transistor Audio PowerAmplifiers
- Amplifiers With NegativeFeedback
- SinusoidalOscillators
- Transistor TunedAmplifiers
- Modulation AndDemodulation
- Regulated D.C. PowerSupply
- Solid State SwitchingCircuits
- Field EffectTransistors
- Silicon ControlledRectifier
- ElectronicInstruments
- IntegratedCircuits

- HybridParameters
- DigitalElectronics

BCA-1.9 (C++ and Object Oriented Programming)

An Introduction to Object Oriented Programming

Object Oriented Programming: OOP Paradigm, the soul of OOP, OOP characteristics, Advantages of OOP, Applications of object Oriented Programming (System software, DBMS, Applications of OODBMS, Advantages and Disadvantages of OODBMS), The Object Orientation, OO Languages, Advantages of C++.

Object Oriented Programming System: What is OOPS?, Class, Inheritance, Abstraction (Procedural language, Object-oriented language), Mechanisms of Abstraction, Encapsulation and information hiding, Polymorphism, overloading,

Advancedconcepts: Dynamism(DynamicTyping,DynamicBinding,LateBinding,Dynamic Loading, Structuring programs, Reusability, Organizing Object-oriented Projects (Large scale designing,SeparateInterfaceandImplementation,Modularizing,SimpleInterface,Dynamicdecisions,InheritanceofGenericCode,Reuseoftestedcode.

IntroductiontoObjectOrientedLanguages: Objective-C,Featuresofobjective-C,Python, Features of Python, C # (C SHAR), Features of C#, Eiffel, Modula-3, Features of modula-3, Small talk, object REXX, Java, Features of Java(Object Oriented, Distributed, Interpreted, Robust, Secure, Architecturally neutral, Portable High performance, Dynamic) , Beta various object oriented programming languages Comparativechart.

An Introduction to Unifted Modelling Language (UML): UML (Goals, History, use), Definition, UML Diagrams (Use case, class, interaction diagrams), State diagrams, ActivityDiagrams, Physicaldiagrams.

C++ — An Introduction

Overview of C++: Programming Paradigms (Procedural Programming, Modular Programming, Data Abstraction, Object Oriented Programming), Concepts of C++ functions and files. **Classes and Objects:** Definition and Declaration of a class, Scope Resolution Operation, PrivateandPublicmemberfunctions,CreatingObjects,Accessingclassdatamembersandmember functions, Arrays of objects, Objects as FunctionArguments.

Operator overloading: Operator Functions, large objects, Assignment and initialization, Function Call, Increment, Decrement Operator, Friends.

Inheritance-Extendingclasses: Conceptofinheritance,BaseclassandDerivedclass,visibility Modes, Single inheritance Multiple Inheritance, Nested classes, virtualfunctions.

Streams and Templates: Output, Input, Files Exception, handling. and streams, Templates,

BCA-1.10 (Multimedia)

Introduction to Multimedia and Its Applications

An Overview of Multimedia: The Concept, Hardware for Multimedia Computer Software forMultimedia,ComponentsofMultimedia,Multimedia–Design,productionandDistribution. **Applications of Multimedia:** Application Areas for Multimedia, Publishing Industry and

Multimedia, Communication Technology and Multimedia Services, Multimedia in Business, Multimedia Pedagogues: Interactive systems for teaching and learning, Concepts for Distributed Learning Environment, A Medical Application: Mednet – A Medical Collaboration and Consultation system.

Multimedia Authoring Tools: Multimedia Development tools, Features of Authoring Software, Authoring Tools, Quick Time, Hypertext, Applications of Hypertext (Computer Application, Business Application, Educational Application, Entertainment and Leisure Applications, Elements of Hypertext (Nodes, Links, Annotations, Buttons, Editors, Browsers, Trails, Built-in Programming Languages).

Multimedia Development – Issues and Suggestions: Learning Interface Design, Planning the Multimedia Programme/Application, Developing Tips of Multimedia BuildingBlocks, MultimediaAuthoring.

BCA-1.11 (System Analysis And Design)

System Analysis

Overview of System Analysis and Design: System, Systems study, Systems analysis and systems approach, characteristics of a system, Elements of systems analysis, types of systems, System Development life cycle, Software Crisis (Programmer's point of view, user's point of view), Role of a systemsanalyst.

Project Selection: System projects, sources of Project requests, Managing Project Review andselection,Preliminaryinvestigation,Problemsclassificationsanddefinitions.

Feasibility Study: Preliminary study, different types of feasibility (Technical, Operational, Economic, Social, Management, Legal and Time feasibility), Investigative study, cost/ Benefit analysis, Fact Findings (interviewing questionnaires, observing the current system, Determination of DFD, New System.

System Requirement Speciftcations and analysis: DFD, data dictionaries, HIPO (VTOC,IPO), decision tables and decision trees, warnier-ORR diagrams, NASSI-SHNEIDERMANN CHARTS **System Design**

Structured System Design: System Design Considerations, Design, Methodologies, Structured Design, Modularization, Design Process, System Specifications, Prototype Design.

Input Design and control: Processing Transaction data, Elements of input data, Input Media andDevices,InputMediaandDevices,InputDesignGuidelines,InputverificationandControl, DataDictionaries,Howtolayoutterminalscreen,MajorconcernsRegardingCRT-InputScreen Design.

Output System Design: Types of output, output Devices, output Design Consideration, Design of output Reports Designing Screen output, Menu design, Form Design and Control, Computer Graphics.

File and Data Base Design: Selecting data storage Media Types of File (Master, Transaction, Table, Report Backup, Archival, Dump, Library), File organization, File Design, Data base Design, Types of database coding system, Types of Code (Classification, Function, Card, Sequence, Significant digit , Subset code, Mnemonic code, Acronym).

System Development and Implementation

System Development: Task of System Development, Prototype installation Hardware and
Softwareselectionandperformance,BenchmarkTesting,Preparingsoftwaredevelopmentcycle, softwarespecificationlanguageselectioncriteria.

System Control and Quality Assurance: Quality Assurance in Software life, cycle, Levels of Quality Assurance, Design objectives, Reliability and maintenance, Maintenance issues, Maintainable Designs, Testing practice and plans, Levels of tests, special sstes tests, Designing test data, system control, AuditTrial.

Documentation: Characteristics of a good documentation, types Software Design and documentation tools, need for documentation, Format for preparing documentation Package.

System Implementation: Training of Personnel involved with system, Training Methods, Conversion Methods, Review plan, System Maintenance, Hardware, Acquisitions, criteria for vendor's selection, service Bureaux.

Management Information System

Introduction to MIS: Definition, Historic Development, Typical Systems,

TheTechnologyComponent: OverviewofcomputingTechnology,OverviewofCommunication Technology, Database Technology, Decision Support Systems, knowledge Based systems.

TheOrganizationalImpactofMIS: InformationasaResource,InformationforCompetitive Advantage,Organization,InformationandDecision,MISasaprofession.

Building Management Information Systems: System Analysis, Techniques of Systems Analysis.

CaseStudies: Case(A)InformationSystemPlanning,Case(B)Preparingforsystemsanalysis, Case(C)SystemsAnalysisCompletion,Case(D)SystemDesignProposal,Case(E)Evaluation and selection of Systems Case (F) Implementation plan andActivities.

EmergingTrends

The Analyst As A Professional: Attributes of a good analyst, Organizational issues, The Systems Analyst and law.

Human Computer Interaction: The What, Why, When and where of Human Computer Interaction, Communicating with Computers, Ergonomics, Human problems in the Automated Office, Designing Human Machine Systems.

Introduction to Multimedia: Multimedia – The Concept, Design, Production and Distribution,ComponentsofMultimedia,SoftwareandHardwareforMultimedia.

BCA-1.13 (Computer Networks)

An Introduction to Computer Networks

Network, Classiftcation and Reference Models: Introduction, Network, Network Goals/ Motivation, Applications of Networks, Types of network, Reference Model (OSI, TCP) IEEE standards for LAN.

Data transmission and Multiplexing: Introduction, Transmission, Terminology, Timedomain Concepts, Frequency domain Concepts, Relationship between Data Rate and Bandwidth, Analog and digital data transmission, transmission media, Multiplexing.

Medium Access Control and D.L.L.: Introduction, D.L.L., Medium Access Control Sub- layer (Contention based media access protocols, polling based MAC protocols, IEEE standard

802.3 and Ethernets, IEEE standard 802.4 Token bus, IEEE standard 802.5 Token Ring.
Network, Transport (TCP/IP) And Application layer: Introduction, Network layer (Routing Algorithms, Shortest path routing, Flooding), Congestion Control Algorithms, Com- parison of virtual circuit and datagram subnets, Internetworking (Repeaters, Bridges, Routers), Transport layer (Transport service and Mechanism, Types of Service/Quality of Service), Transport Control Mechanism (Addressing, Flow Control and buffering , Multiplexing, Connection establishment and Management , Crash Recovery), TCP/UDP, Application layer (The domain name system (DNS), TCP/IP Internet Domain Name, Electronic Mail, www, Mail-based Applications), Remote procedure Call (RPC), File transfer protocol (FTP), Telnet.
Network Devices and Technology Network Devices –I: Introduction, Network devices (Repeaters, Bridges, Switches, Hubs).

Network Devices-II: Introduction, Network devices (Routers, Comparison of Bridges and Routers, Gateways, Modem).
Integrated Services Digital Network (ISDN): Introduction, Baseband and Broadband Communication, ISDN Services, Advantages of ISDN,. ISDN applications (Internet Access, Telephony, Telecommunicating, Video conferencing, Education, Large-Scale file transfers).
Asynchronous Transfer Mode (ATM): Introduction, Switching Techniques (Circuit switching, Packet Switching, Multirate Circuit Switching, Frame Relay, Cell Relay), How compatible isATMasTechnology?,ATMlayeredArchitectureinComparisonwithOSIModel,HowATM protocol works?, The ATM Network, The ATM CELL, ATM classes of services (ATM Service classes, ATM Technical Parameters), ATM, Traffic Control (Network Resource Management, Connection Admission Control, (Network Resource Management, Connection Admission Control, Usage Parameter Control and Network Parameter Control, Priority Control, Congestion Control),BenefitsofATM,ATMApplications(ATMServices,ATMworkgroupandCampusnetworks,ATMenterprisenetworkconsolidation,multimediavirtualprivatenetworksandmanaged services, frame relay backbones, Internet backbones, Residential broadband networks, Carrier infrastructures for the telephone and private linenetworks).

BCA-1.14 (Operating Systems)

Introduction: OperatingSystem,Generationofoperatingsystems,Processors,Memory,Disks, Tapes,I/ODevices,Buses,MainframeOperatingSystems,ServerOperatingSystemsMultiprocessor Operating Systems, Real time, Operating systems, smart card operatingsystems.
Operating System Structure: Monolithic systems, Layered systems, Microkernels, client, Server Model, Virtual Machines.

Processes and Threads: The process Model, process creation, Process Termination Process States Implementation of Processes, Thread usage, The classical thread Model, Hybrid Implementations, Interprocess Communication, Race Conditions, Critical Regions, Mutual Exclusion with busy waiting, sleep and wakeup, semaphores,
MemoryManagement: TheNotationofanAddressSpace,Swappingvirtualmemory,Paging Pagelabels,speedinguppaging,pageReplacementAlgorithms,TheoptimalPageReplacement Algorithm,the(FIFO)Page,ReplacementAlgorithm,ThesecondchancepageReplacement

Algorithm, The clock Page Replacement Algorithm, Design issues for Paging systems, Implementation Issues, Segmentation

Deadlocks: Resources,TheOSTRICHAlgorithm,Deadlock,Avoidance,Deadlockprevention , Deadlock Detection andRecovery.

Security: Basics of Cryptography, protection Mechanisms, Authentication, Malware, Defenses.

Case Study 1: LINUX

Case Study 2: WINDOWS VISTA

BCA-1.15 (Windows Programming)

Components of windows Programming and Visual Basic

Visual Basic : Introduction: Start and Exit visual basic, V.B. Interface, Debug, Window, print command, V.B. ArithmeticOperators.

Variables and Functions: Variables,variablenames,variabletypes,Rangeofthevariablevalues,functions.

Building A Project & Customizing Forms: About Project, Form, Form properties, Form tools, Form Events.

VisualBasicControls: Control,CustomControl,Controlsinaform,FunctionsandProcedures- Form, Standard and class Module, Sub procedure, DO-event Functions, ControlArrays.

Accessing Database : Using Data Manager, Creating a database, Creating a New Table, Attaching a table, changing Design of an existing table, Creating Indexes, working with data. Creating form with data controls - Data controls, Data Aware Control, Creating a form using Data Controls, Manipulating data, creating the menu Bar, Displaying a menu item code.

Object Linking and Embedding : Basics of OLE, the OLE Icon, Terms used in OLE, OLE Automation, using OLE Control popup-Menu, Creating OLE object at Design time Creating part of an OLE object, Testing Embedding/Linking.

Windows Programming Using visual Basic 6.0

Introduction: Starting An Era of visual software Development, RAD Tools, Basic interface component, Creating and linking object through Basic Programming, Activity.

Advanced Features of Visual Basic 6.0 : Identification of some Advanced features of visual Basic 6.0 Employment of Features, Simple Animation using Active X, Drag and Drop,Linking toDatabase.

Active X and Windows API: Creating Active X DLLs, Using windows API in visual Basic IDE.

BCA-1.17 (Software Engineering)

Software Engineering Concepts

Introduction to Software product, Component & Characteristics Engineering: Software product, Components and characteristics, Software Engineering phases, Documentationof the Software product, Software Process and models (Software life cycle, Requirementsanalysis and specification, Design and Specification, Coding and moduletesting).

Software Process Management: Software process management, Human Resource Management (Software process, Team leaders, Problem Solving, Influence and Team Building), The Softwareteam(DemocraticDecentralized(DD),ControlledDecentralized(CD),ControlledCentralized (CC), Organization, Information and Decision, Problem identification, Software Crisis, Role of asystemAnalyst.

Project planning and Control: Project scheduling, outsourcing. Project standards, Project **Risk Management Concepts:** Introduction and Risk Management Concepts, Technical Planning, Benchmark Testing.

Software Quality Concepts and Case Tools:

SoftwarePerformance: CustomerFriendliness,SoftwareReliability,SoftwareReviews,Software Upgradation, Software tools, and environment, Software libraries and toolkits, Software Modules,ReapplicationofSoftwareModules,Developmenttools(CodeGenerators,Debuggers). **Quality Concepts:** Important Qualities of Software product and process (Correctness, Reliability, Robustness, Verifiability, Maintainability, Reusability, Portability, Data Abstraction, Modularity). Principles of Software Engineering (High quality software is possible, Give products to customers Early, Determine the Problem before writing the Requirements, Evaluate Design Alternatives, Use an Appropriate Process Model, Minimize Intellectual Distance, Good Management is more Important than Good Technology, People are the key to success, Follow with care, Takeresponsibility).

Software Methodology: An object Oriented Concepts The Evolving Role of Software, An industry Perspective, Structured Methodologies, Major influencing Factors (Evaluation of End user computing, Emergence of CASE Tools, use of Prototyping and 4 GL Tools, Relational Databases),usingtheMethodology,ChoosingtheRightMethodology,Implementingamethodology, Current Generation of Software Development tools, 4 GL Considerations in Application Development (Problems in Application Development, Impact of AGLs, Limitation of 4GLs, LINC),

Case Tools: Introduction,Softwarecrisis,WhatiswrongwithcurrentDevelopmentMethods?, Software and its increasing Cost, Software Errors and their Impact, An Engineering Approach to Software, why case fails?, Case tools (Generation of CASE tools, Categories of Case tools (Generation of CASE tools, Deft Case tools, The Deft CASE system, The Deft way (DFDs, ERDs,PSPs),FactorsAffectingSoftwareDevelopment,ThebenefitsofusingCASE.

BCA-1.18 (System Software)

Introduction to System Software

Programming Concepts and Software Tools: Introduction to Programming Language Concepts: Algorithm, Flowcharting, Problem and its Algorithm, Concept of a Programming Language, Categories of Languages, Elements of a Programming language.

Introduction to Assembler: Advocates of a translator, types of translators, Assembler implementation, Macro processor, Loaders.

Introduction to Compiler writing: Compiler, Approaches to compiler development, compiler Designing Phases, Software tools.

Graphical user interface : Graphical user interface, Evolution of the human and Machine

interaction, Common Graphical user interface terms, functionality of graphical user interfaces, A look at some graphical user interfaces.

Introduction to a text editor and debugging system: Introduction to a text editor, overview of the Editing process, Types of Editors and user interface, Editor structure, Interactivedebuggingsystems,DebuggingFunctionsandCapabilities,Relationshipwithotherpartsof the system, user interfacecriteria.

Fundamentals of operating system

Introduction to operating system: Operating System, Evolution of operating systems,serial processing, Batch processing, Multiprogramming, types of operating System, Batch Operating system Multiprogramming Operating system, Network operating system, Distributed Operating System, Operating System Structure, Layered Structure Approach, Kernel Approach, Virtual Machine, Client Server Model, Future Operating Systemtrends.

Process Management: Process concept Processor scheduling, Types of Schedulers, Scheduling and performance Criteria, Scheduling algorithms, Interprocess Communications and synchronization, Basic concepts of concurrency, Basic Concepts of Interprocess Communication and Synchronization, Mutual Exclusion, Semaphores, Hardware support for mutual Exclusion, MechanismforStructuredformofInterprocessCommunicationandsynchronization,Deadlocks, System model, Deadlock Characterization andModelling.

Memory Management: Introduction, single process monitor, Multiprogramming with Fixed partitions, Multiprogramming with dynamic partitions, Paging Address mapping in a paging system,HardwareSupportforPaging,AddressTranslationbyAssociativeMemory,Sharingand ProtectioninaPagingSystem,Segmentation,AddressMappinginaSegmentedSystem,Implementation of segment tables, sharing and Protection in a Segmented System, Virtual memory,Advantages of virtual memory, Demand Paging Virtual memory managementpolicies.

File Management: Introduction, File concept, Directories, Disk organization, Disk Space Management methods, Linked List, Bit Map, Disk Allocation Methods, Contiguous Allocation, Non Contiguous Allocation, Disk Scheduling, FCFS, Shortest seek time-first scheduling, scan scheduling, File Protection, Passwords, Access Lists, Access Groups.

UNIX Operating System-I

Theoretical Concepts of UNIX operating System: Introduction, Basic features of unix operating system, UNIX system Architecture, File Structure processing Environment, CPU Scheduling, Memory Management, Swapping, Demand Paging, File System, Blocks and Fragment and Inodes, Directory Structure.

UNIX-GETTNG STARTED I: Introduction, Getting started, user Names and Groups, Logging in, Correcting Typing Mistakes, Format of UNIX commands, changing your Password, Characters with special Meaning, UNIX documentation, Files directories, Current Directory, Locking at the Directory Contents, Absolute and Relative, Pathnames, Some UNIX Directories and Files.

UNIX Getting Started II: Introduction, Looking at file contents, your own directories, file permissions, Basic operations on files, Links between Files, Changing permission modes, standard files, Standard Output, Standard Input, Standard Error, Filters and Pipelines, Processes, Finding out about Processes, stopping Background Processes.

TEXT Manipulation: Introduction, Inspecting files, file statistics, Searching for Patterns, Comparing Files, Operating on files, printing files, Rearranging Files, Sorting files, Splitting

files, Translating characters,

Editors: Introduction, General characteristics of vi , Starting up and quitting from vi , Adding textandNavigation,changingText,SearchingforText,CopyingandMovingText,TheFeatures of ex, The live editors Ex and Ed. starting up and Quitting, Addressing Lines, Looking at Text, Adding Deleting and changing text, Searching for and replacing text, cut and paste operations, filesandMiscellaneousfeatures,TheStreamEditorSED,changingseveralfiledinSED, AWK.

UNIX operating SystemI

User to user Communication: Introduction, Online communication. Communication, Offline

Shell Programming: Introduction, Programming in the Bourne and the C- shell, wild cards, simple shell programs, variables, Programming Constructs, interactive shell scripts, advanced Features.

Programming Tools: Introduction, The UNIX C compiler, other tools (Lint- the –Cverifier, ProgramProfiles,Programlistings),CrossReferencesandProgramflow,MaintainingPrograms , the source code control system (Initializing a file, Examining and Altering files, Identification Keywords, MiscellaneousCommands).

System Administration: Introduction, System Administration – A Definition, Booting the system, Maintaining user accounts, file systems and special files, Backups and Restoration.

BCA-1.19 (Computer Graphics)

INTRODUCTION TO COMPUTER GRAPHICS: What is Computer Graphics?, Applications Presentation Graphics, Painting and Drawing, Photo Editing, ScientificVisualisation, Image Processing, Education, Training, Entertainment and CAD, Simulations, Animation and Games, Graphics Hardware, Input and Output Devices, DisplayDevices.

GRAPHIC PRIMITIVES: Points and Lines, Line Generation Algorithms, DDA Algorithm, BresenhamsLineGenerationAlgorithm,Circle-GenerationAlgorithms,PropertiesofCircle,Mid Point Circle Generation Algorithm, Polygon FillingAlgorithm,

VIEWING AND CLIPPING: Point Clipping, Line Clipping, Cohen Sutherland Line Clippings,Cyrus-BeckLineClippingAlgorithm,PolygonClipping,Sutherland-HodgmanAlgorithm, Windowing Transformations.

2-D and 3-D TRANSFORMATIONS: Basic Transformations, Translation, Rotation, Scaling, Shearing, Composite Transformations, Rotation about a Point, Reflection about a Line, Homogeneous Coordinate Systems, 3-D Transformations, Transformation for 3-1 Translations, Transformationfor3-DRotation,Transformationfor3-DScaling,Transformationfor3-DShearing,Transformationfor3-DReflection

VIEWING TRANSFORMATION: Projections, Parallel Projection, Orthographic and Oblique Projections, Isometric Projections, Perspective Projections

CURVES AND SURFACES: Polygon Representation Methods, Polygon Surfaces, Polygon tables,PlaneEquation,PolygonMeshes,BezierCurvesandSurfaces,BezierCurves,Properties ofBezierCurves,BezierSurfaces,SurfaceofRevolution

VISIBLE-SURFACE DETECTION: Visible-Surface Detection, Depth Buffer (or z-buffer) Method, Scan-Line Method, Area-Subdivision Method

GRAPHIC PRIMITIVES:POLYGON RENDERING AND RAY TRACING METHODS Il-

luminationModel,AmbientReflection,DiffuseReflection,SpecularReflection,Shading,Gour and
ShadingorIntensityInterpolationScheme,PhongShadingorNormalVectorInterpolationShading, Ray Tracing, Basic Ray TracingAlgorithm

COMPUTER ANIMATION: Basics of Animation, Definition, Traditional Animation Techniques, Sequencing of Animation Design, Types of Animation Systems, Types of Animation, Simulating Accelerations, Computer Animation Tools, Hardware, Software, Applications for Computer Animation

MULTIMEDIA: Structure, Introduction, Objectives, Concept of Hypertext and Hypermedia, Definition of Hypertext, Definition of Hypermedia, Understanding the Concept, Hypertext/media and Human Memory, Linking, Multimedia Application, What is Multimedia, Importance of Multimedia, Role in Education and Training, Multimedia Entertainment, Multimedia Business, Video Conferencing and Virtual Reality, Electronic encyclopedia, Graphics, What is Graphics, Types of Graphic Images, Graphic Files Compression Formats, Uses for GIF and JPEG Files, AudioandVideo,SoundaniAudio,AnalogSoundVsDigitalSound,AudioFileFormats,Image Capture Formats, Digital Video, Need for Video Compression, Video File Formats, Multimedia
Tools,BasicTools,TypesofBasicTools,AuthoringTools,TypesofAuthoringTools,Multimedia ToolFeatures

BCA-1.21 (Principle of Programming Language)

Book: Principle of Programming Language

By R. D Tennent (PHI Publication)

BCA-1.22 (Computer Organization)

HardwareConcepts

Introduction and Data Representation: The won Neumann Architecture, Computers:Then and Now, Data Representation, Instruction Execution. Digital

Logic Circuits: Boolean Algebra, logic Gates, Combinational circuits, Adders, Sequential circuits, Interconnection Structures.

Memory Organization: Memory System, characteristics Terms for various memory Devices,
RAM,External/AuxiliaryMemory,HighSpeedMemories,CacheMemory,AssociativeMemories.

input/outputOrganization:input/outputModule,input/outputTechniques,DirectMemory Accessinput/outputprocessors,Externalinterface.(DMA),

CPU Organization

Instruction Sets: Instruction set characteristics, Addressing schemes, Instruction Format Design.

Register Organization and Micro Operations: Basic Structure of the CPU, An Advanced Structure, Register Organization, Micro Operations, Instruction Execution and Micro Operations.

ALUandControlUnitOrganization: ALUOrganization,ControlUnitOrganization,Functional Requirements of a Control unit structure of Control unit, Hardwired Control unit.

Microprogrammed Control Unit : MCU, Wilkes Control, The Microinstruction, Types of Microinstructions, Control Memory Organization, Microinstruction formats, A simple structure of Control Unit, Micro instruction (sequencing, Execution), Machine Startup.

Microprocessor and Assembly Language Programming

Microprocessor Architecture: Microcomputer Architecture, CPU Components, CPU Registers, Instruction set, Addressing Modes, Introduction to Motorola 68000 Microprocessors.

Introduction to Assembly Language: Assembly Fundamentals, input/output Services, language Program Development tools. language Assembly

Assembly Language Programming (Part-I): Simple assembly Programs (Data transfer, shift operations), Programming with loops and comparisons, Arithmetic and String Operations. **AssemblyLanguageProgramming(Part–II):** Arrays,ModularProgramming,Interfacing Assembly language Routines to High level language programs,Interrupts

BCA-1.23 (Computer Oriented Numerical Techniques)

Computer Arithmetic and Solution of Non- Computer Arithmetic: Floating point Arithmetic and errors, Pitfalls in Computations (Loss of significant Digits, Instability of Algorithms).

Solution of Non-Linear Equations: Iterative Methods for Locating roots, chord Methods for finding roots (Regular-falsi Method, Newton Raphson Method, Second Method), Iterative Methods and convergence criteria.

Linear System of Algebraic Equations and Polynomial Interpolation:

Solution of Linear Algebraic Equations: Preliminaries, Direct Methods (Cramer's Rule, Gauss Elimination Method, Pivoting Strategies), Iterative Methods (The Jacobi Iterative Method, The Gass Seidal Iteration Method), Comparison of Direct and Iterative Methods.

Interpolation: Lagrange'sform,Interpolation,Polynomial,InverseInterpolation,GeneralError Term, Newtons Formula for forward, Backward and Divided. Differences, Interpolation at Equally spacedpoints.

BCA-E1 (Design and Analysis of Algorithm)

ELEMEMTARY ALGORITHMICS Structure : Introduction, Objectives, Example of an Algorithm, Problems and Instances, Characteristics of an Algorithm, Problems, AvailableTools & Algorithms, Building Blocks of Algorithms, Basic Actions & Instructions, Control Mechanisms and Control Structures, Procedure and Recursion, Outline of Algorithmic,Understanding the Problem, Analyzing the Problem, Capabilities of the Computer System, Approximate vs Exact Solution, Choice of Appropriate Data Structures, Choice of Appropriate Design Technology, Specification Methods for Algorithms, Proving Correctness of an Algorithm, Analyzingan Algorithm, Coding theAlgorithm

SOME PRE-REQUISITES AND ASYMPTOTIC BOUNDS Structure : Some Useful

Mathematical Functions & Notations, Functions & Notations, Modular Arithmetic/Mod Function, Mathematical Expectation, Principle of Mathematical Induction, Concept of Efficiency of anAlgorithm,WellKnownAsymptoticFunctions&Notations,EnumeratetheFiveWell-Known Approximation Functions and How These are Pronounced, The Notation O, The Notation ω, The θ Notation,The Notation o, The Notationw.

BASICSOFANALYSIS: Structure,Introduction,Objectives,AnalysisofAlgorithmsSimple Examples, Well Known Sorting Algorithms, Insertion Sort, Bubble Sort, Selection Sort, Shell Sort,HeapSort,DivideandConquerTechnique,MergeSort,QuickSort,ComparisonofSorting Algorithms, Best-Case and Worst-Case Analyses, Various Analyses of Algorithms, Worst-Case Analysis, Best-Case Analysis, Analysis of Non-Recursive Control Structures, Sequencing, For Construct, While and Repeat Constructs, Recursive Constructs, Solving Recurrences, Method of Forward Substitution, Solving Linear Second-Order Recurrences with Constant Coefficients, Average-Case and Amortized Analyses, Average-Case Analysis 3.8.2 Amortized Analysis **DIVIDE-AND-CONQUER:**Introduction,Objectives,GeneralIssuesinDivide-and-Conquer, Integer Multiplication, Binary Search, Sorting, Merge Sort, Quick Sort, Randomization Quicksort, Finding the Median, Matrix Multiplication, Exponentiation.

GRAPHALGORITHMS: Introduction,Objectives,Examples,NIM/MarienbadGame,FunctionForComputingWinningNodes,TraversingTrees,Depth-FirstSearch,Breadth-FirstSearch, AlgorithmofBreadthFirstSearch,ModifiedAlgorithm,Best-FirstSearch&MinimaxPrinciple, TopologicalSort

DYNAMIC PROGRAMMING: Introduction, Objectives, The Problem of Making Change, ThePrincipleofOptimality,ChainedMatrixMultiplication,Matrix'MultiplicationUsingDynamicProgramming.

GREEDY TECHNIQUES

Introduction, Objectives, Some Examples, Formalization of Greedy Technique, Function Greedy- Structure (GV: set): Set, Minimum Spinning Tree, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.

MODELS FOR EXECUTING ALGORITHMS-I: FA: Regular Expressions, IntroductiontoDefiningofLanguages,KleeneClosureDefinition,FormalDefinitionofRegular Expressions,AlgebraofRegularExpressions,RegularLanguages,FiniteAutomata,Definition, Another Method to DescribeFA.

MODELS FOR EXECUTING ALGORITHMS-II: PDFA & CFG: Formal Language & Grammar, Context Free Grammar (CFG), Pushdown Automata (PDA).

MODELS FOR EXECUTINGALGORITHMS-III:TM: PreludetoFormalDefinition, TuringMachine:FormalDefinitionandExamples,InstantaneousDescriptionandTransitionDiagram,InstantaneousDescription,TransitionDiagrams,SomeFormalDefinitions,Observations , Turing Machine as a Computer ofFunctions.

ALGORITHMICALLY UNSOLVABLE PROBLEMS: DecidableandUndecidableProblems,TheHaltingProblem,ReductiontoAnotherUndecidableProblem,UndecidabilityofPost Correspondence Problem, Undecidable Problems for Context Free Languages, Other UndecidableProblems.

COMPLEXITY OF ALGORITHMS: Notations for the Growth Rates of Functions, The Constant Factor in Complexity Measure, Asymptotic Considerations, Well Known Asymptotic Growth Rate Notations, The Notation O, The Notation ω, The Notation θ, The Notation o,

The Notation w), Classification of Problems, Reduction, NP-Complete and NP-Hard Problems, Establishing NP-Completeness of Problems.

BCA-E2 (Theory Of Computation)

Finite Automata and Formal Languages

Finite Automata and Languages: Regular Expressions (Introduction to Defining of languages,KleeneclosureDefinition,FormalDefinitionofRegular,Expressions,AlgebraofRegular Expressions), Regular languages, Finite automata, Mealy and MooreMachines.

Non-Deterministic Finite Automata: Equivalence of NFA and DFA, Pumping Lemma,Closure properties (Regular Languages and Finite Automata), Equivalence of Regular expression and FiniteAutomata.

Non-Deterministic Finite Automata: Context Free Grammar: Grammar and its classification,Chomsky,ClassificationforGrammar,Contextfreegrammar,pushdownAutomata(PDA), Non-ContextfreelanguagesPumpingLemmaforcontextfreeLanguages,EquivalenceofCFG andPDA.

Turing Machine and Recursive Functions

Turing Machine: Prelude to formal definition, Instantaneous Description and transition diagrams, Turing Machines as Computer of functions, Modular Construction of Complex turing machines, Symbol Writing machines, Right/Left head moving machines.

Turing Machine Miscellany: Extensions –cum-Equivalents of Turing Machine, Universal Turing Machine (UTM), Languages Accepted/Decided by TM, The diagonal language and the universal language, Chomsky Hierarchy.

Recursive Function Theory: Recursive Function Theory Recursive Definitions, Partial, Total and Constant Functions, Primitive Recursive Functions, Intuitive Introduction to primitive recursion,PrimitiveRecursionisweakTechnique,TheTechniquesofunboundedminimilization, Partial Recursion andu-Recursion.

Complexity of Computability

Computability/Decidability: Decidable and undecidable problems, The halting, problem, Reduction to another undecidable problem, undecidability of post correspondence problem, undecidable problems for context free languages.

Computability/Decidability: Complexity Notations for Growth rates of functions (The ConstantFactorinComplexityMeasure,Asymptoticconsiderations,wellknownAsymptoticgrowth rateNotations,TheNotationO,TheθNotation,TheNotationω,TheNotationW,classification of problems, Reduction, NP-Complete and NP-Hard Problems, Establishing NP-Completeness ofproblems.

Computability/Decidability: Applications Applications of Finite Automata, Applications of RegularExpressions,ApplicationofContextfreegrammars(DefinitionofC-typesmalllanguage, Definition of Part of HTML), ACM Code of Ethics and ProfessionalConduct.

BCA-E3 (Data Mining)

Book: Data mining: concepts and techniques

By Han, Jiawei, Micheline Kamber, and Jian Pei. (Morgan Caufmann Publication)

- Introduction
- DataPreprocessing
- DataWarehouse and OLAP Technology: AnOverview
- Data Cube Computation and Data Generalization
- Mining Frequent Patterns, Associations, andCorrelations
- Classification andPrediction
- ClusterAnalysis
- Mining Stream, Time-Series, and SequenceData
- Graph Mining, Social NetworkAnalysis, and Multirelational DataMining
- Mining Object, Spatial, Multimedia, Text, and Web Data
- Applications and Trends in DataMining

BCA-E4 (E-Commerce)

Electronic Commerce, By, Bharat Bhasker (TMHPublication)

- Introduction to ElectronicCommerce
- Electronic Commerce: BusinessModels
- Electronic Data InterchangeChapter
- Electronic Commerce: Architectural Framework
- electronicCommerce: NetworkInfrastructure
- Electronic Commerce: Information Distribution andMessaging
- Electronic Commerce: Information PublishingTechnology
- ElectronicCommerce:SecuringtheBusiness onInternet
- Electronic Commerce: SecuringNetwork Transaction
- Electronic PaymentSystems
- Electronic Commerce: Influence on Marketing
- ElectronicCommerce: SearchEnginesand DirectoryServices
- InternetAdvertising
- Mobile Commerce: Introduction, Framework, andModels
- Agents in Electronic Commerce Printed Pages

BCA-E5 (Object Oriented Analysis and Design)

INTRODUCTION TO OBJECT ORIENTED MODELING: Introduction, Object Oriented Modeling, Basic Philosophy of Object Orientation,Characteristics Object Oriented Modeling,Class and Objects, Links and Association, Generalization and Inheritance, An Object Model, Benefits of OO Modeling, Introduction to OOA& Design Tools.

OBJECT ORIENTED ANALYSIS: Introduction, Objectives, Object Oriented Analysis, Problem Statement: An Example, Differences between Structured Analysis and Object OrientedAnalysis,AnalysisTechniquest,ObjectModeling,DynamicModeling,FunctionalModeling, Adding Operations, Analysis Iteration, Refining the Ratio Analysis, Restating the Requirements

USING UML: Introduction, Objectives, UML: Introduction, Object Modeling Notations: Basic Concepts, Structural Diagram, Class Diagram, Object Diagram, Component Diagram, Deployment Diagram, Behavioral Diagrams, Use Case Diagram, Interaction Diagram, Activity Diagram, Statechart Diagram, Modeling with Objects, Summary.

SYSTEMDESIGN: Introduction,Objectives,SystemDesign:AnObjectOrientedApproach, BreakingintoSubsystems,Concurrencyidentification,ManagementofaDataStore,Controlling Events Between Objects, Handling BoundaryConditions

OBJECT DESIGN: Introduction, Objectives, Object Design for Processing, Object Design Steps,ChoosingAlgorithms,SelectingDataStructure,DefiningInternalClassesandOperations, Assigning Responsibility for Operation, Design Optimization, implementation of Control, State as Location within a Program, State Machine Engine, Control as Concurrent Tasks,Adjustment ofInheritance,RearrangingClassesandOperations,AbstractingOutCommonBehavior,Design ofAssociations,AnalyzingAssociationTraversal,One-wayAssociations,Two-wayAssociations **ADVANCE OBJECT DESIGN:** Introduction, Objectives, Control awl its Implementation, Control as a Stake within Program, Control as a State Machine Engine, Control as Concurrent Task, Inheritance Adjustment, Association: Design, Object Representation, Design Optimization, DesignDocumentation.

OBJECT MODELING: Introduction, Objectives, Advanced Modeling Concepts, Aggregation, Abstract Class Multiple Inheritance, Generalization and Specialisation, Meta Data and Keys, Integrity Constraints, An Object Model

DYNAMIC MODELING: Introduction, Objectives, Events, State and State Diagram, ElementsofaStateDiagram,AdvancedConceptsinDynamicModeling,ConcurrencyADynamic Model.

FUNCTIONAL MODELING: Introduction, Objectives, Functional Models, Data Flow Diagrams, Features of a DFD, Processes, Data Flows, Actors, Data Stores, Constraints, Control Flows,DesignFlawsinDFD,ASampleFunctionalModel,RelationofFunctionaltoObjectand DynamicModel

IMPLEMENTATION STRATEGIES: Introduction, Objectives, Implementation Associations, Unidirectional Implementations, Optional Associations, One-to-One Associations, AssociationswithMultiplicity'Many',Bi-directionalImplementations,One-to-OneandOptional Associations,One-to-ManyAssociations,ImmutableAssociations,ImplementingAssociationsas Classes, Implementing Constraints, Implementing State Charts,Persistency.

OBJECT MAPPING WITH DATABASE: Introduction, Objectives, Relational Database

SchemaforObjectModes,GeneralDBMSConcepts,RelationalDBMSConcepts,RDBMSLogical Data Structure, Object Classes to Database Tables, Extended Three Schema Architecture forObjectModels,TheuseofObjectIDs,MappingObjectClassestoTables,MappingAssociationstoTables,MappingBinaryAssociationstoTables,MappingMany-to-ManyAssociationto Tables,MappingTernaryAssociationstoTables,MappingGeneralizationstoTables,Interfacing toDatabases,

CASE STUDY: INVENTORY CONTROL SYSTEM: Introduction, Objectives, Class Diagram, Object Diagram, Generalization and Association Diagram, Collaboration Diagram, Activity Diagram and Events, Use Case Diagram, Deployment Diagram.

BCA-E6 (Java Programming)

Object Oriented Technology and Java

Object – Oriented Methodology-1: Paradigms of Programming languages, Evolution of 00 Methodology, Basic Concepts of OO Approach, Comparison of object oriented and procedure – oriented Approaches, Benefits of OOPS, Applications of OOPS.

Object – oriented Methodology -2: Classes and objects, Abstraction and Encapsulation, Inheritance, Method overriding and Polymorphism.

Java Language Basics: Introduction to Java, Primitive Data Type and Variables, Java Operators.

Expressions Statements and Arrays: Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump statements, Arrays.

Object oriented concepts and Exceptions Handling

Class and objects: Class Fundamentals, Introducing Methods, this Keyword, Using objects as Parameters, Method overloading, Garbage collection, the finalize ()Method.

Inheritance and Polymorphism: Inheritance Basics, Access, Multilevel, inheritance,Method overridingAbstractclasses,Polymorphism,FinalKeyword.

Packages and interfaces: Package, Accessibility of Packages, using Package members, Interfaces,Implementinginterfaces,interfaceandAbstractclasses,ExtendsandImplementstogether.

ExceptionsHandling: Exception,HandlingofException,TypesofExceptions,Throwing,Exceptions, writing Exceptionsubclasses.

Multithreading, I/O, and Strings Handling

Multithreaded Programming: Multithreading, The Main thread, JAVA Thread Model, Thread Priorities, Synchronization in JAVA, Inter thread Communication.

I/O In Java:I/O Basics, Streams and stream, Classes, the predefined streams, Reading from and writing to console, reading and writing files, the transient and volatile Modifiers, using instance of Native Methods.

Strings and Characters – : Fundamental of Characters and Strings, the String class, String operations, Data Conversion using value of () Methods, Strings Buffer and Methods.

Exploring Java I/O: Java I/O classes and interfaces, Stream classes, Text streams, Stream Tokenizer, Serialization, Buffered stream, print stream, Random Access file.

Graphics and user interfaces

Applets: The applet class, Applet architecture, An applet Skeleton: Initialization and Termination, Handling events, HTML Applet TAG.

Graphics and user interfaces: Graphics contests and Graphics objects, user interfacecomponents, Building user interface with AWT, Swing – Based GUI, Layouts and layouts and layout Manager,Container.

NetworkingFeatures: Socketoverview,Reservedpartsandproxyservers,InternetAddressing : Domain Naming Services (DNS), Java and The Net: URL, TCP/IP Sockets,Datagrams.

AdvanceJava: Javadatabaseconnectivity,anoverviewofRMIApplication,JavaServlets,Java Beans.

BCA-E7 (Network Programming)

Book: Unix Network Programming

By, W. Richard Stevens (Addison Wesley):

- Introduction
- The Transport Layer: TCP andUDP
- SocketsIntroduction
- Elementary TCPSockets
- TCP Client-ServerExample
- I/O Multiplexing: The select and poll Functions
- SocketOptions
- Elementary UDPSockets
- Elementary Name and Address Conversions
- IPv4 and IPv6Interoperability
- Advanced Name and Address Conversions
- Daemon Processes and inetdSuperserver
- AdvancedI/OFunctions
- Unix DomainProtocols
- NonblockingI/O
- ioctlOperations
- RoutingSockets
- Broadcasting
- Multicasting
- Advanced UDPSockets
- Out-of-BandData
- Signal-Driven I/O
- Threads
- IPOptions
- RawSockets
- DatalinkAccess
- Client-Server DesignAlternatives
- XTI: TCPClients
- XTI: Name and Address Functions
- XTI: TCPServers
- XTI: UDP Clients andServers
- Streams
- XTIOptions
- XTI: AdditionalFunctions

BCA-E8 (Mobile Computing)

Book: Mobile Computing

By, RajKamal (Oxford University Press):

- Mobile Communications: AnOverview
- Mobile Devices andSystems
- GSM and Other 2GArchitectures
- WirelessMediumaccessControl,CDMA, 3G and 4GCommunication
- Mobile IP networklayer
- Mobile TransportLayer
- Databases and MobileComputing
- Data Dissemination and Systems for Broadcasting
- DataSynchronizationinMobileComputingSystems
- Mobile Devices: Application Serversand Management
- Mobile Ad-hoc and Wireless Sensor Networks
- Mobile Wireless Short range Networks and MobileInternet
- Mobile Application Languages- XML, Java, J2ME, andJavaCard
- Mobile Application Development Platforms

BCA-E9 (Web Technology)

Book: Web Technology

By Jeffrey C. Jackson (Pearson Publication):

- Web Essentials: Clients, Servers, andCommunication
- Markup Languages: XHTML1.0
- Style Sheets:CSS
- Client-Side Programming: The JavaScriptTMLanguage
- Host Objects: Browsers and theDOM
- Server-Side Programming: JavaServlets
- Representing Web Data:XML
- Separating Programming and Presentation: JSPTMTechnology
- Web Services: JAX-RPC, WSDL, XML Schema, andSOAP

BCA-E10 (Client Server Technology)

Book: Client/Server Computing

By Patrick Smith (PHI Publication)

- The BusinessOpportunity
- Advantages of Client/ServerComputing
- Components of Client/Server Applications—TheClient
- Components of Client/Server Applications—TheServer
- Components of Client/Server Applications—Connectivity
- Client/Server Systems Development—Software
- Client/Server Systems Development—Hardware
- Client/Server Systems Development—Service andSupport
- Client/Server Systems Development—Training
- The Future of Client/Server Computing

BCA-E11 (Computer Architecture)

Book : Computer Architecture and Parallel Processing,

By Kai Hwang (Mcgraw-Hill Education)

- Introduction to parallelprocessing
- Memory and input-outputsubsystems
- Principles of pipelining and vector processing
- Pipeline computers and vectorization methods
- Structures and algorithms for array processors
- SIMD computers and performance enhancement
- Multiprocessor architecture and programming
- Multiprocessing control andalgorithms
- Example multiprocessorsystems
- DataflowcomputersandVLSIcomputations.

BCA-E12 (Microprocessor and its Applications)

Book: Microprocessor and its Applications

By R. Theagarajan (New Age International Publication)

- Architecture and Pin Details of the 8085 Microprocessor
- Programming theMicroprocessor-I
- Programming theMicroprocessor-II
- ProgrammingExercises
- Interfacing Input and OutputDevices
- Interrupts
- Memory in A Microprocessor Based System
- ProgrammablePeripheralInterface8255
- Keyboard and DisplayInterface-8279
- Serial CommunicationInterface-8251
- Priority InterruptController-8259
- Direct MemoryAccess-8257 Microprocessor Based Applications
- Other 8 Bit Microprocessors

3. Post Graduate Diploma in Computer Application (PGDCA)

Course Code and Detail

Semester	Paper No.	Course Code	Title of Course	Credits
First Semester	603	PGDCA-01	Discrete Mathematics	4
	604	PGDCA-02	Programming through C and Data Structure	4
	605	PGDCA-03	Computer Organization and Assembly Language Programming	4
	606	PGDCA-04	Lab-1 (Based on PGDCA 02)	4
	607	PGDCA-E1 OR PGDCA-E2	Computer Architecture OR Microprocessor and its Applications	4 OR 4
Credits of First Semester				**20**
Second Semester	608	PGDCA-05	Object oriented Programming with C++	4
	609	PGDCA-06	Database Management System	4
	610	PGDCA-07A	Computer Fundamental and Its Orgnization	4
	611	PGDCA-08	Lab-2 (Based on C++)	4
	612	PGDCA-E3 OR PGDCA-E4	Data Warehouse and Mining OR System Analysis and Design	4 OR 4
Credits of Second Semester				**20**
Total credit				**40**

PGDCA-01 (Discrete Mathematics)

Elementary Logic
Propositional Calculus: Propositions, Logical Connectives, Logical Equivalence, Logical Quantifiers.
Methods of Proof: What is a proof? Different Methods of proof and Direct proof, Indirect proofs), Principle of induction.
Boolean algebra and Circuits: Boolean Algebras, Logic circuits, Boolean Functions.
Basic Combinatorics
Sets, Relations and Functions: Introducing Sets, Operations on sets, Relations, Functions.
Combinatorics – An Introduction: Multiplication and addition Principles, Permutations (Permutation of objects Not Necessarily distinct, circular permutation), Combinations, Binomial Coefficients, Combinatorial probability.
Some More Counting Principles: Pigeonhole principle, Inclusion – Exclusion Principle, Applications of inclusion exclusion.
Partitions and Distributions: Integer partitions, Distributions, distinguishable objects into Distinguishable Containers, Distinguishable objects into Indistinguishable containers, Indistinguishable objects into Distinguishable Containers, Indistinguishable objects into Indistinguishable Containers.

PGDCA-02 (Problem Solving and Programming through C)

An Introduction to C

Problem solving: Problem solving Techniques, Design of Algorithms, Analysis of Algorithm efficiency, Analysis of Algorithm Complexity, Flowcharts,
Basics of C: History of C, Salient features of C, Structure of a C Program, Compiling a C Program, Link and Run the C Program, Diagrammatic Representation of Program execution process.
Variables and Constants: Character set, Identifiers of Keywords, Data types and storage, Data type Qualifiers, Variables, Declaring variables, Constants, Symbolic Constants.
Expressions and Operators: Assignment Statement, Arithmetic operators, Relational Operators, Logical operators, Comma and Conditional Operators, Type Cast operator, Size of Operator, C shorthand, priority of operators,
Control Statements, Arrays and Functions
Decision and Loop Control Statements: The if statement, the switch statement, the while loop, The do... while Loop, The for loop, The Nested Loops, The goto statement, The break statement, The continue statement.
Arrays: Array Declaration, Initialization, Subscript, Multidimensional Arrays.
Strings: Declaration and Initialization of Strings, Display of Strings, using different formatting Techniques, Arrays of Strings, Built in String functions and Applications
Functions: Definition of a function, Declaration of a function, Function prototypes, the return statement, Types of variables and storage classes, Types of function invoking, Call by value, Recursion.
Structures, Pointers and File Handling
Structures and Unions: Declaration of Structures, Accessing the Members of a structure, Initializing structures, Structures as function Arguments, Structures and Arrays, unions.
Pointers: Pointers and their characteristics, the address and Indirection operators, Pointer type Declaration and Assignment, Pointer Arithmetic, Passing Pointers to functions, Arrays and pointers, Arrays of Pointers, Pointers and strings.
The C Preprocessor: # define to implement Constants # define to create, functional Macros, conditional selection of Code using # if def. Predefined Names Defined by preprocessors, Macros vs. Functions.
Files: File Handling in C using File pointers, Input and output using file pointers, string Input/Output Functions, Formatted Input/Output Functions, Block Input/Output Functions.

PGDCA-03 (Computer Organization and Assembly Language Programming)

Introduction to Digital Circuits
The Basic Computer: The Von Neumann Architecture, Instruction Execution, Instruction Cycle, Computers: Then and Now. Data Representation Number Systems, Decimal Representation in Computers, Alphanumeric Representation, Data Representation for Computation. Principles of Logic Circuits I Logic Gates, Logic Circuits, Combinational circuit (Address, Decoders, Encoders, ROM) Principles of Logic Circuits – II Sequential Circuits (Definition) Flip Flops (Basic Flip-Flops, Excitation Tables, Master slave Flip-Flop, Edge-Triggered Flip-Flops), Sequential circuit Design (Registers, Counters Asynchronous Counters, synchronous counters, RAM) Design of a sample counter.
Basic Computer Organization
The Memory System: The Memory Hierarchy RAM, ROM, DRAM, FLASH Memory Secondary Memory and characteristics, Raid and its Levels, The concepts of High speed Memories, virtual memory, SIMM, DIMM. The input /Output System Input/output Devices, The input/output Interface, The Device Controllers and its structure, Device Drivers, Input – Output Techniques, Input/Output Processors.
External Communication Interfaces
Secondary Storage Techniques: Secondary Storage Systems, Hard Drives, Removable Storage options. The I/O Technology: Keyboard, Mouse, Video Cards, Monitors (Cathode

Ray Tubes, DPI, Interlacing, Bandwidth, Liquid Crystal Displays, Digital Camera, Sound Cards, Printers, Modems, Scanners, Power Supply. The Central Processing Unit Instruction Set Architecture Instruction set characteristics, Instruction set Design Considerations, Addressing Scheme (Immediate Addressing, Direct Addressing, Indirect Addressing, Register Addressing, Register Indirect Addressing, Indexed Addressing Scheme, Base Register Addressing, Relative Addressing Scheme, Stack Addressing), Instruction set and Format Design issues (MIPS 2000, Instruction Format). Registers Micro-Operations and Instruction Execution Basic CPU Structure, Register Organization, General Registers in a processor, Micro-operation Concepts,
Instruction Executions, Instruction Pipelining
ALU Organization: ALU Organization, Arithmetic Processors,
The Control Unit: The Control unit, the Hardwired Control, Wilkes Control, The Microprogrammed Control, The Micro instructions, The Execution of Micro Program Reduced Instruction set Computer Architecture Instruction to RISC, RISC Architecture, The use of Large register file, Comments on RISC, RISC pipelining.
Assembly Language Programming
Microprocessor Architecture: Microcomputer Architectures, Structure of 8086 CPU, Register set of 8086, Instruction set of 8086, Addressing modes.
Introduction to Assembly Language Programming: The Need and use of the Assembly Language, Assembly program, Execution, An Assembly program and its components, Input output in Assembly program, The types of Assembly programs.
Assembly language programming (Part-I): Simple Assembly programs, Programming with Loops and Comparisons, programming for Arithmetic and String operations.
Assembly language programming (Part-II): Use of Arrays in Assembly, Modular Programming, Interfacing, Assembly language Routines to High level language programs, Interrupts, Device Drivers in Assembly.
Sequential vs. Random Access Files, Positioning the file Pointer, the buffered I/O – The UNIX like file routines.

PGDCA-E1 (Computer Architecture)

Book: Computer Architecture and Parallel Processing,
By Kai Hwang (McGraw-Hill Education) Introduction to parallel processing

- Memory and input-output subsystems
- Principles of pipelining and vector processing
- Pipeline computers and vectorization methods
- Structures and algorithms for array processors
- SIMD computers and performance enhancement
- Multiprocessor architecture and programming
- Multiprocessing control and algorithms
- Example multiprocessor systems
- Data flow computers and VLSI computations.

PGDCA-E2 (Microprocessor and its Applications)

Book: Microprocessor and its Applications
By R. Theagarajan (New Age International Publication) Architecture and Pin Details of the

8085 Microprocessor

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- Programming the Microprocessor-I
- Programming the Microprocessor-II
- Programming Exercises
- Interfacing Input and Output Devices
- Interrupts
- Memory in A Microprocessor Based System
- Programmable Peripheral Interface 8255
- Keyboard and Display Interface-8279
- Serial Communication Interface-8251
- Priority Interrupt Controller-8259
- Direct Memory Access-8257.
- Microprocessor Based Applications
- Other 8 Bit Microprocessors
- 16 Bit Microprocessors

PGDCA-05 (C++ and Object Oriented Programming)

An Introduction to Object Oriented Programming

Object Oriented Programming: OOP Paradigm, the soul of OOP, OOP characteristics, Advantages of OOP, Applications of object Oriented Programming (System software, DBMS, Applications of OODBMS, Advantages and Disadvantages of OODBMS), The Object Orientation, OO Languages, Advantages of C++.

Object Oriented Programming System: What is OOPS? Class, Inheritance, Abstraction (Procedural language, Object-oriented language), Mechanisms of Abstraction, Encapsulation and information hiding, Polymorphism, overloading,

Advanced concepts: Dynamism (Dynamic Typing, Dynamic Binding, Late Binding, Dynamic Loading, Structuring programs, Reusability, Organizing Object-oriented Projects (Large scale designing, Separate Interface and Implementation, Modularizing, Simple Interface, Dynamic decisions, Inheritance of Generic Code, Reuse of tested code.

Introduction to Object Oriented Languages: Objective-C, Features of objective-C, Python, Features of Python, C # (C SHAR), Features of C#, Eiffel, Modula-3, Features of modula-3, Small talk, object REXX, Java, Features of Java(Object Oriented, Distributed, Interpreted, Robust, Secure, Architecturally neutral, Portable High performance, Dynamic) , Beta various object oriented programming languages Comparative chart.

An Introduction to Unifted Modelling Language (UML): UML (Goals, History, use), Definition, UML Diagrams (Use case, class, interaction diagrams), State diagrams, Activity Diagrams, Physical diagrams.

C++ -An Introduction

Overview of C++: Programming Paradigms (Procedural Programming, Modular Programming, Data Abstraction, Object Oriented Programming), Concepts of C++ functions and files. **Classes and Objects:** Definition and Declaration of a class, Scope Resolution Operation, Private and Public member functions, Creating Objects, Accessing class data members and member functions, Arrays of objects, Objects as Function Arguments.

Operator overloading: Operator Functions, large objects, Assignment and initialization, Function Call, Increment, Decrement Operator, Friends.

Inheritance-Extending classes: Concept of inheritance, Base class and Derived class, visibility Modes, Single inheritance Multiple Inheritance, Nested classes, virtual functions.

Streams and Templates: Output, Input, Files Exception, handling, and streams, Templates,

PGDCA-06(Database Management System)

The Database Management System Concepts

Basic Concepts: Need for a database Management System, The logical DBMS Architecture, Physical DBMS Architecture, Commercial Database Architecture, Data Models.

Relational AND E-R Models: The Relational Model, Relational Constraints, Relational Algebra, Entity Relationship (ER) Model, E-R diagram, Conversion of ER diagram to Relational database.

Database integrity and Normalization: Relational Database integrity, Redundancy and Associated problems, Single – valued dependencies, single valued Normalization, desirable properties of decomposition, Rules of Data Normalization.

File organization in DBMS: Physical Database Design issues, storage of database on Hard disks, file organization and its types, types of indexes, Index and tree structure, Multi-key file organization, Importance of file organization on database.

Structured Query language and transaction Management

The Structured Query language: SQL Data Definition language, DML, Data control, Database objects: Views sequences, Indexes and synonyms, table Handling, Nested Queries.

Transactions and Concurrency Management: The transactions, the concurrent transactions, the locking protocol, Deadlock and its prevention, optimistic concurrency control.

Database Recovery and Security: Recovery, Recovery Techniques, Security and Integrity, Authorization.

Distributed and Client Server Databases: Need for Distribution Database Systems, Structure of distributed Database, Advantages and Disadvantages of DDBMS, Design of Distributed database, client server Database.

Application Development: Development of A Hospital Management System, Needs to Develop HMS, Creating a database for HMS, Developing Front and forms, Reports, using Queries and Record set.

Study Centre Management System: A Case Study

Introduction: Introduction to Software, Software Development process: Analysis, System Designing, Software Development, Testing and Maintenance.

PGDCA-07A (Computer Fundamentals and its Organization)

Computer Basks: Algorithms. A Simple Model of a Computer, Characteristics of Computers. Problem-solving Using Computers**.**

Data Representation: Representation of Characters in computers, Representation of Integers, Representation of Fractions. Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes. Input & Output Devices. Description of Computer Input Units, Other Input methods. Computer Output Units Printers. Plotters)

Computer Memory: Memory Cell. Memory Organization, Read Only Memory, Serial Access Memory. Physical Devices Used to Construct Memories. Magnetic Hard Disk, floppy Disk Drives. Compact Disk Read Only Memory, Magnetic Tape Drives.

Processor: Structure of Instructions, Description of a Processor. Machine Language and Instruction set Processors used in desktops and lap tops. Specification of a desktop and Lap top computer currently available in the market (Specifications of Processor. motherboard &chipset, memory. interface & capacity of hard disk & DVD drives, 1/0 ports).

Computer Architecture: Interconnection of Units. Processor to Memory communication. LO to Processor Communication. Interrupt Structures, Multiprogramming. Processor Features, Reduced Instruction Set Computers (RISC), Virtual merman.

Software Concepts: Types of Software. Programming Languages. Software (Its Nature &

Qualities). Programming Languages. Operating Systems: History and Evolution. Main functions of OS Multitasking, Multiprocessing, Time Sharing. Real Time Operating System with Examples

PGDCA-E3 (Data Warehouse and Mining)

Book: Data mining: concepts and techniques
By Han, Jiawei, Micheline Kamber, and Jian Pei. (Morgan Caufmann Publication)

- Introduction
- Data Preprocessing
- Data Warehouse and OLAP Technology: An Overview
- Data Cube Computation and Data Generalization
- Mining Frequent Patterns, Associations, and Correlations
- Classification and Prediction
- Cluster Analysis
- Mining Stream, Time-Series, and Sequence Data
- Graph Mining, Social Network Analysis, and Multirelational Data Mining
- Mining Object, Spatial, Multimedia, Text, and Web Data
- Applications and Trends in Data Mining

PGDCA-E4 (Systems Analysis and Design)

Introduction to Systems Development
Introduction to SAD: Fundamentals of Systems, Real Time Systems, Distributed Systems, Development of a successful System, various Approaches for Development of information systems (Model Driven, Accelerated approach, Joint Application Development.
System Analyst – A profession: Needs Systems Analysts, users, Analysts in various functional Areas (Systems Analyst in Traditional Business, Systems Analyst in Modern Business), Role of a Systems Analyst, Duties of a Systems Analysts, Qualification of a Systems Analyst. **Process of System Development:** Systems Development Life Cycle, Phases of SDLC, Products of SDLC Phrases, Approaches to Development (Prototyping, Joint Application Design, Participatory Design), Case Study (College Library).
Introduction to documentation of Systems: Concepts and process of Documentation, Types of Documentation, Different Standards for Documentation, Documentation and Quality of Software.
Planning and Designing Systems
Process of Systems Planning: Fact Finding Techniques, Need for fact finding, Issues involved in Feasibility Study, Cost Benefit Analysis, Preparing Schedule, Gathering Requirements of System.
Modular and Structured Design: Design principles (Top Down Design, Bottom up Design), Structure Charts, Modularity (Goals of Design, Coupling, Cohesion).
System Design and Modeling: Logical and Physical Design, Process Modelling, Data Modeling (ER Diagram), Process specification Tools (Decision Tables, Decision Trees, Structured English Notation), Data Dictionary.
More Design Issues and Case Tools
Forms and Reports Design: Forms, Reports, Differences between forms and Reports, Process of Designing Forms and Reports, Deliverables and outcomes, Design specifications, Types of Information, General formatting Guidelines, Guidelines for Displaying Contents, Criteria for form Design, Criteria for Report Design.

Physical file Design and Database Design: Introduction to Database Design, Design of Database fields, Design of Physical Records, Design of Physical Files, Design of Database, Case Study (Employee database),

Case Tools for Systems Development: Use of Case Tools by Organizations, Advantages and Disadvantages of CASE Tools, Components of CASE, Types of CASE tools, classification of CASE Tools, Reverse and Forward Engineering, Visual and Emerging Case tools.

Implementation and Security of Systems & MIS

Implementation and Maintenance of Systems: Implementation of Systems, Maintenance of Systems.

Audit and Security of Computer Systems: Definition of Audit, Audit of Transactions on computer, Computer Assisted Audit Techniques, Computer System and Security Issues, Concurrent Audit Techniques.

Management Information Systems: Role of MIS in an organization, Different kinds of information systems, Expert Systems.

4. Basic Diploma in Computer (DIC)

Course Code and Details

Semester	Paper No.	Course Code	Title of the Course	Credits
1st Semester.	764	DIC-01	Personal Computer and PC Software	8
	765	DIC-02	Information Technology	8
Credits of 1st Sem.				16
2nd Semester	766	DIC-03	Business System	8
	767	DIC-04	Programming and Problem Solving Using 'C' Language	8
	768	DIC-05 (L)	Lab Based on DIC-04	8
Credits of 2nd Sem.				24
Total Credits				40

DIC-01 (Personal Computer and PC Software)

Problem Solving Techniques:

Classical Problems and Puzzles: The Konigsberg Bridges, Cannibals and missionaries, De-canting problems, decision trees, classical Conundrums.

The Higher Arithmetic {I: Prime numbers, Gaps between primes, The sieve of Eratosthenes, Euler's proof of the in nitude of the primes.

The Higher Arithmetic-II: Hungarian problems, An Archimedean Result, the theorem

of Pythagoras and irrational numbers, The division of a plane by straight line, Minimum Span-ning circles.

General Methods: Experimentation, five sailors, A monkey and Many coconuts, the twelve coins problem, Poin care on the Psychology of invention.

Introduction to MS-Excel:

Introduction to Excel: Excel Basics, worksheets, within workbook, Enter and Edit data in Excel, Range Names, Navigate worksheet, search and replace DATA, Rearrange cell contents, save and Protect workbook, Exit Excel.

Formatting and Printing worksheet: Page set up, Column width and Row Height, Fonts, Alignment, Numbers, Autoformat, Format Painter.

Customising Workplace: Excel windows, workplace, Displays, worksheet, at di erent Mag-ni cations, using custom controls using dialaog Boxes.

Calculations in Worksheet: Formula basics, Functions.

Charts: Chart components, chart types, chart wizard, Resi- zing and moving charts, editing charts, use charts for analysis, printing charts.

Database Power of Excel: Database Concepts, creating, database, Adding Records, Deleting Records, Editing Records Sorting a database, Filtlering a database, Data tables , Pivot table. Focus on analysis: Goal seek, Salver, Scenario Manager. Automating Worksheet: Using Macros, using Templates.

Internet Awareness :

Internet :An Overview: DNS, working of Internet, Tools and Services on Internet, Browsing the Internet, Gopher.

Internet Tools: E-Mail, PTP & Telnet: E-Mail, E-Mail, Addressing, The Components of E-Mail, Address Book, Troubleshooting in E-Mail, Interesting E- Mail Addresses, Mail Re ec-tors, Mailing Lists and list servers, FTP and Telnet, Interesting Sites.

Browsers: Netscape Navigator, Search Engines, NCSA, Mosaic, Microsoft, Internet Explorer.

Visiting web sites: Downloading.

DIC-02 (Information Technology)

Information Technology: Computer Basics, Input Units and Devices, Output units, and Devices, Computer Memories, WINDOWS, Documentation using MS word.

Object Oriented Programming with C++: OOP using C++, Data types and variables, operators, Expressions and Statement, Flow of Control of Program, Looping, Functions, Arrays and Strings, Structure, Pointer, Classes and Constructors / Destructors, Operator overloading, Derived Classes and inheritance, Polymorphism and virtual functions.

DIC-03 (Business System)

Introduction to Business Data Processing: Business systems, Management Functions, Levels of management, Information requirements for Planning, Coordination and Control for various levels in Business, Industry and Government, large volumes of data and data handling

implicit, Identi cation of relevant data, classi cation of data elements by function and by source, Primary and Secondary, Historical data for reference and analysis, Need for ensuring accurate, reliable and timely processing of data, Basic tasks in Business data processing, data origination, Capture, sorting, merging, calculating, Summarising, managing output-results, storing and re-trieving transmission, both interim and nal Concept of Files: Master and transaction les, le organization, sequential, relative and indexed, Modes of processing: batch Online, real time.

Principles and Techniques of Programming: Introduction to programming: Programme de nition, Life cycle, characteristics of a good program, data handling (ow charts, pseudocodes) Report production and le updation, Simple report generation, overview of Control break pro-cedure for report production.

Operation on les: Input, Output and I/O; processing a le, multiple handling le updation, sequential le updation, random le update.

Programming Paradigms: Unstructured Programming, Structured Programming, procedu-ral programming, modular Programming Program design, Top down and bottom up design, program documentation.

Business Applications: Design, analysis and development of computerized nancial account-ing, Computerized Inventory Control, Computerized Payroll, Computerized Invoicing applica-tion.

DIC-04 (Programming and Problem Solving Using 'C'

Introduction:

Introductory: An Overview of C, Escape sequences, Getting A "feel" for C.

Data types in 'C': Variables of type (out char, oat, double,); Enumerated type, the typed-of statement, identi ers.

Operators and Expressions: Elementary Arithmetic operations and operators, Expressions, L values and P values, Promotion and Demotion of variable types : The cast operator , print f() functions.

Decision Structures in 'C': Boolean operators and Expressions The goto statement, the if(), Statement, the if () { else statement.

Control structures-I: The do { while ( ) and while Loops, the Comma Operator, the transfer of Central from within loops, Ternary, operator, The Switch case default statement.

Programming in C :

Control Structures II: The for (;;) loop, uni-dimensional Arrays, The sizeof operator, storage classless and scope.

Pointers and arrays: Pointer variables and pointer Arithmetic, Pointers Arrays and the sub-script operator, A Digression on Scan f(), Multidiensional Arrays.

Functions: Function Prototypes and Declarations, Functions and Scope, Pointers as Function Arguments, String Functions, Multi Dimentional Arrays as Function Arguments.

Functions { II: Recursive functions, Macros, Conditional Compilation, Macros with Param-eters, Command, Line Arguments, Variable length Argument lists, Complicated Declarations, Dynamic Memory Allocation.

Files and Structs, Unions and Bit-Fields: Files, structs, the DOT Operator, structs and

les: fseek (), structs and Function and Unions, The Bitwise operators.

Data Structures:

Introduction to Data Structures : Array: Programme Analysis, Arrays, Array Declara-tion, Storage of arrays in Main memory, sporse arrays.

Lists: Basic Terminology, Static Implementation of lists, Pointer implementation of lists, Doubly linked lists, circular linked list, Storage Allocation, Storage Pools, Garbage Collection, Fragmen-tation, Relocation and Compaction.

Stacks and Queues: De ning stack and Queue, stck oerations and implementations, stack

Applications, Queues: Operations, and implementation, Queue Application, priority Queues. Graphs: De ning graph, Basic, Terminology, Graph Representation, Graph traversal (DFS, BFS), shortest path problem, Minimum spanning tree.

Trees and File Organisation:

Trees: Basic Terminology, Binary, trees, Traversals of a Binary, tree Binary search trees (BST). AVL-Tree and B-Tree: Height Balanced tree, Building Height Balanced tree, B- Tree, B-Tree of order 5.

Files: Terminology, File organization, sequential les, Direct, File organization, Indexed Se-quential le organization.

Searching and Sorting Techniques:

Searching Techniques: Sequential search, Binary Search.

Sorting Techniques-I: Internal Sort (Insertion Sort, Bubble Sort, Quick Sort, Way Merge Sort Heap Sort), Sortings on Several keys.

Sorting Techniques-II: Data Storage (Magnetic Tapes, Disks), sorting with Disks, K-way merging, Bu ering, Sorting, with tapes.

5. Diploma in Hardware Technology (DIHT)

Course Code and Details

Semester	Paper No.	Course Code	Title of the Course	Credits
1st Semester	776	DIHT-01	Fundamental of Computer and IT	8
	777	DIHT-02	Basic Electronics Devices and PC Software	8
Credits of 1st Semester				16
2nd Semester	778	DIHT-03	Computer Interfacing Devices	8
	779	DIHT-04	Computer Network and Security Maintenance	8
	780	DIHT-05 (L)	Lab Based on DIHT-01	8
Credits of 2nd Semester				24
Total Credits				40

DIHT-01 (Fundamentals of Computer and IT)

Introduction to Computer:
Computer Basics: Characteristics of Computer, Application of Computer.

Basic Components of Computer: Components of Computer, CPU, Memory, Keyboard, Mouse, VDU, Printers, RAM, ROM, CD-ROM, Hardware and Software.

Classification of Computer: Analog, Digital Hybrid Computer, General purpose, Special

Computer, Micro, Mini, Mainframe Computer, Super Computers, Desktop, Laptop,

Palmtop. **Representation of Data/information:** Information Technology, Data, information, Data processing, Characteristics of information, Scope of information, Basic data types.
Basics of Digital Electronics:
Digital Number System : Number System, Decimal System, Binary System, Octal System, Hexadecimal System, Code Conversion, Binary Coes, 8421 Code/BCD Code, 2421 Code, 5211 Code, Reflective Code, Sequential Codes, Non weighted codes, Gray Code, Error Detecting and Correction Codes, ASCII Code, EBCDIC Code, Floating point Numbers.
Digital Logic Gates: Gate. AND, OR, NOT, BUF, NAND, NOR, XOR, XNOR, Universal Gates.

Simplification of Boolean Functions: Karnaugh Maps, Minimization Technique upto 5-variable K-map, Inverse function.

Digital Combinational Circuit: Decoders, Encoders, Priority Encoder, Multiplexer, De-Multiplexer, Boolean Function, Implementation, Mux-Demux Application Example.
Sequential Circuits: Concept of Sequential logic, Asynchronous sequential circuit, Synchronous sequential circuits, Latches and Flip- Flops, RS, JK Latch, JK Master Slave Flip-Flop, Sequential circuits Design.
Memory System:
Introduction of Memories System: Memory Cell, Block diagram of Memory Cell, Memory locations and address, Memory operations, Memory hierarchy.

Main Memories: Semi-conductor RAM Memories, Static Memories, Dynamic RAM,

Performance Measure, SDRAM, ROM, Flash Memory, Speed, size and cast of memory.
Secondary Storage Memories: Magnetic Disk Memory, Floppy Disk Memory, RAID Disk Arrays Optical Disk.

High Speed and Virtual Memories: Cache Memories, Performance Consideration, Virtual Memories, Demand Paging.

Microprocessor:
Introduction to Microprocessor: Evolution, Introduction and Characteristics of Microprocessor Systems, Microprocessors Register Structure, ALU, Timing and Control Unit, CPU, Memory, Input/Output, Hardware, Software and firmware, Machine , Language, Assembly language, High level language.
8085 Microprocessor: Architecture, Software Model, Functions and operations, Instruction and Data format, Opcode format, Data transfer Instructions, Arithmetic instructions, Addressing Mode of 8085.
16-Bit Microprocessor: Architecture, Bus interface unit, Execution Unit, Register Organization, Memory Segmentation, Software Model of 8086, 8088 Microprocessor.
Advanced Microprocessors and Micro Controllers: Introduction to 32 bit and 64 bit Microprocessors, The 80386. Microprocessor, The 80486 Microprocessor, Pentium Processor, Motorola 68XXX Processors, Microcontrollers

DIHT-02 (Basic Electronics Devices and PC Software)

System Software:
Software: Software, Classification of Software, Types of Software, Software Packages, Evaluating Packages, Selection Process, Market of Packaged software.
Operating System Techniques: Multiprogramming, Multiprocessing, Multitasking, Batch Processing Operating Systems, User interface.

Linker and Loader: Linker, Loader, Address binding, Compiler Drivers, Basic loading, with relocation, Position – Independent Code, Bootstrap loading, Dynamic Linking, Dynamic loading.
Programming languages and its types: Classification of Programming Language, procedural language, functional language, Logic oriented languages, object-oriented languages, Parallel Processing Languages, Program Structure, Conditional Structures, Looping Structures.
Operating System:
Concept of Operating System: Services of O.S., Functions of O.S., Characteristics of an operating system, Advantages of an O.S., Types of O.S., Operating System Techniques.
Disk Operating System: DOS 1-2, Directory, Main operations on Files, DOS Commands.
Windows: Windows 95, The windows 95, Desktop, Menus, working with Program and Document windows, Dialog Boxes, Control Panel, About help, Difference between Windows 95 and Windows 98.
System files: Booting sequence, Batch File, Executable file, Config. File, Com file
Windows XP:
Features of windows XP: About Windows XP, System requirements for windows XP, Features new to windows XP.

Files and Folders: Files and Folders, Control Panel, Windows Registry, DLL.

Windows Installation: Installation of Windows XP, Process, Description of Universal plug and play features in windows XP.
Setting in Windows XP: Device Manager, Set up your Screen Saver, User Account Passwords.

LINUX Operating System:
Features of LINUX: History, Features, Structure of Linux, Differences between Linux and UNIX, Difference between Linux and MS Windows, Hardware requirements, space requirements and Coexistence.
Directories and File Systems: File System, Permissions, Terminals, Common Commands, The mount and umount Command, File Compression, backing up and restoring.
Linux Installation: Installation Overview, Installation in Detail, Repartitioning your DOS/Windows drives, Partition basics, choosing console or X installation, Post- Partition Steps, Installing software Packages.
Booting Process in Linux: First time log-in, shutting down/rebooting, Booting in Linux, system startup, Init, Configuring Boot Loaders, virtual consoles.

DIHT-03 (Computer Interfacing Devices)

Introduction to Motherhood:
Basics of Motherboard: Installation of CPU, PC Board or Motherboard, CPU Speed, Microcode Efficiency and Pipelines, Word Size, Data path, Internal Cache memory, Slots and sockets.
Concept of various CPU and PC Buses: CPU Chips, concept of Bus, AT Bus (ISA), PS/2 Bus, EISA, Local Bus, Latest Bus PCI, AGP, PC Card (Portable Bus), PC Card Features, Mini PCI, Card Bus.
Introduction of various controllers: System controllers, Video Adapter, Floppy Disk Controller and Disk Drivers, IDE Controller, SCSI Host Adapter, Serial Port, USB, Firewire or IEEE 1394.
Understanding the Speed and Role of Connectors: System clock/ Calendar and CMOS chip, Location and Identification Components.

PC Assembly:
Requirements before PC Assembly: PC Repair tools, Avoidable tools, General PC Disassembly Advice.

Upgradation of Motherboard: Diagram, Remover the board Correctly, Remove the Drivers, Remove the Power supply, Remove the CPU and RAM, upgradation of Computer.
Installation and Configuration of New Motherboard: Installation of New Circuit board, Application of plug and play, Configuration of New Circuit Boards, software, Switch setup Ad- vice, Avoiding Configuration Conflicts, Understanding I/O Addresses, DMA, RAM, and ROM Addresses.
Maintenance of Motherboard: Resolving Drive conflicts, PNP, DIP switches, Finding the Bad Boards, Failure of Boards.

PC Memory:
Understanding the PC Memory: Installing RAM, Memory sizes, speeds and shapes, Mem- ory Modules, Motherboard Chipsets, Dynamic RAM, SDRAM, FPM and EDO DRAM, DDRS- DRAM, SLDRAM.
Managing the PC Memory: Memory Maintenance in the DOS world, Device Drivers, Command Shell, Video RAM, Flash RAM, Buffers and Frames, Extended Memory, EMS, LIM, PAGED, Expanded Memory.

Testing and Trouble-Shootings of Memory: Power Drops and Surges, Mismatched chip speeds and Manufactured, Memory tests.

Assembling and maintenance of Power supply: Components of the Power Supply, Form Factor connectors, Power Problems, Devices to Remedy Electrical Problems.

Working with Hard Disk Drive:
Basics of Hard Disk Drive: Magnetic Recording, Data Recording Method, Data Encoding Method, NRZ, Hard Disk Drive.

Interfacing Devices of Hard Disk Drive: ST-506/412, ESDI, ATA IDE, ATA Cable/Connector, SCST, Logical working of Hard disk Drive.

Installation and Configuration of HDD: Software setup, setup configuration, Low level formatting , HD test, Non-destructive Formatters, surface Analysis, Defect free Drivers, Drive Partitioning, FDISK.

Maintenance and trouble-shooting of HDD: Un-erasing a file, undeleting partially over-written file, unformatting Hard disks, Backing up and Restoring MBR, with DEBUG, Hardware Failure, Check stepper Motor, Check the Controller, Disk Media Error, check drive cables, Check Drive is spinning.

DIHT-04 (Computer Network and Security Maintenance)

Network Basics:
Introduction: Networking, Need, Advantages and Types.

Network Topologies: Terminology, Bus Topology, Ring Topology, Star topology, Hybrid Network Topology.
Network Protocols, Hardware and Software: Networking Protocols, Standards, Network Hardware, Internetwork and Network software.

Network Design and Configuration: Network components/Configurations, Directions, Procedure.

Transmission and Network Elements:
Signal Transmission: Terminology, Data transmission, Connection- oriented and Connection-less Transmissions, Synchronous and Asynchronous Transmission, Transmission Media, Analog Signals.
OSI Reference Model: Terminology, the OSI Model.

Ethernet: Terminology, Ethernet origins, Ethernet configuration, Ethernet communication, Ethernet collision, Ethernet frames, Frames types.
Network and Devices: Token Ring Architecture, Fiber Distributed Data Interface (FDDI), Token Ring Case Study, ATM, Connectivity Devices, Transceivers, Repeaters, Hubs, Media Dependent Adapter, Internetworking Devices, Gateways.
Internet Connectivity:
The Internet: Usage, Architecture of the Internet, IP, TCP/IP Reference Model, Unified Networks.
The Internet Services: E-Mail, Remote login, ISPs, Message transfer, File Transfer Protocol (FTP), Telnet, Leased line.
ISDN and Bridge-Routers: ISDN, NFAS, Advantages of ISDN, Interfaces, Physical layer Protocols, 2BIQ, Link layer Protocols, Bridge- Routers.
ISP Connectivity: Internet service Provider (ISP), ISP Connection Options, DSL, Cable Modem, DSL, SHDSL, Broadband Access, Dynamic DNS.
Installation and Administration:
Network Operating Systems: Terminology, Network Operating Systems, Windows for Workgroups/Windows 95/Windows NT Server, UNIX/LINUX, MAC OS Apple Share.
World Wide Web and client server Model: www, architecture of www.

Network Planning and Management: Quality of Service Analysis, Propagation Delay,

Response Time, Throughput, Workload, Network, Maintenance and Management, Network Management tools.

Network Security: Cryptography, Encryption, Authentication, Firewalls, Proxy Servers, Virtual Private Networks (VPNs).

6. Diploma in Computer Office Management (DCOM)

Course Code and Details

Semester	Paper No.	Course Code	Title of the Course	Credits
1st Semester	770	DCOM-01	Office Environment and Data Processing	8
	771	DCOM-02	Information Processing in Office	8
Credit of 1st Semester				16
2nd Semester	772	DCOM-03	Office Productivity Tools	8
	773	DCOM-04	Computer Application in Office	8
	774	DCOM-05	Modern Office	8
Credit of 2nd Semester				24
Total Credits				40

DCOM-01 (Office Environment and Data Processing)

Office Environment:

Organization of a typical office: Concept of an office, The concept of an organisation.

Document flow Management in an Office: Importance of document as means of Communication information inputs for the documents, Management of inward mail Movement, information processing, Document preparation, Types of Documents, Channels of document flow, Handling of outward mail, Document storage and Retrieval.

Management and Human relations in Office: Management in an office, Management styles, Effective Leadership, Human relations, Methods of working, integration of Methods through Administrative Management.

Office Management Information System: Need for Management Information System, MIS, MIS in Government.

State of art in using Modern Technology in Office: Need for Office Automation, Office Automation, Automation in Government Offices, Computer Aided Office Monitoring of Development Programmes, A New emerging technology – Optical information Technology.

Convergence of Technologies:

Office Automation: Today's Office, Office Automation Explosion, Advantages, Office Automation functions.

Office Automation Technology: Document Generation, Document Distribution, Archival, Impact of Personal Computers.

Office Automation Technology-Workstations: Workstation Architecture, Hardware Technologies, Workstation, Software, input technologies, Work station graphics, printer technologies, Storage Technologies.

Communication and Convergence of Technologies: Communication Technologies, Emerging Services, Software Trends.

Introduction to Computer:

History of Computers: About to ENIAC, Computer generations, Languages, Software and Applications, Computers in India.

Computer Hardware-Software Components: Impact of Technology, Components of a Computer, Computer Hardware, Computer Software.

Introduction to Personal Computer: Micro Computer and its operating systems, The personal Computer and its Environment, Disk operating system Commands, Printer.

Introduction to Data Processing: Systems

Analysis and Design: Steps in System Analysis, Systems Design Concepts, Design of Systems Components Systems Documentation, System Design Methodologies.

Algorithm and Problem Solving: Algorithm, Different Aspects of problem solving, Computer animation and Algorithm, Debugging of a program, Verification of a Program.

Programming Concepts: Algorithm and flow charting symbols, Elements of a Programming language.

Programming Techniques: Current Trends in Programming Techniques.

DCOM-02(Information Processing in Office)

Management Information System :

An MIS Perspective : MIS Introduction, Historical Background, Status of MIS in organizations, Framework for understanding Management Information System.

Information Needs and its Economics: Growing Need for information, Data, Information, Information from Data, value of information.

Management Information and Control Systems: System View, Role of MIS at various Management Levels, Structure of MIS, Information Network, Desirable Characteristics of MIS. **MIS: Role of Computers:** Human efforts and the limitations, planning for computerized MIS, Elements of computerized MIS, Data Processing in Computerised MIS, Role of Office Function in Computerized MIS, Computerised MIS inaction.

Database Management System:

Introduction to Database Management System: Database, Need of Computerised Database, DBMS.

Database Structure: The architecture of A DBMS, Indexing and searching Techniques.

Various Approaches of DBMS: A Study of the three Approaches, Hierarchical Approach, Network Approach, Relational Approach.

A Database Management Package:

Introducing dBASE III Plus: Concepts of A dBASE III Plus file, Entering Data in a file, Adding data, Listing of Records, Listing Selected fields.

Data Retrieval and ftle Maintenance: Data Retrieval, Updating a file, Arithmetic Calcula- tions.

Sorting and Indexing: Sorting, Indexing.

Printing A formatted Report: Creating A report format, using Multiple files.

Programming in dBASE III Plus: dBASE III Plus Program file, Commands in a Program, Conclusion.

DCOM-03 (Office Productivity Tools)

Word processing and Desk Top publishing:

Word Processing : Evolution and Concepts: Evolution of word processing, Basic word processing functions, Common word processing features and tools.

Wordstar : A Typical word processor: Menus, Commands, Screen Displays and Help, Creating Text, Editing Text, Formatting Text, Printing Text.

Advanced word processing Feature – Spellstar: Approach and Methodology of Spelling check, spellstar.

Advanced word processing feature-Mail Merge: Mail Merge

Desktop Publishing (DTP): Components of Publishing System, Limitations of a word

processor to perform DTP- tasks, Components of A DTP System, Pagemaker: A Typical DTP Software, Limitations of DTP VIS-À-VIS professional publishing.

Spreadsheet in Business Decision:

Fundamentals of Decision Making and Spreadsheet: History, Modelling for Decision making in Business, Lotus Access System, Strengths of Lotus 1-2-3, 1-2-3 Screen, Lotus 1-2-3 Function keys.

Basic Skills in using spread sheet: Data entry and Menu Handling, Moving around the worksheet, Indicating and Erasing a Range, Copying and Moving Data, Saving A file and Quitting 1-2-3.

Tuning A spread sheet: Worksheet Commands Handling a range.

Managing a Spreadsheet: 1-2-3 file functions, printing a file, plotting graphs in Lotus 1-2-3

Database Functions in Lotus 1-2-3 Database functions in 1-2-3.

Functions and Programming in Lotus 1-2-3: Functions, Macros – Programming in 1-2-3.

DCOM-04 (Computer Application in Office)

Database Management Systems (Financial) :

An Approach for Developing a Payroll Application: Need for Computerisation, Benefits of a Computerised Systems, Features of the System, System Analysis and Design, Using dBASE III Plus for programme Development.

An application for a Hotel: Inputs and outputs, Files layout, Program Modules, in the sys- tem.

Alternate Programming Approach-Payroll: Role of Computerised System in Office,Versatility of A Computer for Office Applications, Selection of a suitable programming Medium, System Study: Payroll Application, Application Software Development, Comparative Study of Different Programming Approaches.

Financial Accounting: Scope of the System, A Sample System for Financial Accounting.

Inventory Control System: Inventory Management, Computer System.

Database Management System – Non Financial Applications:

DAK Management System: System Study, General Design of the System, Approach to

Pro- gram Design, Modules of the System, Implementation and Utilisation.

Personnel Management System: System Study, General Description of the Computerised System, System Design, Modules of the System, Implementation and Utilisation.

Designing A Database From Textual Information: Problem Definition, System Requirement, System Design Framework, Implementation Considerations, Approach to Program Design, Modules of the System.

Applications on Spreadsheet:

An Office Application Using Multiple Packages: Package characteristics, System Description : Recruitment Management System, Activities and Program Modules, Application Development, Running an integrated Application.

Budgeting and Cash Flow: Relevancy of Cash flow in Business, The Budgeting process, The operating Manager and the Accountant, A brief Recapitulation of Relevant Accounting terms, Advantages of using electronic computers, A comprehensive illustration, Making changes in the spreadsheet.

Profit Analysis: Worksheet Description, Developing the worksheet, "What-IF" Analysis.

DCOM-05 (Modern Office)

Communication in the Office :

Introduction to an Integrated Office Communication: Concept of an Automated office, Applications in A Modern Office, Equipment in Modern Office, Typical Modern Office, Integrated Communication for Modern Office.

Fundamentals of Data Communication and Networking: The Data Communication process, Types of electronic signals, types of transmission, Modes of transmission, character transmission, Lines for Data Transmission, Transmission Methods, Communication Hardware, Data transmission error and Recovery, Data Communication protocols.

Fundamentals of Data Communication and Networking – II: Impact of Technology growth, Genesis of Computer Networks, Distributed processing and Networking, Network topologies, switching Alternatives, Computer Networks, Applications for Computer Networks.

Introduction to Local Area Network: Definition of LAN, Advantages of LAN, Resource sharing – An example, characteristics of LAN, Transmission Medium, LAN topologies, IEEE

802.3 LAN and CSMA/CD protocol, Access Methods and Topologies, LAN Architecture, LAN Standards, LAN services, Application of LANS, Connecting to the Rest of the world-use of LAN, Sharing Data Base Information of A LAN, Accounting on a LAN, Communication Between A LAN and a Mainframe Computer.

Emerging trends in Computer Networking: Standards, The Standards Makers, The OSI Reference model, Emerging trends in Data Communication in Department of Telecommunication (DOT), International Gateway Packet Switching System, Existing Indian Networks.

PHASED Modernisation:

An Approach to Modernisation: Information in the office, Need for Modernisation, Criteria for priorities, Environmental Concerns.

Information Systems Analysis Methodologies: Need for aMethodology, Information processing and Technology Options, Current Office Environment: Office Models, Procedure Models: A closer view, A pragmatic Approach to systems Design and Development.

Office Information System Implementation: Hardware and Software Selection, Methods of System Acquisition and testing, Training of Personnel, Change over procedures, Review and Maintenance.

Human Aspects of Modernisation: Characteristics of Human-Machine interaction, Ergonomics, Human problems in the Automated Office, Designing Human-Machine Systems, A Futuristic Perspective.

Expert-Systems in Office: Expert System, Knowledge Representation, Reasoning Strategies, Expert System shells, use of Expert Systems in Offices.

Security and privacy:

Computer Security – Part – I: Computer Security and Data Security, Components of Com- puter Security, Physical Security.

Part – II : Abuses of Electronic Access, Security procedures for electronic Access Control.

Part – III: Cryptographic Terminologies , codes, ciphers, Elements of Encryption

Algorithms. **Computer virus and protective Measures:** Security Risks with PCS, perverse Software, Computer virus, preventive measures and treatment.

Case Studies:

System Implementation in an office Environment – An Interview System Implementation in a Corporate Environment.: System Design and Implementation in a Planning Environment.

Planning for Office Modernization

7. DIPLOMA IN WEB TECHNOLOGY

Course Code and Detail

Semester	Paper No.	Course Code	Title of Course	Credits
First Semester		DWT-1	Fundamental of Information Technology & Operating System	4
		DWT -2	Internet and Web Technology	4
		DWT -3	ASP.Net	4
		DWT -4	Software Lab-I (ASP.Net)	4
		DWT -5	Software Lab-II(HTML)	4
Credits of First Semester				**20**
Second Semester				
		DWT -6	Introduction to Java Script and Multimedia tools	4
		DWT -7	PHP and MySQL	4
		DWT -8	Software Lab-III (Office, Java Script, Multimedia Tools)	6
		DWT -9	Software lab- IV (PHP and MySQL)	6
Credits of Second Semester				**20**
Total credit				**40**

DIPLOMA IN WEB TECHNOLOGY

Course Code and Detail

Semester	Paper No.	Course Code	Title of Course	Credits
First Semester		DWT-1	Fundamental of Information Technology & Operating System	4
		DWT -2	Internet and Web Technology	4
		DWT -3	ASP.Net	4
		DWT -4	Software Lab-I (ASP.Net)	4
		DWT -5	Software Lab-II(HTML)	4
Credits of First Semester				**20**
Second Semester				
		DWT -6	Introduction to Java Script and Multimedia tools	4
		DWT -7	PHP and MySQL	4
		DWT -8	Software Lab-III	6

			(Office, Java Script, Multimedia Tools)	
		DWT -9	Software lab- IV (PHP and MySQL)	6
Credits of Second Semester				**20**
Total credit				**40**

DWT-1 (FUNDAMENTALS OF INFORMATION TECHNOLOGY AND OPERATING SYSTEM)

SECTION A

Introduction to Information Technology, Applications of Information Technology, Computer Fundamentals: Block diagram of Computer, Classification and Generation of Computer, Terms: Hardware, Software, Types of Software, Concept of Bit and Byte.

Input Devices: Keyboard, Mouse, Scanner, OMR, MICR, Video Cameras. Output Devices: Monitors, CRT, TFT, Plasma Panel Display, Printers: DOT Matrix, Inkjet, Laser, Plotter, Multimedia Projector, CPU Organization, Instruction Set, Processor Speed.

SECTION B

Memories: RAM, ROM, Cache, Storage Devices: Floppy Disk, Hard Disk, Compact Disk, Computer Languages: Machine Language, Assembly Language, High Level Language, 4GLs, Translators-Interpreters, Compilers, Assemblers.

Number System: non-positional and positional number system, base conversion, fractional numbers, various operations on numbers.

Computer Code: computer words, characters data, weighted and non-weighted code, BCD, EBCDIC, ASCII, grey code.

SECTION C

Introduction to Computer Software, Operating System, its need and Operating System services, Definition, Early system, Introduction to various types of Operating Systems.Windows: Installing Windows with setup, starting and quitting Windows, basic elements, desktop, starts menu, my computer, Recycle Bin, Windows accessories, System Tools, Control Panel, Sharing information between programs, GUI Vs CUI.

SECTION D

Unix: Introduction to UNIX,. Basics of files, directories and filenames, permissions, inodes, directory hierarchy. Common file and directory Commands Metacharacters, pipes and filters: grep, sort and wc

.**Suggested Reading:**

1. Computer Fundamentals-P.K.Sinha-BPB Publication
2. Sukhmeen Kaur, Vikram Gupta, S. S. Bhatia and Navneet Kaur, "Fundamentals of Information Technology", Kalyani Publishers.
3. Fundamentals of Computers – V. Rajaraman - PHI
4. Windows for Dummies- Andy Rathbone-PustakMahel
5. The Unix Programming Environment : B.W. Kernigham and Rob Pike - PHI

6. Understanding UNIX-Stan Kelly-Bootle-BPB Publications

DWT-2 (INTERNET & WEB TECHNOLOGY)

SECTION A
Definition of Internet, Internet organisation and committees, Growth of Internet, Internet Application, Portals, Introduction to WWW, Definition of DNS (Domain Name System).
Internet Protocols - Data Transmission Protocols, Client/Server Architecture & its Characteristics, FTP & its usage. Telnet Concepts, Remote Logging, Internet chatting - Voice chat, text chat.

SECTION B
Definition of Networks, Types of Networks (LAN, MAN,WAN),Network Topologies, Introduction to search engines (Mozila, Netscape, Opera) Email. OSI Reference model, TCP/IP Model Addressing in Internet Definition of Ethernet, Intranet, Telnet.

SECTION C
Introduction to HTML : Hyper Text Markup Language; HTML tags (The structure of an HTML program, Document Head, Document Body); Titles and Footers; Text Formatting (Paragraph Breaks, Line Breaks); Emphasizing Material in a Web Page (Heading Styles, Drawing Lines); Text Styles ; Text Effects; Lists :Types of Lists, Web Server; Web Client/Browser (Understanding how a Browser communicates with a Web Server)

SECTION D
Adding Graphics to HTML Documents: Using the Border attribute; Using the Width and Height Attribute; Using the Align Attribute; Using the ALT Attribute.
Tables : Introduction (Header, Data rows, The Caption Tag); Using the Width and Border Attribute; Using the Cell padding Attribute; Using the Cell spacing Attribute; Using the BGCOLOR Attribute; Using the COLSPAN and ROWSPAN Attributes.
Linking Documents: Links, Images as Hyperlinks, Introduction to Frames.

Suggested Readings:

1. Data and Computer Communication-William Stallings
2. Computer networks-Andrew S. Tanenbaum-PHI Publication
3. Computer network and internets-D.E. Comer- Pearson Education.
4. HTML-E.Stephen Mack and Janam Platt-BPB Publications
5. The Complete Reference-HTML-Powell Thomas-Tata Macgraw Hill
6. HTML, DHTML, JAVA SCRIPT AND CGI- Evan Bayross-BPB Publications.

DWT-3 (ASP.NET)

SECTION A

Web Form Basics : Introduction, Declaring an ASP.NET Page, Using a Code behind File with an ASP.NET Page, Dynamically Adding Literal Text or HTML to a Web Form, Submitting Data to Another Page Using ASP.NET, Creating a Scrolling Table within a Web Form, Selectively Hiding or Revealing Portions of a Web Form Programmatically, Displaying a Calendar in a Web Form, Validating User Form Input, Working With Drop Down Lists, Creating Dependent Dropdown List Control, Working with List Boxes, Persisting Data on a Web Form Between Postbacks, Adding Client-Side Script to a Web Form

User Controls: Introduction, Declaring a User Control, Adding a User Control to a Web Form, Getting and Setting User Control Properties, Partial Page Output Caching, Dynamically Adding User Controls to a Web Form, Raising Events from a User Control.

SECTION B

ASP.NET Application Configuration : Introduction, Storing and Reading Custom Settings from the web.config File, Creating Custom Application Settings in the web.config File, Configuring Application Tracing, Configuring Application Debugging, Configuring Application Error Handling, Configuring Application Security, Configuring Sessions in your ASP.NET Application.

State Management : Introduction, Reading and Writing Values to the Application Object, Reading and Writing Values to the Session Object, Reading and Storing Data in Cookies, Reading and Storing Data in ViewState

SECTION C

Basic Data Operations with ADO.NET : Introduction, Connecting to SQL Server, Connecting to Oracle, Connecting to a Microsoft Access Database, Connecting to ODBC Datasource. Working with Datasets: Creating a Datasets Consisting of Several Data tables, Filtering Contents of a Datasets, Sorting the Contents of a Datasets, Finding a Particular Row in a Datasets. Rendering Data with ASP.NET Web Controls: Introduction, Rendering Data Directly on a Web Form, Data Binding to a Drop Downlists, Data Binding to a Repeater, Data Binding to a Data Lists, Data Binding to a Data Grid

SECTION D

Manipulating Strings: Introduction, Dissecting Strings, Various Operations on Strings, Working with a Numbers, Dates, and Times, Working with Files and Folders, Working with Collections

Text Books:

1. ASP.NET Developer's Cookbook- Steven A. Smith, Rob Howard, PEARSON Education, New Delhi

Suggested Reading:

1. Microsoft .NET framework 2.0 Windows based client development (Mathew A. stocker and Steven J.Stein, with Tony Northup PHI)
2. Building Web Solutions with ASP.NET and ADO.NET (Dino Esposuto)
3. Developing More Secure Microsoft ASP.NET 2.0 Application Dominick Baier.
4. Complete Reference of ASP. Net-Black Book.

DWT-4 (SOFTWARE LAB- I - Based On Asp.Net)

DWT-5 (SOFTWARE LAB-II - Based on HTML)

DWT-6 (INTRODUCTION TO JAVASCRIPT AND MULTIMEDIA TOOLS)

Section-A

Introduction to JavaScript : JavaScript in Web Pages, The Advantages of JavaScript Writing JavaScript into HTML; Building Up JavaScript Syntax; Basic Programming Techniques ; Operators and Expressions in JavaScript; JavaScript Programming Constructs; Conditional Checking Functions in JavaScript, Dialog Boxes

Section-B

The JavaScript Document Object Model : Introduction (Instance, Hierarchy); The JavaScript Assisted Style Sheets DOM ; Understanding Objects in HTML (Properties of HTML objects, Methods of HTML objects); Browser Objects ,Handling Events Using JavaScript

Forms Used by a Web Site : The Form Object; The Form Object's Methods (The Text Element, The Password Element, The Button Element, The Submit (Button) Element, The Checkbox Element, The Radio Element, The Text Area Element, The Select and Option Element, The Multi Choice Select Lists Element); Other Built-In Objects in JavaScript (The String Object, The Math Object, The Date Object); User Defined

Section –C

Introduction to Multimedia: Different forms of Multimedia--text, Graphics, images, audio and video Applications of Multimedia. Flash Basics: Panels, Tools panel, Time line, Properties Panel, Stage, Current Layer, Current Frame, Current Symbol. File types: source files, exported files,

Section-D

Introduction to Photoshop: The tool box and Menu Bar Options, Color modes and color models: Color Models, the modes and Models of Color, Color bit depth. Adjusting Color: Making other Adjustments, Adjustments layers, understanding Channels. Paint Brushes and Art Tools: The Brushes menu, The Painting Tools, Digital Painting: foreground and background colors. Selecting colors, Blending modes. Moving Paint, Smudges focus tools, the toning tools. Layers: Using the layers palette, working with multiple layers, using masks, applying masks, using quick mask, layer mask, paths creating paths, editing paths, using paths.

Suggested Reading:

1. Multimedia Communications: Fred Halsall- Pearson Education 2001.

2. Adobe Flash CS3 Professional- Phillip Kerman-Pearsons Education
3. Adobe Photoshop CS2 in 24 hours-Carla Rose, Kate Binder.
4. The Complete Reference: Photoshop Elements 2-Ken Milburn and Gene Hirsh Sams Teach Yourself Javascript in 24 hours
6. The Complete Reference, Javascript, second edition

DWT-7 (PHP and MySQL)

SECTION A

Installing and Configuring : Current and Future Versions of MySQL and PHP, How to Get MySQL, Installing MySQL on Windows, Trouble Shooting your Installation, Basic Security Guidelines, Building PHP on Windows with Apache, Windows, php.ini. Basics,

The Basics of PHP scripts. The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output.

SECTION B

Working with Functions: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments, Working with Arrays: What are Arrays, Creating Arrays, Some Array-Related Functions.

Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads.

SECTION C

Understanding the database design process: The Importance of Good Database Design, Types of Table Relationships, Understanding Normalization.

Learning basic SQL Commands: Learning the MySQL Data types, Learning the Table Creation Syntax, Using Insert Command, Using SELECT Command, Using WHERE in your Queries, Selecting from Multiple Tables, Using the UPDATE command to modify records, Using the DELETE Command, Frequently used string functions in MySQL, Using Date and Time Functions in MySQL.

SECTION D

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

Creating an Online Address Book: Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

Suggested Readings:

- Sams Teach Yourself PHP in 24 Hours, Third Edition
- Wrox, Beginning PHP, Apache, MySQL Web Development
- Wrox, Beginning PHP

DWT-8 (SOFTWARE LAB-III - JAVA SCRIPT, Office, Multimedia Tools)

DWT-9 (SOFTWARE LAB-IV – PHP and MySQL)

8. Certificate in Computer Course [CCC]

Paper No.	Course Code	Title of the Course	Credits
880	CCC-01	Microsoft Office and Internet	8
881	CCC-02	Fox-Pro	8
882	CCC-03	The Technology	8
Total Credits			24

CCC-01 (Microsoft Office and Internet)

Microsoft Windows:

Windows Fundamentals: Basic elements, parts of a window, Types of windows, Types of Icons, Basic Techniques for working in windows, Menus.

Managing the File System: Switching between Directory windows, changing viewof the Directory window, Changing Drives and Directories, working with files and directories, Managing floppy Disks.

PrintinginWindows: Activating print Manager, Printing using print Manager, Pausing and Resuming printing

Windows Accessories: Write, Paintbrush.

Microsoft word:

MS-Word Basics : Starting the word screen, word document.

Typing and Editing : Typing and Revising text, finding and Replacing, Editing and proofing tools.

Formatting Text : Formatting Text Characters, Paragraph, Document Templates.

Page Design and Layout: Page setup, tables.

Mail Merge : Mail Merge.

Document Management : Opening, Saving and protecting documents, finding documents, printing a document.

Microsoft Excel :

Introduction to Excel : Excel Basics, Worksheets, within workbook, Enter and Edit Data, Range Names, Navigate, Worksheet, Search and Replace Data, Save and Protect work book.

Formatting and print worksheet : Page Setup, Column width and Row Height, Fonts, Alignments, Numbers.

Customising workplace: Excel Windows, Worksheet at different Magnifications, Using custom Controls.

Calculations in worksheet : Formula Basics, Functions.

Charts : Chart types, Editing charts.

Database Power of Excel: Database Concepts, Creating database, Adding Records, Deleting Records, Editing Records, Sorting a database.

Microsoft Powerpoint:

Presentation Graphics: Business Graphics, Types of Business Graphics, Physical Aspects of presentation.

Introducing Power point : Power point views, The Power point Window.

Creating a presentation: Create a title slide, creating a graph, creating tables, Make organization charts, Save and Close a presentation, Change Slide layout, Slideshow.

Customizing the Slide show: Create a blank presentation, working with text, change fonts, size and colour of text, working with graphic tools, Align Objects, group or ungroup the objects.

Internet Awareness:

Internet : An Overview: Internet, DNS, Host/Terminal, Connections, Individual Computer TCP/IP Link, Dedicated Link Connections, Tools and Services on Internet, Usenet and News- groups, Transfering Files with Ftp, Browsing the Internet.

Internet Tools: E-mail, FTP, Telnet.

Browsers : Netscape Navigator Search Engines, NCSA Mosaic, Microsoft, Internet Explorer.

Visiting Websites: Downloading, Examples, URL.

CCC-02 -(Fox-pro)

Introduction to FoxPro:

Software: Foxpro, creating a database file, viewing and Editing Data, Modify structure, Memo Certificate in
field and File utilities, Sorting and Indexing Database files, printing Reports and Labels,

Memory variables, Data & Time Functions and Keyboard, Macros, Mathematical Commands and Functions, Programming with Foxpro, Multiple Database files, Windows, Menus and pop-ups. **Case Studies:** Pay-roll problem & Income Tax problem.
Case Study : The Investment Problem.

CCC-03 – (The Technology)

Hardware :
Computers : An Introduction : Computers : Then and Now, Instruction Execution.
Memory Organisation: Memory System, Characteristics terms for various memory Devices, Main Memory or Primary Memory, External/Auxiliary Memory, High Speed Memories.

Input/ Output organization: Input/Output Devices, Input/Output Module/ Interface, Input/Output Techniques, Input/Output processors, External Interfaces.
Introduction to parallel organization : Parallel processing, Pipelining, vector processing, Introduction to RISC, RISC pipelining.

Software:
Software Concept and Terminology: Computer Software, Categories of Languages, Elements of a programming language.

Operating System Concepts : Evolution of operating system, Types of Operating System, Future Operating System Trends.

Graphical User Interface: GUI ,Evolution of the Human and Machine Interaction, Common Graphical user Interface Terms, Functionality ofGUI.
Software Development Methodologies/Tools: The Evolving Role of Software, An Industry perspective structured Methodologies, Major influencing factors, choosing the right Methodology, Implementing A Methodology Current generations of Software Development tools.
Communication:
Fundamentals of Data Communication : Concept, Data Communication modes, Communication Hardware.

Computer Networks: Network concept and classification, LAN, WAN.
Emerging Trends in Networking : E-Mail, EDI, Networking Scenario.
Computer Security and Virus: Risk

Risk Analysis and Disaster Planning: Risk Analysis, Disaster Recovery Planning.

Principles of Cryptography : History, Cryptography, Cryptoanalysis.

The Management of Computer Security: Definitions, Security, Status on PC, Breaches of Security , Security , Measures.

ComputerVirus: The Evolution of virus, The Menance, The process of infection,classification of viruses, Type of virus, Prevention, The cure.

9. CERTIFICATE COURSE IN LINUX ADMINISTRATION [CCLA]

Paper No.	Course Code	Course Name	University Examination	Total	Credits
	CCLI-01	Linux Internals	100	100	8
	CCLI-02	Shell Programming	100	100	8
	CCLI-03	Lab based on CCLI-01 and CCLI-02	100	100	8
		Total	300	300	24

SYLLABUS

CCLI-01

LINUX INTERNALS

1: Starting with Linux
2: Creating the Perfect Linux Desktop
3: Using the Shell
4: Moving around the Filesystem
5: Working with Text Files
6: Managing Running Processes
7: Writing Simple Shell Scripts
8: Learning System Administration
9: Installing Linux x
10: Getting and Managing Software
11: Managing User Accounts
12: Managing Disks and Filesystems
13: Understanding Server Administration
14: Administering Networking
15: Starting and Stopping Services
16: Configuring a Print Server r
17: Configuring a Web Server
18: Configuring an FTP Server
19: Configuring a Windows File Sharing (Samba) Server
20: Configuring an NFS File Server
21: Troubleshooting Linux
Part V: Learning Linux Security Techniques
22: Understanding Basic Linux Security
23: Understanding Advanced Linux Security
24: Enhancing Linux Security with SELinux
25: Securing Linux on a Network
26: Using Linux for Cloud Computing
27: Deploying Linux to the Cloud

CCLI-02

SHELL PROGRAMMING

1. Introduction
2. The Unix File System
3. Essential Unix Commands
4. I/O Redirection and Piping
5. The King of All Editors
6. Processes in Unix
7. Communication – Unix style
8. Shell Programming – The First Step
9. Taking Decisions
10. The Loop Control Structure
11. Shell Metacharacters
12. Tricks of The Trade
13. Shell Mischellany
14. System Administration
15. Shell Programming Project

Foundation Course [NON CREDIT]

10. Gandhian Thoughts and Peace Studies [PGFGS]

1. गांधी का संक्षिप्त परिचय
2. हिदं स्वराज
3. सत्याग्रह की परिकल्पना एवं सिद्वातं
4. आधुनिकता एवं गाधंी
5. सर्वोदयः एक मानवतावादी विकल्प
6. गाधंी और उत्तर आधुनिकता
7. न्यासिताः अर्थषास्त्र का नैतिक व आध्यात्मिक सिद्धान्त
8. स्वदेषी
9. अहिंसा
10. गाधंी का राष्ट्रवाद
11. रचनात्मक कार्यक्रम
12. स्वराज की अवधारणा
13. गाधंी तथा साम्प्रदायिक एकता
14. महिलाओं पर गाधंी के विचार
15. अस्पृष्यता और गाधंी
16. गाधंी और पर्यावरण
17. महात्मा गाधंी की प्रासंगिकता

    एपेन्डिक्स – 1 गांधी के जीवन की महत्वपूर्ण घटनाएं

11. Human Rights and Duties [PGFHR]

मानव अधिकार एवं कर्त्तव्य

(1) मानव अधिकार एवं कर्त्तव्य : मौलिक तत्व

1. मानव अधिकार का अर्थ एवं प्रकृति
2. मौलिक तत्व (सहअस्तित्व, समूह, राज्य, स्वतंत्रता, समानता, न्याय, भ्रातत्व)
3. अधिकार और कर्त्तव्य के बीच संतुलन की आवश्यकता, स्वतंत्रता और उत्तरदायित्व

(2) दार्शनिक और ऐतिहासिक परिप्रेक्ष्य

1. मानव अधिकार का इतिहास
2. मानव अधिकार आंदोलन
3. मानव अधिकार के सिद्धान्त

(3) अन्तर्राष्ट्रीय स्तर पर प्रयास

1. 1948 का सार्वभौमिक घोषणा पत्र
2. अन्तर्राष्ट्रीय प्रसंविदाएं; नागरिक और राजनीतिक अधिकार 1966
3. अन्तर्राष्ट्रीय मानवाधिकार संस्थाऐ

(4) भारत में मानव अधिकार और कर्त्तव्य

1. विकास : स्वतंत्रता आन्दोलन, संविधान निर्माण
2. भारतीय संविधान
   a प्रस्तावना
   b नीति निर्देशक सिद्धान्त
3. a मौलिक कर्त्तव्य व अधिकार
   b आरक्षण सम्बन्धी प्रावधान

(5) मानवाधिकारों का संरक्षण

1. राष्ट्रीय स्तर पर (सर्वोच्च न्यायालय राष्ट्रीय मानवाधिकार आयोग, राष्ट्रीय महिला आयोग)
2. अन्तर्राष्ट्रीय स्तर पर (संयुक्त राष्ट्र एवं एन.जी.ओ. की भूमिका)

प्रान्तीय स्तर पर (राज्य महिला आयोग एवं लोकायुक्त की भूमिका)

Compulsory Foundation Course

12. Foundation Course in Open and Distance Learning [UGFODL]

मुक्त एवं दूरस्थ शिक्षा

खण्ड – 01 : मुक्त एवं दूरस्थ शिक्षा की अवधारणा एवं ऐतिहासिक परिप्रेक्ष्य

इकाई : 01 – मुक्त एवं दूरस्थ शिक्षा का स्वरूप एवं आवश्यकता
इकाई : 02 – मुक्त एवं दूरस्थ शिक्षा का विकास
इकाई : 03 – दूरस्थ शिक्षक
इकाई : 04 – दूरस्थ विधार्थी

खण्ड – 02 : मुक्त एवं दूरस्थ शिक्षा में छात्र सहायता सेवायें

इकाई : 05 – स्व–अधिगम सामग्री
इकाई : 06 – परामर्श सेवायें
इकाई : 07 – अधिन्यास
इकाई : 08 – सूचना एवं सम्प्रेषण प्रौद्योगिकी

खण्ड – 03 : मुक्त एवं दूरस्थ शिक्षा की संगठनात्मक संरचना
इकाई : 09 – राष्ट्रीय मुक्त विश्वविद्यालय
इकाई : 10 – राज्य मुक्त विश्वविद्यालय
इकाई : 11 – राष्ट्रीय मुक्त विद्यालयी संस्थान
इकाई : 12 – दूरस्थ शिक्षा परिषद्

खण्ड – 04 : मुक्त एवं दूरस्थ शिक्षा में चुनौतियाँ

इकाई : 13 – मुक्त एवं दूरस्थ शिक्षा की समस्यायें
इकाई : 14 – मुक्त एवं दूरस्थ शिक्षा में प्रशिक्षण
इकाई : 15 – मुक्त एवं दूरस्थ शिक्षा में मूल्यांकन
इकाई : 16 – मुक्त एवं दूरस्थ शिक्षा में अनुसंधान

13. Foundation Course in Environment Awareness [CHEQ]

पर्यावरण अध्ययन

खण्ड – 01 : पर्यावरण और पारिस्थितिकी

इकाई – 01 : **पर्यावरण** – अवधारणा, संघटन एवं प्रकार

इकाई – 02 : पारिस्थितिकी – अवधारणा, प्रकार एवं सिद्धान्त

इकाई – 03 : **पारिस्थितिकी तंत्र** – अवधारणा, संघटन, कार्यशीलता एवं स्थिरता

इकाई – 04 : **वि□व के प्रमुख पारिस्थितिक तंत्र**

खण्ड – 02 : प्राकृतिक संसाधन : उपयोग एवं संरक्षण

इकाई – 01 : प्राकृतिक संसाधन – अवधारणा, वर्गीकरण एवं संरक्षण के सिद्धान्त

इकाई – 02 : जैव संसाधन – वन संसाधन, जैव विविधता, राष्ट्रीय उद्यान

इकाई – 03 : जल संसाधन – जलचक्र, उपलब्धता, उपयोग एवं संरक्षण

इकाई – 04 : मृदा संसाधन – विकास प्रक्रिया, उपयोग एवं संरक्षण

इकाई – 05 : ऊर्जा संसाधन – उत्पादन, उपयोग एवं संरक्षण

इकाई – 06 : खनिज संसाधन – संमाव्यनिधि, उत्पादन, उपयोग एवं संरक्षण

खण्ड – 03 : प्राकृतिक आपदा, पर्यावरण प्रदूशण एवं प्रबन्धन

इकाई – 01 : प्राकृतिक आपदा – अवधारणा एवं प्रकार

इकाई – 02 : प्रमुख प्राकृतिक आपदायें

इकाई – 03 : जल प्रदूशण एवं प्रबन्धन

इकाई – 04 : वायु प्रदूशण एवं प्रबन्धन

इकाई – 05 : ठोस अप□ाश्ट – प्रदूषण एवं प्रबन्धन

खण्ड – 04 : जनसंख्या एवं पर्यावरण

इकाई – 01 : विश्व जनसंख्या वृद्धि एवं वितरण

इकाई – 02 : भारत में जनसंख्या वृद्धि एवं सामाजिक–आर्थिक संरचना

इकाई – 03 : जनसंख्या वृद्धि एवं घनत्व के पर्यावरणीय प्रभाव

इकाई – 04 : नगरीय जनसंख्या, पर्यावरण एवं स्वास्थ्य

इकाई – 05 : जन जीवन पर पर्यावरणीय दुर्घटनाओं के प्रभाव

खण्ड – 05 : पर्यावरण के सामाजिक–आर्थिक संदर्भ

इकाई – 01 : वहनीय विकास – संकल्पना, उदभव एवं प्रसार

इकाई – 02 : सामाजिक व्यवस्था एवं पर्यावरण

इकाई – 03 : पर्यावरणीय नैतिकता एवं प्राकृतिक संसाधनों की सुलभता

इकाई – 04 : वैश्विक पर्यावरणीय समस्यायें एवं दुर्घटनायें

इकाई – 05 : भारत में पर्यावरण संरक्षरण एवं सम्बन्धित अधिनियम

14. Foundation course in Disaster Management [DM]

आपदा प्रबन्धन में आधार पाठ्क्रम

खण्ड 01 : – महत्त्व एवं कारकों की समझ

इकाई –1 आपदाः एक परिचय

इकाई –2 आपदा विश्व और भारतीय सन्दर्भ में

इकाई –3 आपदाः सरकारी तथा गैर सरकारी संगठनों की भूमिका

इकाई –4 अन्तर्राष्ट्रीय अभिकरणों की भूमिका

खण्ड 02 आपदा का वर्गीकरण

इकाई –05 भूकम्प, बाढ़ एवं जल निकासी

इकाई –06 चक्रवात, सूखा और अकाल

इकाई –07 भूस्खलन, हिमस्खलन, आग और जंगल की आग

इकाई –08 औद्योगिक और प्रौद्योगिकीय आपदा और महामारी

खण्ड 03 आपदा तैयारी के आधारभूत तथ्य

इकाई –09 नियोजन

इकाई –10 संचार

इकाई – 11 नेतृत्व एवं संयोजन

इकाई –12 भण्डारण एवं सम्भरण

खण्ड 04 आपदा प्रबन्धन एवं जागरुकता

इकाई –13 मानव व्यवहार एवं अनुक्रिया व्यक्तिगत सामुदायिक संस्थागत

इकाई –14 सामुदायिक भागीदारी एवं जागरूकता

इकाई –15 जन जागरूकता कार्यक्रम

इकाई –16 सूचना संगठन एवं प्रसार

Elective Foundation Course

15. Foundation Course in Science and Technology [UGFST]

Block-1 History of Science

Unit-1 Science as a Human Endeavour
Unit-2 Science in the Ancient World
Unit-3 Iron Age
Unit-4 The Golden Age of Science in India

Block-2 Emergence of Modern Science

Unit-5 Science in the Medieval Times
Unit-6 Renaissance, the Industrial Revolution and After
Unit-7 Science in Colonial and Modern India
Unit-8 The Method of Science and the Nature of Scientific Knowledge

Block-3 Universe and Life: The Beginning

Unit-9 Universe as a System
Unit-10 Exploring the Universe
Unit-11 The Solar System
Unit-12 Origin and Evolution of Life
Unit-13 Evolution of Man

Block-4 Agriculture, Nutrition and Health

Unit-19 Food and Agriculture
Unit-20 Scientific Possibilities and Social Realities
Unit-21 Food and Nutrition
Unit-22 Health and Disease

15. Foundation Course in Human Environment [AOCHE]

Block1 Environment

Unit1 Introduction to Human Environment

Unit2 Climate and Resources

Unit3 Description of Ecosystem

Unit4 Nonliving and Living Components of Environment

Unit5 Social Environment and Population of Man

Block2 Human Activities and Environment I

Unit6 Impact of Man on Environment

Unit7 Effects of Overexploitation of Biological Resources

Unit8 Effects of Agriculture on Human Environment

Unit9 Effects of Urbanisation

Block3 Human Activities and Environment II

Unit10 Atmospheric Pollution

Unit11 Water Pollution

Unit12 Land Degradation

Unit13 Hazardous Waste Chemicals

Block4 Effect of Changed Environment on Man

Unit14 Environment and Human Health -I

Unit15 The Environment and Human Health -II

Unit16 Social Implications of Developmental Projects

Unit17 Economic Implications of Changed Environment

Block5 Management of Environment-I

Unit18 Challenges of Environment Management

16. Office Organisation & Management [AOCOM]

खण्ड–1 आधुनिक कार्यालय के प्रबंध के संबंध में मूल बातें

इकाई–01 कार्यालय प्रबंध का स्वरुप और क्षेत्र
इकाई–02 प्रशासनिक व्यवस्था और सुविधाएं
इकाई–03 कार्यालय का वातावरण
इकाई–04 कार्यालय पद्धतियाँ और कार्यविधियाँ

खण्ड–2 रिकार्डो का रख–रखाव और डाक सेवाएं

इकाई–05 फाइल करने की प्रणाली
इकाई–06 फाइल करने के उपकरण
इकाई–07 आवक तथा जावक डाक
इकाई–08 आंतरिक संप्रेषण
इकाई–09 वाह्य संप्रेषण

खण्ड–03 कार्यालय की म□ीनें एवं आंकड़ों का संसाधन

इकाई–10 कार्यालय के उपकरण एवं मशीनें– I
इकाई–11 कार्यालय के उपकरण एवं मशीनें– II
इकाई–12 आंकड़ों का संसाधन
इकाई–13 कम्प्यूटर का उपयोग

खण्ड–04 कार्यालय की स्टे□ानरी और फार्मो की व्यवस्था

इकाई–14 कार्यालय की स्टेशनरी तथा संबंधित आपूर्तियां
इकाई–15 स्टेशनरी का भंडारण और नियंत्रण
इकाई–16 कार्यालय के फार्म

खण्ड–05 कार्यालय पर्यवेक्षण

इकाई–17 कार्यालय पर्यवेक्षक
इकाई–18 कार्य की माप (कार्य मापन) और उसका मानकीकरण
इकाई–19 कार्य का सरलीकरण
इकाई–20 कार्मिक संबंध

18. Foundation Course in Nutrition for the Community [AOCNC]
समुदायिक पोषण एवं स्वास्थ्य शिक्षा

खण्ड–01
समुदाय का पोषण और स्वास्थ्य स्तर

- UNIT-01 समुदाय के बारे में जानना और उसके साथ काम करना
- UNIT-02 समुदाय पोषण और स्वास्थ्य
- UNIT-03 समुदाय के स्वास्थ्य और पोषण को प्रभावित करने वाले कारक

खण्ड–02
पोषण व स्वास्थ्य शिक्षा से सबंधी विषयवस्तु

- UNIT-04 पोषण संबंधी विषय वस्तु
- UNIT-05 स्वास्थ्य षिक्षा संबंधी विषय वस्तु
- UNIT-06 पोषण एवं स्वास्थ्य षिक्षा सम्बन्धी संदेष

खण्ड–03
पोषण एवं स्वास्थ्य शिक्षा के लिए संचार की विधियाँ

- UNIT-07 समूह संचार की विधियाँ
- UNIT-08 जनसंचार माध्यम
- UNIT-09 चुने हुये संचार माध्यामों का प्रस्तुतिकरण
- UNIT-10 गैर मषीनी माध्यम : योजना व निर्माण
- UNIT-11 मषीनचलित उपकरण : योजना व निर्माण

खण्ड–04
पोषण एवं स्वास्थ्य शिक्षा के उपागम

- UNIT-12 पारम्परिक उपागम
- UNIT-13 पारम्परिक उपागमों का प्रस्तुतिकरण
- UNIT-14 आधुनिक उपागम
- UNIT-15 गैर मषीनी माध्यम : योजना व निर्माण
- UNIT-16 आधुनिक उपागमों का प्रस्तुतिकरण

खण्ड–05
पोषण एवं स्वास्थ्य शिक्षा की सामुदायिक कार्यनीतियाँ

- UNIT-17 व्यक्तिगत कार्यनीतियाँ

- UNIT-18 सामुदायिक कार्यनीतियाँ
- UNIT-19 चुनी हुई कार्यनीतियाँ के प्रचालन की प्रस्तुति
- UNIT-20 गैर मषीनी माध्यम : योजना व निर्माण
- UNIT-21 आधुनिक उपागमों का प्रस्तुतिकरण

खण्ड–06
पोषण कार्यक्रम

- UNIT-22 विगत तथा वर्तमान पोषण कार्यक्रम
- UNIT-23 पोषण षिक्षा कार्यक्रम : आयोजन, क्रियान्वयन तथा मुल्यांकन
- UNIT-24 पोषण तथा स्वास्थ्य कार्यक्रम का सफल आयोजन : चुने हुये प्रक्रिया मॉडल

प्रायोगिक नियमावली : भाग – III