B.C.A. – Semester III
Computer Application
[*Paper: I – Digital Electronics and Microprocessor*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit – I: Background of Digital Electronics

Digital Signals, Different Type of Numbering System: Decimal, Octal, Binary, Hexadecimal, Conversation from One Number System to Another System, Binary Addition, Binary Subtraction, Binary Complements. One's & Two's Complement, Binary Subtraction Using Two's Complement.

Unit – II: Logic Families

Logic Gate Basics: Or gate AND Gate, NOT Gate, Exclusive-OR (XOR) Gate, Truth Tables for Logic Gates, Truth Tables for Combinational Logic.

Types of Logic Family: Circuit of RTL, DTL, TTL and Working Function as a Gate, Emitter Coupled Logic (ECL) CMOS Logic Family, NMOS and PMOS Logic, Comparison of Different Logic Families.

Unit – III: Boolean Algebra and Karnaugh Maps

Boolean Algebra, Boolean Expression Of Combinational Logic, Laws of Boolean Algebra, Rule a of Boolean Algebra: NOT Rule, OR Rules, AND Rules, XOR Rules, Derivation of other rules Simplification, Demorgan's Theorem, Boolean Expression Formats: Sum-Of- Product, Product-Of-Sum, Converting SOP & POS to Truth Table & Truth Table to Expression, Karnaugh Maps.

Unit – IV: Combinational and Sequential Circuit

Decoders, Multiplexers, De-Multiplexers, State Machine Design Process: Mealy Versus Moore State Machines, S-R Latch/ Flip-Flop, D Latch, J-K Flip-Flop, Divide-By-Two Circuit, Registers, Counter Ripple (Asynchronous) Counter and Synchronous Counter, UP/DOWN Counters,

Unit – V: Microprocessor

Generic Architecture of Microprocessor, Pin Diagram & Pin Function of Intel 8085 Microprocessor, Instructions Set for Microprocessor, Definition and need of Addressing Mode, Addressing Modes of Intel 8085 & 8086 Microprocessor, Machine Cycle and Instruction Cycle of Microprocessor, Working of Microprocessor.

Text book:

1. Modern Digital Electronics, R. P. Jain, TMH
2. Digital Principles & Application, Leach & Malvino, TMH
3. Digital Logic Design, Morries Mano, PHI
5. Microprocessor – Architecture, Programming and Applications with the 8085, Ramesh S. Gaonkar

Reference Books:

1. Digital Integreated Electronics, H. taub & D. Shilling, McGraw Hill
2. Digital Principles & Design, Givone, TMH
3. Digital Circiut & Design, S. Aligahanan, S. Aribazhangan, Bikas Publishing House.
4. Fundamental of Digital Electronics & Micropressor, Anokh Singh, A. K. Chhabra, S. Chand

B.C.A. – Semester III
Computer Application
[*Paper: II – Computer Networks*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit – I: Introduction to Computer Network
Computer Network Fundamental and types of Computer Network LAN, MAN, WAN, Wireless and Wired Network Broadcast and Point to Point Network, Network Topologies, ISO-OSI Reference Model, TCP/IP Model.

Unit – II: Data Link Layer
Functions at Data Link Layer, Framing and Correction Codes: Checksum, CRC, Hamming Code, Flow Control: Stop & Wait and Sliding Window Protocols, Data Link Protocols: HDLC and PPP, Medium Access Sub-Layer, LLC Protocol, IEEE Overview of IEEE 802.2, 802.3, 802.5 802.6.

Unit – III: Network Layer and Transport Layer
Functions of Network Layer, Routing Protocols & Algorithms, Principles of Congestion Control, Ipv4 Address, Ipv4 Addressing, Ipv6 Address, Internetworking Basics, Functions of Transport Layer, Flow Control & Buffering, Introduction To TCP/UDP Protocols and their Comparison.

Unit – IV: Common Network Architecture
Connection Oriented & Connectionless N/Ws, Frame Relay, Example of N/Ws-P2p, X.25, ATM Ethernet, Wireless LANS – 802.11, 802.11x, Gigabit, Broad Band Networks: Integrated Service Digital Networks (ISDN), Broad Band ISDN, ATM, Very Small Aperture Terminal(VSAT).

Unit – V: Internet and Protocols
World Wide Web (WWW), Domain Name System (DNS), E-Mail, File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), E-Mail Protocols: Mime & SMTP, POP, IMAP, Telnet – Remote Communication Protocol, Proxy Server, Proxy Web Servers: Internet Class Full Addressing, Working Of Internet Applications.

Text books:

1. Computer Networks, Andrew S. Tanenbaum, PHI / Pearson Education Inc.
2. Data communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
3. Internet Law-Text and Materials, chris Reed, universal law Publishing co., new delhi

Reference book:

1. Data and computer communication, William stallings, pearson education.
2. Computer and communication networks, nader F. Mir, Pearson Education, 2007.
3. Data &computer communication, black, PHI.

B.C.A. – Semester III
Computer Application
[*Paper: III –Data Structure*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Introduction and Array

Data Types, Data Structure and its Classification, Arrays: Array concept (one dimension, two dimension), Operations for one dimension array (insertion, deletion, traversal), Examples.

Unit-II : Linked Lists

Concept of a linked list, Circular & Doubly linked list, Operations on linked lists, List Manipulation with Pointers, Insertion & Deletion of elements, Applications of linked lists.

Unit-III : Stacks-Queues and Binary Tree

Definitions and Structure, Representation using Array & Linked List, Application of Stack and Queues, Postfix and Prefix Conversion, Evolution of Arithmetic Expressions, Binary Trees: Definition, Memory Representation, Trees traversal algorithms (recursive and non-recursive), threaded trees, BFS, DFS.

Unit-IV : Searching and Sorting

Linear and Binary Search Algorithms, Complexity, Binary Search Trees (construction, insertion, deletion & search), Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort, Tree sort, Heap Sort, Quick Sort, Merge Sort & Radix sort, External Sorting.

Unit-V : Analysis of Algorithm

Time and Space Complexity of Algorithms, Average Case & Worst Case Analysis, Asymptotic Notation, Big O notations, Analysis of sorting algorithms -Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and Analysis of searching algorithms -Linear Search & Binary Search.

Text Book:

1. Data Structures using C, A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
2. Data Structures using C by A. K. Sharma, Pearson Education
3. Data Structures and Algorithms, A.V. Aho, J.E Hopcroft and T.D. Ullman, Addison- Wesley, Low Priced Edition.
4. Fundamentals of Data structures, Ellis Horowitz & Sartaj Sahni, AW Pub.
5. Fundamentals of computer algorithms, Horowitz Sahni and Rajasekaran, Pearson Edu.
6. Data Structures and Program Design in C, Robert Kruse, PHI of Data Structures, Jr. Symour Lipschetz, Schaum's outline by TMH.

****

B.C.A. – Semester IV

Computer Application

[*Paper: I –Object Oriented Programming Using C++*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I

Features of C++, OOP vs. procedure-oriented programming, OOP Concepts: Abstraction, Inheritance, Polymorphism, Data Binding, Encapsulation, Classes, subclasses and Objects; Basics of C++: Data Types and sizes, Variable, Constants and its types, Use of « and » operators, Operators and Expressions: Operators:-Arithmetic, Relational, Assignment, Logical, Increment and Decrement Operators (++ and --), Operate-Assign' Operators, Expressions, Operator Precedence, Precedence and Order of Evaluation, Conditional Expression, Casting and type conversion.

Unit- II

Program Flow & Decision Control: if, if - else, if - else if, Loop Control: while, do - while, for, break, continue, Case Control: switch, goto; Functions/Procedures, Returning values from functions, Arguments Passed by Value, Passing Addresses of Arguments, Pointers and Arrays: Pointer Initialization, Pointer Operators, Pointer Arithmetic, Functions and pointers, Arrays, Initializing Arrays, Passing Arrays to Functions, Pointers and Arrays, Pointer to an Array, Array of pointers, Strings: String I/O, Arrays of Strings, Structures, Arrays of Structures.

Unit-III

Binding Data & Functions: Defining a Class, Creating an Object, Scope, Data Abstraction, Data Encapsulation, 'this' Pointer, Dynamic Creation of Objects, Constructors and Destructors: Parameterized & Copy constructor, Member Functions & Methods, Friend Class and Friendly Functions, Returning Objects, Arrays of Objects.

Unit-IV

Function and Operator Overloading, Rules for Overloading, Operator overloading and its uses: Overloading unary and binary operators, Overloading the Assignment Operator, Overloading the « Operator, Overloading the Increment & Decrement Operator, Converting data types: Basic to class type, Class to Basic Type, Class to Another Class Type.

Unit-V

Reusing Classes: Inheritance-Base and Derived classes, Inheritance types, Scope Resolution Operator, Access Modifiers, Multiple & Multilevel Inheritance, Calling Base Class Constructor, Overriding Base Class Members, Virtual functions and Polymorphism: Virtual & non-virtual Overriding, Rules for Virtual Functions, Pure Virtual Functions, Static and Dynamic Binding, Virtual Base Classes, Templates, Exception Handling, Throwing an exception.

Text books:

1. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
2. Object Oriented Programming in C++, 4th Edition, R.Lafore, SAMS, Pearson Education

Reference Books:

1. An Introduction to OOP, 3rd Edition, T. Budd, Pearson Education,2008.
2. Programming Principles and Practice Using C++, B.Stroutstrup, Addison- Wesley, Pearson Education.
3. Problem solving with C++, 6th Edition, Walter Savitch, Pearson Education,2007.
4. The Art, Philosophy and Science of OOP with C++, R.Miller,SPD. OP in C++,J3rd Edition, T.Gaddis, J.Walters and G.Muganda, Wiley DreamTech Press.
5. An Introduction to OOP in C++ with applications in Computer Graphics, 2nd Edition, G.M.Seed, Springer.
6. Programming with ANSI C++, B.Trivedi,Oxford Press.

B.C.A. – Semester IV
Computer Application
[*Paper : II – Computer Graphics and Multimedia*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I: An Introduction Graphics System

Computer Graphics Fundamentals, Application of Computer Graphics, Video Display Devices. Raster & Random Scan Systems, Input Devices, Graphics Software, Interactive devices, Output Primitives, Line Drawing & Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm.

Unit-II: 2D Transformations

2-D Viewing and Clipping: Viewing Transformations, Point Clipping & Line Clipping Algorithms, Polygon Clipping algorithms, 2D Geometric Transformations: Basic transformations (Translation, Rotation, Scaling), Matrix Representation & Homogeneous Coordinates, Composite transformations, Reflection and Shear.

Unit-III: 3D transformations

3D Viewing Transformation, Projections: Parallel Projection (Orthographic & Oblique Projections, Isometric Projections), Perspective Projections, 3D Geometric Transformations: Translation, Rotation, Scaling, Matrix Representation, 3D Object Representations: Polygon Surface and Polygon table, Bezier curves and surfaces.

Unit-IV: Multimedia and Photoshop s/w

Fundamentals of Multimedia, Adobe Photoshop CS4: Menus and panels, Exploring the Toolbox, Working with Images: Working with Multiple Images, Rulers, Guides & Grids, Image Size Command, Adjusting Canvas Size & Canvas Rotation, Creating, Selecting, Linking & Deleting Layers, Painting with Selections, Red Eye Tool, Clone Stamp Tool, Color creation, Quick Mask Options, Creating Straight & Curved Paths, Creating Special Effects.

Unit-V: CorelDraw X4

CorelDraw X4 Command Bars & Tools, Drawing Area-Objects-Lines, Working with Text & Artistic Media Tool, Fills & Modifying Outlines, Drop Shadows, Importing and Editing OCR Text, Templates, Drawing and Editing Curves and Lines, Three-point Tools, Clipart, Special Characters and Creating Symbols, Working with Layers & Creating a Master Layer, Brush Tools and Adding Objects, Interactive Tools, Power Clip Feature and the Envelope Tool.

Text Books:

1. Procedural Elements for Computer Graphics, D.F. Rogers, Tata McGraw Hill
2. Fundamentals of Interactive Computer Graphics, J.D. Foley and A.D. Van, Addison- Wesley.
3. How to Do Everything Adobe Photoshop CS4, Chad Perkins, Tata McGraw Hil
4. Corel Draw X4: The Official Guide, (Paperback), Gary David Bouton, Tata McGraw Hill

Reference Books:

1. Mathematical Elements for Computer Graphics,, Rogers and Adam, Tata McGraw Hill.
2. Theory & Problem of Computer Graphics, Plastock, Schaum Series.
3. Computer Graphics, Tosijasu, L.K., Springer-verleg
4. Principles of Interactive Computer Graphics, Newman, Tata McGraw Hill.

B.C.A. – Semester IV
Computer Application
[*Paper: III – Computer Organization and Architecture*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Pipeline:
Linear: pipeline processor, Non linear pipeline processor, Instruction pipeline design, Mechanisms, Dynamic instruction scheduling, Arithmetic pipeline design, Super-scalar processors, VLIW architecture.

Unit-II: Memory Hierarchy and I/O Organization On:
Cache memories, Cache coherence, High bandwidth memories, high bandwidth I/O, Disk I/O, Bus specifications and standards.

Unit-III : Parallel Computer Models & Program parallelism:
Classification of Machines, SISD, SIMD & MIMD, Condition of parallelism, data and resource dependencies, Program partitioning & scheduling, grain size latency, control flow versus data control, data flow architecture.

Unit-IV : Synchronous Parallel Processing:
Vector instruction types, vector access memory schemes, vector and symbolic processors,SIMD architecture, SIMD parallel algorithms, SIMD computers and performance enhancements.

Unit-V : System Interconnection:
Network properties and routing, static interconnection networks, dynamic interconnection networks, Multiprocessor system interconnection, Multistage & combining networks.

Text Books

1. Flynn Computer Architecture: Pipelined and parallel processor design, JB, Boston.
2. Computer Architecture & Parallel processing - Kai Hwang 7 Briggs. (MGH).
3. Computer System Architecture, M. Morris Mano, PHI/Pearson Education.
4. Computer Organization, C Hamacher, Z Vranesic, SafwatZaky, McGraw Hill.
5. Computer Architecture and Organization, J. P. Hayes, Tata McGraw-Hill.

Reference Books:

1. Parallel Computer Arch.& Algo, R.W. Hockney, C.R. Jesshope, Adam Hilger.
2. Structured Computer Organization, A. S. Tanenbaum, Pearson Education.
3. Fundamentals of Computer Organization, P. Dandamudi , Springer.

B.C.A. – Semester IV
Computer Application
[*LAB: III – Programming Lab Using C++*]

Max. Marks: 50 **Min. Marks:17**

List of Sample Problems/Experiments:

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C++ program to generate the first n terms of the sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
4. Write C++ programs that use both recursive and non-recursive functions
   a) To find the factorial of a given integer,
   b) To find the GCD of two given integers,
   c) To find the n^{th} Fibonacci number.
5. Write a C++ program that uses a recursive function for solving Towers of Hanoi problem.
6. Write a C++ program to find both the largest and smallest number in a list of integers.
7. Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:
   a) Reading a matrix,
   b) Printing a matrix,
   c) Addition of matrices
   d) Subtraction of matrices.
   e) Multiplication of matrices.
9. Write a program to demonstrate concept of method overloading.
10. Write a program to demonstrate concept of method overriding.
11. Write a program to demonstrate concept of inheritance.
12. Write a program to demonstrate concept of operator overloading.
13. Write a program to demonstrate concept of virtual and pure virtual function.
14. Write a program to demonstrate concept of polymorphism.
15. Write a program to demonstrate concept of friend function and friend class.

B.C.A. – Semester IV
Computer Application
[*LAB: IV – Multimedia Lab*]

Max. Marks: 50 **Min. Marks: 17**

Series of Practical Curriculums

Photoshop:

1. (i) Handling different file formats and interchanging them, changing the resolution, color, grayscales and size of the images
   (ii)Using, brushes and creating multicolor real life images. Cropping, rotating, overlapping, superimposing, pasting photos on a page, Creation of a single image from selected portions of many, Developing a commercial brochure with background tints, Creating an image with multi-layers of images and texts. Applying masks and filtering on images.

CorelDRAW X4 Part 1

- Getting Started with CorelDRAW
- Starting CorelDRAW
- Working with Command Bars
- Working with Layers
- Examining a Master Page
- Creating a Master Layer
- Working with Layers
- Using Brush Tools and Adding Objects
- Working with Interactive Tools
- Using Advanced Techniques for Text Manipulation
- Working with Paragraph Text
- The PowerClip Feature and the Envelope Tool
- Creating Bulleted Lists
- Working with Vector and Bitmap Graphics
- Converting Vector Objects to Bitmaps
- Working with Bitmap Graphics
- Introduction to CorelTRACE
- Advanced Output Options
- Preparing a Document For Printing
- Other Printing Options

****

B.C.A. - Semester V

Computer Application

[*Paper: I – Numerical Analysis*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Solution of Polynomial and Transcendental Algebraic Equations

Bisection method, Regula falsi method & Newton Raphson Method, Secant Method, Iteration Method, Solution of Cubic & Biquadratic Equation.

Unit-II : Simultaneous Equations and Matrix

Gauss -Elimination Method, Gauss -Gordon Method and Pivoting. Gauss Seidel Iterative Method, Reduction to lower or upper Triangular forms , Inversion of matrix , method of partitioning , Characteristics equation of matrix , Power methods , Eigen values of matrix , Transformation to diagonal forms.

Unit –III : Interpolation - Single Variable Functions

Newton's Interpolation formula, Newton's Forward and Backward Difference Interpolation Formula, Langranges Interpolation formula, Newton's Divided Difference Interpolation Formula.

Unit –IV : Numerical Differentiation and Integration

Newton - cotes integration formula, Trapezoidal Rule, Simpson's One-Third and Three- Eight Rule, Waddle's Rule.

Unit-V : Numerical Solution of Ordinary Differential and Integral Equation

Numerical Solution of first order Ordinary Differential Equations, one step method, Euler's, Picard's and Taylor's series Methods, Picard's Methods for successive approximations, Runga-Kutta Method.

Text Books:

1. Numerical methods, B.S. Garewal,
2. Introduction to Numerical Methods, S. Shastri, TMH.
3. Numerical methods for Science and Engineering, Jain M.K.

B.C.A. - Semester V

Computer Application

[*Paper: II – Software Engineering and Project Management*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Software Engineering and Process models

Software myths, Software engineering- A layered technology, Software Development Life Cycle, Process models: waterfall model, Incremental process models, Evolutionary process models, The Unified process; Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirements document.

Unit II : Requirements and Design Engineering

Feasibility studies, Requirements elicitation and analysis, Requirements . validation, Requirements management, System models: Context Models, Behavioral models, Data models, Object models, Design concepts, the design model, software architecture, Data design, Architectural styles and patterns, Architectural Design.

Unit-III : Testing Strategies and Product metrics

A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging, Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Unit –IV : Plans for testing

Snooping for information, Coping with complexity through teaming, Testing plan focus areas, Testing for recoverability, Planning for troubles, Preparing for the tests: Software Reuse, Developing good test programs , Data corruption, Tools, Test Execution .Testing with a virtual computer, Simulation and Prototypes, Managing the Test, Customer's role in testing

Unit-V : Software Project Management

Evolution of Software Economics, Life Cycle Phases and Process artifacts, Model based software architectures, Software process workflows, quality indicators, life-cycle expectations, CCPDS-R Case Study and Future Software Project Management Practices

Text Books:

1. Fundamentals of Software Engineering, Rajib Mall, PHI Learning Pvt. Ltd.
2. Software Engineering, Ian Sommerville, Pearson Education Inc., New Delhi.
3. Software Engineering: A Practitioner's Approach. Roger S. Pressman, Tata McGraw-Hill
4. Software Project Management, Walker Royce, Pearson Education.

Reference Books:

1. Software Engineering, Shari L, Joanne M. Atlee, Pearson Education, Inc. New Delhi.
2. Software Engineering, Pankaj Jalote, Wiley India Pvt. Ltd., New Delhi.
3. Software Engineering, Dines Bjorner, Springer India Pvt. Ltd . New Delhi
4. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
5. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH.
6. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly.

B.C.A. - Semester V
Computer Application
[*Paper: III – Database Design and RDBMS*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Introduction to DBMS

Data & Information, File systems versus Database systems, Data Models, Schemas and Instances, Data Abstraction, Data Independence, Database languages and Interfaces, DBMS Architecture, Data Independence, Database Characteristics: Data modeling using Entity - Relationship (ER) Model: Entity sets, attributes and keys, Relationship types, sets, roles and structural constraints, Weak Entity types. Data Models: Relational, Network, Hierarchical and Object Oriented, Enhanced E-R Modeling.

Unit-II : Relational Model and RDBMS

Relational data model concepts, Codd's 12 rules, Relational model constraints and schemas, Relational Algebra and Relational calculus, Relational database design by ER & EER to Relational Mapping, Overview & Architecture of commercial RDBMSs: Oracle, SQL Server. My SQL etc., Database Language: SQL, SQL Programming Techniques: DDL, DML, DCL query statements, Constraints and Triggers, Views and Indexes, SQL in Server Environment.

Unit –III : Database Design Concepts

Data dependency, Armstrong's Axioms, Functional dependencies and Normalization of Relational Databases, First, Second and Third Normal forms, Boyce-Codd Normal form (BCNF), Relational Database design Algorithms and further dependencies, De-normalization.

Unit-IV : Transaction Processing

ACID Properties of Transactions, Concurrency control, Serializability and Recoverability, Transaction support in SQL, Locking Techniques. Time Stamp ordering, Validation Techniques, Granularity of Data Items, Database recovery techniques - Shadow paging, Log Based Recovery, ARIES recovery algorithm, Database Security: Access control, Statistical Database Security, Deadlock: Detection, Avoidance and Recovery.

Unit –V : Special Purpose Databases

Semi-structured Data Model, OO Data Model, OODBMS, Object-Based Databases, Object Relational Databases: XML and Web Databases, Structure of XML, Temporal Databases, Distributed Databases, Deductive Databases, Mobile Databases, Multimedia Databases, GIS Databases, Spatial Databases.

Text Books:

1. Fundamentals of Database Systems, R Elmasri & S B. Navathe, Pearson Education.
2. Database Systems Concepts, A Silberschatz, H F. Korth & S. Sudarshan, McGraw-Hill.
3. Fundamentals of Database Management Systems, Mark L. Gillenson, Wiley India Pvt.
4. Introduction To Database Systems, C.J.Date, Longman, Pearson Education

Reference Books:

1. Database Systems: A Complete Book, Molina, Ullman, J. Widom, Pearson Education.
2. Database Systems: Design, Implementation, and Management, Peter Rob & Carlos Coronel, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Database Systems Using Oracle, Nilesh Shah, PHI Learning Pvt. Ltd., New Delhi.
4. Database Management Systems, R Ramakrishnan, J Gehrke, McGraw-Hill Education
5. Database Development and Management, Lee Chao, Auerbach Publications.

B.C.A. - Semester V
Computer Application
[*Paper: IV – Introduction to AI and Expert System*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Overview of Artificial Intelligence
Definition & Importance of Al, Intelligent Agents: Agents & Environments, Emergence of Intelligent Agents, PEAS Representation for an Agent, Types of Agents; Knowledge: General Concepts: Introduction, Definition and Importance of Knowledge, Knowledge-Based Systems and Representation of Knowledge, Knowledge Organization, Knowledge Manipulation and Acquisition of Knowledge.

Unit-II : Problem Solving and Search Strategies
Solving Problems by Searching, Examples of Search Problems, Problem Formulation, Uninformed Search Techniques- DFS, BFS, Iterative Deepening, Comparing Different Techniques, Informed search methods - heuristic Functions, Hill Climbing, Simulated Annealing, A*, Searching And-Or Graphs, Constrained Satisfaction Problems: Various CSP problems, map, Coloring, Crypt Arithmetic, Backtracking for CSP, Local Search, Adversarial Search: Games, Minimax Algorithm, Alpha Beta pruning.

Unit-III : Knowledge Representation, Reasoning and Structured Knowledge
Syntax and Semantics for Propositional logic, Syntax and Semantics for FOPL, Properties of Wffs, Unification, Forward and backward chaining, Conversion to Clausal Form, Inference Structured Knowledge: Graphs, Semantic Net. Associative Networks, Frames, Frame Structures, Conceptual Dependencies and Scripts.

Unit –IV : Learning and Planning
Learning from Observations, General Model of Learning Agents, Inductive learning, learning Decision Trees, Introduction to neural networks, Perceptrons, Multilayer feed forward network, Application of ANN, Planning problem, Planning with State Space Search, Partial Order Planning, Hierarchical Planning, Conditional Planning

Unit-V : Expert Systems Architectures
Introduction, Rule Based System Architecture. Non-Production System Architecture, Dealing with uncertainty. Knowledge Acquisition and Validation, Knowledge System Building Tools

Text Book:

1. Artificial Intelligence: A Modern Approach, S Russell & P Norvig, Pearson Publication
2. Principles of Artificial Intelligence, Nils J. Nilsson, Narosa Publication.
3. Introduction to Artificial Intelligence and Expert System, Dan W. Patterson.PHI.
4. Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGraw Hill.

Reference Books:

1. Al-Structures & Strategies for Complex Problem Solving, G Lugar. Pearson Educations
2. Artificial Intelligence: an Engineering approach, Robert J Schalkolf, McGraw Hill.
3. Artificial Intelligence, Patrick H Winston, 3rd edition, Pearson Educations
4. Decision Support Systems and Intelligent Systems, Efraim Turban Jay E.Aronson. PHI.
5. Artificial Intelligence-A System Approach, M.Tim Jones, Infinity Science Press
6. Artificial Intelligence - Strategies, Applications, and Models through Search, Christopher Thornton and Benedict du Boulay, New Age International Publications.

****

B.C.A. - Semester V
Computer Application
[*Paper: I – .Net Technology*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Programming with C#.net

Getting Started with Net Framework, Exploring Visual Studio NET, Inside a C# Program, Data Types, Statements, Arrays, Using Strings. Objects, Classes and Structs, Properties, Inheritance, Indexers, Delegates, Events. Namespaces, Generics, Collections and Data Structures. Exception Handling. Threading, Using Streams and Files, Reflection, Assemblies, versioning, Windows Forms, Controls, Data binding to Conrols, Advanced Database Programming using ADO.net, Using GDI +, Networking, net Remoting, Manipulating XML.

Unit-II : Programming with VB.net

Creating Applications with Visual Basic.NET, Variables, Constants, and Calculations, Making Decisions and Working with Strings, Lists. Loops, Validation, Sub Procedures and Functions Multiple Forms. Standard Modules, and Menus, Arrays, Timers, Form Controls. File Handling, Exception Handling, Working with Databases, Advanced Database Programming using ADO.net. Classes, Generics, Collections, Inheritance, Custom Controls, Crystal Reports

Unit-III : Programming with ASP.net

Building a Web Application, Examples Using Standard Controls, Using HTML Controls, Validating Form Input Controls using Validation Controls, Understanding Applications and Stcite, Applying Styles, Themes, and Skins, Creating a Layout Using Master Pages, Binding to Databases using Controls, Data Management with ADO.net , Creating a Site Navigation Hierarchy, Navigation Controls , Membership and Role Management, Login Controls, Securing Applications, Caching For Performance, XML, Using Crystal Reports in Web Forms.

Unit-IV : Database and .NET Technology

Data Access with LINQ to SQL : Automatic Properties, Initializers, Understanding type inference/lamda exp/generics/anonymous types, Creating LINQ to SQL Entities, Performing standard database commands with LINQ to SQL, Creating a custom LINQ entity Base Class, Standard Data-access operation, Performing Validation; Navigation Controls: Understanding Site Maps, SiteMapPath Control, Formating the SiteMapPath Control, Menu Control, Login Control: Automatically Redirecting a user to the Referring Page, Automatically Hiding the Login Control from Authinticated Users, Authenticated Users, Caching Application Pages and Data, Manipulating the Page Output Profiles, Localizing Applications for multiple languages, Forms- Based Authentication with the web.cofig file- with an xml file-with a database table.

Unit-V : Advanced Applications with .NET Technology

XML Web Services: Setting WebMethod Attribute, Setting WebServices Attribute, Invoking an XML Web Service with HTTP-Get, HTTP-Post & SOAP, XML Web Services Behavior, AJAX(Asynchronous JavaScript and XML): Server Side & Client Side Ajax, Ajax Toolkit, Setting up and implementing Ajax, SQL Server Administration: Setup Database server of a website, Converting data between MDF to DBO,DBO to XLS or in any other format, Backup and Restore of data, FTP Management, Setting up FTP Server (Live), Sending Emails, Designing email panel, How to send an email to various users, Sending auto emails.

Text Books:

1. Professional Visual Studio 2013, Bruce Johnson, Wrox Publication
2. Beginning ASP.NET 4.5.1: in C# and VB, Imar Spaanjaars, Wrox Publication
3. Professional C# 5.0 and .NET 4, C. Nagel, J Glynn, Morgan Skinner, Wrox Publication
4. Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald and Mario S, Wrox Publication
5. Pro ASP.NET MVC 3 Framework, Adam Freeman; Steven Sanderson, Apress
6. Professional ASP.NET MVC 3, Jon Galloway; Phil H; Brad Wilson; K. Scott Allen, Wrox

Reference Books:

1. Pro ASP.NET 4 in C# 2010, Matthew Mac Donald; Adam Freeman; Mario S, Apress
2. Microsoft® ASP.NET 4 Step by Step, George Shepherd, Microsoft Press
3. Programming Microsoft® ASP.NET 4, Dino Esposito, Microsoft Press

B.C.A. - Semester V

Computer Application

[*Paper: II – Data Mining and Warehousing*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Overview and Concepts:

Need for data warehousing, Basic elements of data warehousing, Trends in data warehousing. Planning And Requirements: Project planning and management, Collecting the requirements. Architecture And Infrastructure: Architectural components, Infrastructure and metadata.

Unit-II : Data Design and Data Representation:

Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality.

Unit-III : Information Access and Delivery:

Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web. Implementation and Maintenance: Physical design process, data warehouse deployment, growth and maintenance.

Unit-IV : Data Mining Introduction:

Basics of data mining, related concepts, Data mining techniques Data Mining Algorithms: Classification, Clustering, Association rules. Knowledge Discovery: KDD Process.

Unit –V : Web Mining:

Content Mining, Web Structure Mining, Web Usage mining. Advanced Topics: Spatial mining, Temporal mining. Visualization: Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining descriptive statistical measures in large databases Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Architectures of data mining systems Application and Trends in Data Mining: Applications, Systems products and research prototypes, Additional themes in data mining, Trends in data mining

Text Books:

1 Data Mining-Concepts & Techniques, J. Han & M Kamber, Morgan Kaufmann Pub
2 Introduction to Data Mining. P N Tan, M. Steinbach & Vipin Kumar, Pearson education
3 Data Mining Techniques - Arun K Pujari,2nd edition, Universities Press
4 Data Warehousing in the Real World - Sam Aanhory & Dennis Murray Pearson Edn

Reference Books:

1 Insight into Data Mining.K P.Soman,S.Diwakar.V.Ajay,PHI,2008
2 Data Warehousing Fundamentals - Paulraj Ponnaiah Wiley student Edition
3 Data Mining Introductory and Advanced Topics, Margaret H.Dunham, Pearson Education 2004
4 Principles of Data Mining, David Hand, Heikki Manila, Padhraic Symth, PHI 2004
5 Building the Data Warehouse. W.H.Inmon, Wiley, 2003.
6 Data Warehousing, Data Mining & OLAP, Alex Bezon, Stephen J Smith, MeGraw-Hill.

B.C.A. – Semester VI

Computer Application

[*Paper: III – Current Trends and Technology in Computer Science*]

Max. Marks: 80 **Min. Marks: 28** **Hours 45; Credit-3**

Unit-I : Fundamentals of advanced computing

System models for advanced computing -clusters of cooperative computing, grid computing and cloud computing; software systems for advanced computing-service oriented software and parallel and distributed programming models with introductory details, Features of grid and clpttoplatform.

Unit-II : Grid Computing

Grid Architecture and Service modeling, Grid resource management, Grid Application trends, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps, Review of Web Services-OGSA-WSRF.

Unit-III : Grid Monitoring

Grid Monitoring: Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridlCE - JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridM.

Unit-IV : Cluster Computing

Introduction: Overview of Cluster Computing, The Role of Clusters, Definition and Taxonomy Of Parallel Computing, Hardware System Structure, Node Software, Resource Management, Distributed Programming, Limitations, Cluster Planning, Architecture , Node Hardware and Node Software, Design Decisions.

Unit-V : Cloud Computing

Cloud Computing services models and features in Saas, Paas and laas; Service oriented architecture and web services; Features of cloud computing architectures and simple case studies, Virtualization- Characteristic features, Taxonomy Hypervisor, Virtualization and Cloud Computing, Pros and Cons of Cloud Computing, Technology Examples/Case Studies.

Text Books:

1. Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.
2. Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S Tanurai Selvi, TMH, 2012.
3. Beowulf Cluster Computing with Linux, William Gropp, Ewing Lusk, Thomas Sterling, MIT Press, 2003
4. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education 2004. 5. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons , 2005.

Reference Books:

1. Cloud Computing, John W. Ritting House and James F Ramsome, CRC Press, 2012Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2012.
2. In Search of Clusters: The ongoing battle in Lowly Parallel Computing, Gregory F P Fister, Second Edition, Prentice Hall Publishing Company, 1998.
3. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - 2004.
4. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons

B.C.A. - Semester VI
Computer Application
[Project: Major Project]

Max. Marks: 100 **Min. Marks: 34**

It is compulsory, that students would have group of maximum of two students and project should be done under Government Sectors/ Public Sector / Pvt. Limited SAA/ Company/ Software Technology Park of India/ ISO 9001 certified company only.

The students should not make any project under local or private institutions.
The students should make project themselves and project will not be copy of other project.

Steps for Live Project

1. Getting customer's requirements
2. Designs, database and business logics
3. Developing software application project
4. Testing and implementing the project
5. Troubleshooting the project application after Implementation

****

Session 2021-23 Skill Based Course

NETWORK SECURITY AND CYBER TECHNOLOGY

Unit-I
Fundamentals of Network Security

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality. Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms A model for Internetwork security, Internet Standards and RFCs.

Unit-II
Conventional AND Encryption Principles

Conventional encryption algorithms, cipher block modes of operation, location of encryption dev ces key distribution Approaches of Message Authentication, Hash Functions and HMAC.

Unit -III
Public key cryptography principles

Public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service, Email privacy: Pretty Good Privacy (PGP) and S/MIME.

Unit-IV
IP Security Overview

IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management, Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Unit-V
Cyber Laws in India

Information Technology Act, 2000 - a brief overview; Documents or transactions to which IT Act shall not be applicable; meaning of Computer, Computer system and Computer network; E - commerce; E - governance; Concept of Electronic Signature; Concept of Cyber contraventions and Cyber Offences, E- Contract - legal provisions regulating the e - contract with special reference to the provisions of IT Act, 2000.

Text Books:

1. Network Security Essentials (Applications and Standards), William Stallings Pearson Education.
2. Hack Proofing your network, Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, Wiley Dreamtech
3. Internet Law-Text and Materials, Chris Reed, Universal Law Publishing Co., New Delhi
4. Hand book of Cyber Laws, Vakul Sharma, Macmillan India Ltd, New Delhi

Reference Books:

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.
2. Network Security - Private Communication in a Public World, Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Cengage Learning.
5. IT and Indian Legal System, Kamiesh N. & Murali D.Tiwari(Ed), Macmillan India Ltd, New Delhi
6. The Internet: A User's Guide (2003), K.L.James, Prentice Hall of India, New Delhi
7. Computer Contract & IT Laws (in 2 Volumes), S.V.Joga Rao, 2005 Prolific Law Publications, New Delhi

Session 2022-23 Skill Based Course

SEMESTER VI

COMPUTER FUNDAMENTALS AND PC PACKAGE

UNIT-I

Basic of Computer Device

What is computer?, Components of computer system:-input devices ,output devices and CPU .Generation of computer, Types of computer, Characteristics and limitation of computer..

Computer memory

Primary Memory:-RAM and ROM, Secondary Storage:-Hard Disk Drive, CD,DVD,BRD,Optical Disk,Magnetic Tape, Magnetic disks.

Input /Output Devices

Keyboard ,mouse ,monitor ,trackball ,joystick, scanner(MICR,OCR,OMR,Bar code reader),printer and types of printer,plotter,light pen,touch screen.

UNIT-II

Basic of Computer Software

Introduction to software ,types of software:-System software and application software, Operating System, utilities software,word processing software,spreadsheet software,presentation software,database software.Virus and types of virus, malicious software.

UNIT-III

Introduction to MS Word

Documents and document Types,Menus,shortcuts, Working with Documents:Opening-new and existing file,Save file.

Working with text documents-Inserting, Deleting,cut,copy,paste,undo redo,

UNIT-IV

Introduction to MS Excel

Working with Spreadsheet and its Application, Working with spreadsheet-openings, saving file

Itroduction to MS Powerpoint

Application of Power point presentation, Creating new presentation, different presentation templates, setting backgrounds, Formatting a presentation-Adding style, Color, gradient fills, Adding header and footer,slide background,slide layout,Inserting pictures, movies, tables etc.Setting animation and transaction effect.

UNIT-V

Introduction to Web Component

Introduction of internet, Network, Types of Network, HTTP, Www, URL, HTML, Web Browser, FTP

Proxy Server ,e-mail.

----------00----------