

PROGRAMME: THREE-YEAR **BCA - Bachelor of Computer Application**

SYLLABUS & REGULATIONS

(with effect from the batch admitted in the academic year 2026-27)
CHOICE BASED CREDIT SYSTEM (CBCS) Regulations-2016



Dr B.R. Ambedkar Open University

Eluru - Andhra Pradesh, India

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(with effect from the batch admitted in the academic year 2026-27)

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BCA - Bachelor of Computer Application

EMESTER – I

Sl.No.	Course	Name of the Subject	Total Marks	Mid Sem	Sem End	Teaching Hours	Credits
1.	First Language	English	100	25	75	4	3
2.	Second Language	Telugu	100	25	75	4	3
3.	Skill Skills		50	---	50	2	2
4.	Skill Development Courses		50	---	50	2	2
5.	BCA-101	Computer Fundamentals and Office Tools	100	25	75	5	4
6.	BCA-102	Programming in 'C'	100	25	75	5	4
7.	BCA-103	Numerical and Statistical Methods	100	25	75	5	4
		Total	600	125	475	27	22

SEMESTER – II

Sl.No.	Course	Name of the Subject	Total Marks	Mid Sem	Sem End	Teaching Hours	Credits
1.	First Language	English	100	25	75	4	3
2.	Second Language	Telugu	100	25	75	4	3
3.	Skill Skills		50	---	50	2	2
4.	Skill Development Courses -1		50	---	50	2	2
	Skill Development Courses -2		50	---	50	2	2
5.	BCA-201	Data Structures	100	25	75	5	4
6.	BCA-202	Introduction to Python Programming	100	25	75	5	4
7.	BCA-203	Database Management Systems	100	25	75	5	4
		Total	650	125	525	29	24



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SEMESTER – III

Sl.No.	Course	Name of the Subject	Total Marks	Mid Sem	Sem End	Teaching Hours	Credits
1.	First Language	English	100	25	75	4	3
2.	Second Language	Telugu	100	25	75	4	3
3.	Skill Skills - 1		50	---	50	2	2
	Skill Skills - 2		50	---	50	2	2
4.	Skill Development Courses		50	---	50	2	2
5.	BCA-301	Accounting and Financial Management	100	25	75	5	4
6.	BCA-302	Object Oriented Programming Through Java	100	25	75	5	4
7.	BCA-303	Operating Systems	100	25	75	5	4
		Total	650	125	525	29	24

SEMESTER – IV

Sl. No.	Course	Name of the Subject	Total Marks	Mid Sem	Sem End	Teaching Hours	Credits
1.	BCA-401	Cyber Laws	100	25	75	5	4
2.	BCA-402	Data Warehousing and Data Mining	100	25	75	5	4
3.	BCA-403	Web Programming	100	25	75	5	4
4.	BCA-404	Data Communication and Networks	100	25	75	5	4
5.	BCA-405	Data Analytics using R	100	25	75	5	4
6.	BCA-405	Object Oriented Software Engineering	100	25	75	5	4
		Total	600	150	450	30	24



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SEMESTER – I

Paper BCA 101: Computer Fundamentals and Office Tools

Course Outcomes

Describe the usage of computers and why computers are essential components in business and society.

Identify categories of programs, system software and applications. Organize and work with files and folders.

Compose, format and edit a word document and working with macros.

Create work sheets and using various functions.

Make presentations and inserting multimedia in them.

Unit-I: Basic of Computer

Introduction: Characteristics of Computer, The evolution of Computers, The Computer Generations.

Basic Computer Organization: Input Unit, Output Unit, Storage Unit, Arithmetic Logic Unit, Control Unit, Central Processing Unit.

Secondary Storage Devices: Magnetic Disk, Optical Disk. Magneto optical Disk, Mass Storage Devices, Flash Drive and Other related Concepts.

Unit-II: Computer Software, Languages & OS

Computer Software: Types of Software, Logical systems Architecture, Acquiring Software, Software developmental Steps, Software Engineering.

Computer Languages: Machine Language, Assembly Language, High Level Language, Some High Level Languages, Characteristics of good Programming Language.

Operating Systems: What is an Operating System, Process Management, Some Popular Operating Systems.

Unit-III: MS Word

MS-Word: Features of MS-Word, MS-Word Window components, working with formatted text, Shortcut keys, Formatting documents: Selecting text, Copying & moving data, Formatting characters, changing cases, Paragraph formatting, Indents, Drop Caps, Using format painter, Page formatting, Header & footer, Bullets & numbering, Tabs, Forming tables. Finding & replacing text, go to (F5) command, proofing text (Spell check, Auto correct), Reversing actions, Macros, Inserting pictures, Hyper links, Mail merging, Printing documents.

Unit-IV: MS Excel

MS-Excel: Excel Features, Spreadsheets, workbooks, creating, saving & editing a workbook, Renaming sheet, cell entries (numbers, labels, and formulas), spell check, find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting work sheet, Functions and its parts, Some useful Functions in excel (SUM, AVERAGE, COUNT, MAX, MIN, IF), Cell referencing (Relative, Absolute, Mixed), What-if analysis Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet.

Unit-V: MS Power Point

MS-Power Point: Features of Power Point, Uses, components of slide, templates and wizards, using template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using master slide, adding slides, changing color scheme, changing background and shading, adding header and footer, adding clip arts and auto shapes. Various presentation, Working in slide sorter view (deleting, duplicating, rearranging slides), adding transition and animations to slide show, inserting music or sound on a slide, viewing slide show, Printing slides.

PAPER - BCA 102: Programming in 'C'

Course Outcomes

Upon successful completion of this course, students will be able to;

- Understand the basic terminology used in computer programming.
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Understand the dynamics of memory by the use of pointers and Structures.
- Apply different operations in File handling.

Unit-I

Introduction to Algorithms and Programming Languages: Algorithm - Key features of Algorithms - examples of Algorithms, Flow Charts - Pseudo code, Programming Languages - Generation of Programming Languages - Structured Programming Language. **Introduction to C:** Introduction - Structure of C Program, Writing the first C Program, File used in C Program - Compiling and Executing C Programs, Using Comments - Keywords - Identifiers, Basic Data Types in C, Variables - Constants, I/O Statements in C, Operators in C, Programming Examples, Type Conversion and Type Casting.

Unit-II

Control Structures and Functions: Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement - Goto Statement. **Functions:** Introduction, Using functions - Function declaration/ prototype - Function definition, Function call - Return statement - Passing parameters, Scope of variables, Storage Classes, Recursive functions.

Unit-III

Arrays and Strings: Arrays: Introduction, Declaration of Arrays, Accessing elements of the Array - Storing Values in Array, Calculating the length of the Array, Operations that can be performed on Array, One dimensional array, Accessing one dimensional array, Passing one dimensional array to function, Two dimensional Arrays, Accessing two dimensional arrays, Passing two dimensional arrays to functions. **Strings:** Introduction, String Operations using String functions.

Unit-IV

Pointers, Structures and Unions: Pointers: Understanding Computer Memory - Introduction to Pointers, Declaring Pointer Variable, Pointer Expressions and Pointer Arithmetic - Null Pointers, Passing Arguments to Functions using Pointer, Pointer and Arrays - Passing Array to Function, Memory Allocation in C Programs, Memory Usage - Dynamic Memory Allocation, Drawbacks of Pointers. **Structures:** Introduction to structures, Nested Structures. **Union, and Enumerated Data Types:** Introduction to Union - accessing union elements, Enumerated Data Types.

Unit-V

File Handling: Files: Introduction to Files, Using Files in C, Reading Data from Files, Writing Data from Files, Detecting the End-of-file, Error Handling during File Operations.

PAPER - BCA 103: Numerical and Statistical Methods

Course Outcomes

- Skill to choose and apply appropriate numerical methods to obtain appropriate solutions to difficult mathematical problems.
- Ability to apply various statistical techniques such as Measures of Central Tendency and Dispersion.
- Understanding of relationship between variables using the method of Correlation and Fit Analysis.
- Skill to execute programs of various Numerical Methods and Statistical techniques for

Unit-1: Solution of Equations

Solution of equations (polynomial and transcendental equations) interval having methods, secant, Regula - Falsi, Newton - Raphson methods, Fixed point Iteration method.

Unit-2: Solution of System of Linear Equations

Solution of system of linear equations: Gauss - Elimination method, Gauss - Jordan, Gauss - Siedel iteration method, LU- Decomposition method, Eigen values and Eigen vectors of a square matrix.

Unit-3: Interpolation

Forward and backward differences, Newton's forward and backward formula, Lagrange's interpolation and Lagrange's inverse interpolation formula.

Numerical differentiation, integration: Numerical differentiation forward and backward formula,

Trapezoidal and Simpsons formulas.

Unit-4: Statistical Methods

Basic concepts and definition of statistics : Mean ,Median , Mode , standard deviation ,coefficient of variation ,skewness and kurtosis ,Karl Pearson Correlation coefficient ,Rank Correlation and illustrated examples .

Unit-5: Probability

Basic concepts and definition of probability , Probability axioms, Conditional probability , Addition and Multiplication theorem of probability (Based on set theory concepts) , Bayes theorem , problems and applications .

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SEMESTER – II

Paper BCA 201 : Data Structures

Course Objectives

To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms. In addition, another objective of the course is to develop effective software engineering practice, emphasizing such principles as decomposition, procedural abstraction, and software reuse.

Course Outcomes: After completing this course satisfactorily, a student will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
2. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees
5. Compare alternative implementations of data structures with respect to performance
6. Compare and contrast the benefits of dynamic and static data structures implementations
7. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.
8. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.

Unit-I

Concept of Abstract Data Types (ADTs)- Data Types, Data Structures, Primitive and Non-primitive Data Structures, Linear and Non-linear Structures.

Linear Lists - ADT, Array and Linked representations (Single and Double Linked lists), Pointers.

Unit-II

Stacks: Definition, Stacks using Array and Linked representations, expressions, notations.

Queues: Definition, Queue using Array and Linked representations, Circular Queues, Dequeues.

Unit-III

Trees: Binary Tree, Definition, Properties, Trees using Array and Linked representations, Implementations and Applications, Heaps Trees.

Binary Search Trees (BST) - Definition, Operations and Implementations. B Trees, B+ Trees Implementation

UnitIV

Graphs - Graph and its Representation, Graph Traversals, Connected Components, Basic Searching Techniques, Minimal Spanning Trees.

Unit-V

Sorting and Searching: Selection, Insertion, Bubble, Merge, Quick, Sequential and Binary Searching.

Paper BCA 202 : Introduction to Python Programming

Course outcomes

After successful completion of this course, the students will be able to:

CO 1: Summarize the fundamental concepts of python programming. [K2]

CO 2: Interpret object oriented and event driven programming in python. [K2]

CO 3: Apply the suitable data structures to solve the real time problems. [K3]

CO 4: Apply regular expressions for many different situations. [K3]

Unit-I

Introduction to python: Numbers, strings, variables, operators, expressions, Indentation, String operations and functions, math function calls, Input/output statements, conditional if, while and for loops,

Unit-II

Functions: user defined functions, parameters to functions, recursive functions, and lambda function.

Event driven programming: Turtle graphics, Turtle bar chart, Widgets, key press events, mouse events, timer events.

Unit-III

Data structures: List- list methods & functions, Tuple-tuple methods & functions, Dictionaries-dictionary methods & functions, traversing dictionaries. Sets-methods & functions, Files

Unit-IV

OOP: class, object, methods, constructors, inheritance, inheritance types, polymorphism, operator overloading, abstract classes, exception handling.

Unit-V

Regular expressions: Power of pattern matching and searching using regex in python, Meta characters and Sequences used in Patterns, Password, email, URL validation using regular expression, Pattern finding programs using regular expression.

Paper BCA 203 : Database Management Systems

Course Objective:

Design & develop database for large volumes & varieties of data with optimized data processing techniques.

Course Outcomes

On completing the subject, students will be able to:

1. Design and model of data in database.
2. Store, Retrieve data in database.

UNIT I

Overview of Database Management System: Introduction, file-based system, Drawbacks of file-Based System, Data and information, Database, Database management System, Objectives of DBMS, Evaluation of Database management System, Classification of Database Management System, DBMS Approach, advantages of DBMS, data models, Components and Interfaces of Database Management System. Database Architecture, Situations where DBMS is not Necessary.

UNIT II

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, aggregation and composition, entity clusters, connection types, advantages of ER modelling.

UNIT III

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC). QBE

UNIT IV

Structured Query Language: Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Table Truncation, Imposition of Constraints, Join Operation, Set Operation, View, Sub Query, Embedded SQL,

UNIT V

PL/SQL: Introduction, Shortcoming in SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Cursors, Steps to create a Cursors, Procedure, Function, Packages, Exceptions Handling, Database Triggers, Types of Triggers.

Reference Books

1. "Database System Concepts" by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill, 2010, 9780073523323
2. "Database Management Systems" by Raghu Ramakrishnan, McGrawhill, 2002,
3. Database Management Systems by Dr. P. Santosh Kumar Patra, Spectrum Techno Press
4. Fundamentals of Relational Database Management Systems by S. Sumathi, S. Esakkirajan, Springer Publications
5. "An Introduction to Database Systems" by Bipin C Desai
6. "Principles of Database Systems" by J. D. Ullman
7. "Fundamentals of Database Systems" by R. Elmasri and S. Navathe

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SEMESTER – III

Paper BCA 301 : Accounting and Financial Management

Unit-I

Accounting-Scope-Nature- Objective-Principle concepts-Users of Accounting Information-
Classification of Accounts-Journal-Ledger-Trial balance

Unit-II

Financial Statements- Capital and Revenue Items- Construction of Trading and Profit & Loss
Account and Balance- Sheet- Accounting for Intangible Assets

Unit-III

Elements of Cost- Classification of Costs- Marginal Costing- Activity Based Costing

Unit-IV

Functional and Activity Based Budgeting- Standard Costing and Variance Analysis

Unit-V

Computerisation of Accounts- Advantages- Disadvantages- Accounting Information System
– Use of Tally Packages.

Paper BCA 302 : Object Oriented Programming Through Java

Unit-1

Introduction to OOP, Procedural Programming Language and Object Oriented Language, principles of OOP, Applications of OOP, History of JAVA, JAVA features, JVM, program Structure. Variables, Primitive Data Types, Identifiers, Literals, Operators, Expressions, Precedence Rules and Associativity, Primitive Type Conversion and Casting, Flow of Control. Classes and Objects, Class declaration, Creating Objects, Methods, Method Overloading.

Unit-II

Constructor, Overloading, Garbage Collector, Importance of Static Keyword and this keywords, Examples, Arrays, Command Line Arguments, Nested Classes.

Inheritance & Polymorphism: Basic concepts of Inheritance, Member access, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, Relationship, Creating Multilevel Hierarchy, super uses, using final with Inheritance, Polymorphism, Runtime polymorphism, pure polymorphism, method overriding, abstract classes & Methods, Object class

Packages: Defining a Package, PATH, CLASSPATH, Difference between PATH and CLASS PATH, Access protection, importing packages.

Unit-III

Interfaces: Defining an interface, implementing interfaces, Nested interfaces, variables in interfaces and extending interfaces, Multiple inheritances of interfaces, Difference between Abstract class & Interfaces.

Exception handling: Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multithreading: Thread Introduction, Differences between thread-based multitasking and process-based multitasking, Thread life cycle, creating threads using Thread class and Runnable Interface, Thread Priorities, synchronizing threads, inter thread communication.

Unit-IV

Files: Reading data from files and writing data to files, Random Access File

Applet: Applet class, Applet structure, Applet life cycle, Sample Applet programs. Event handling: Event delegation model, Sources of event, Event Listeners, Adapter classes, Inner classes.

Paper BCA 303 : Operating Systems

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Apply optimization techniques for the improvement of system performance.
2. Ability to design and solve synchronization problems.
3. Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput by keeping CPU as busy as possible.
4. Ability to change access controls to protect files.
5. Ability to compare the different operating systems

Unit-I: Introduction to Operating System

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Unit-II: Process and CPU Scheduling

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

System call interface for process management-fork, exit, wait, waitpid, exec.

Unit-III: Deadlocks

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

Unit-IV: Memory Management and Virtual Memory

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

Unit-V: File System Interface and Operations

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls. Case Study-Linux: Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Inter-process Communication.

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SEMESTER – IV

Paper BCA 401 : Cyber Laws

COURSE OBJECTIVES

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

COURSE OUTCOMES

1. The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
2. The students will learn the rights and responsibilities as an employee, team member and a global citizen.

Unit-I: Introduction to Computer Security

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

Unit-II: Secure System Planning and Administration

Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

Unit-III: Information Security Policies and Procedures

Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy developing standards.

Unit-IV: Information Security

Fundamentals-Employee responsibilities- information classification- Information handling- Tools of information security- Information processing-secure program administration.

Unit-V: Organizational and Human Security

Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

Paper BCA 402 : Data Warehousing and Data Mining

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Demonstrate the functionalities of data mining and the need of data warehouse.
2. Extract interesting patterns from large amounts of data.
3. Explain various classification algorithms
4. Apply clustering algorithm for mining applications.
5. Describe complex types of data and applications of data mining.

Unit-I: Data Mining and Data Warehouse

Data–Types of Data–, Data Mining Functionalities–Interestingness Patterns–Classification of Data Mining systems–Data mining Task primitives–Integration of Data mining system with a Data ware house–Major issues in Data Mining–Data Pre-processing. Introduction to Data warehousing, Difference between operational Database Systems and Data Warehouses, A Multidimensional Data Model, Data warehouse Architecture.

Unit-II: Association Rule Mining

Mining Frequent Patterns–Associations and correlations–Mining Methods– Mining Various kinds of Association Rules – Correlation Analysis–Constraint based Association mining. Graph Pattern Mining, SPM.

Unit-III: Classification

Classification and Prediction– Basic concepts– Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner, Support vector Machines.

Unit-IV: Clustering and Applications

Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Outlier Analysis.

Unit-V: Mining Complex types of Data

Mining Time-Series and Sequence Data, Mining Spatial Data mining, Mining Multimedia, Mining Text Databases, Mining the world wide web, Data Mining Applications, Trends in Data Mining.

Paper BCA 403 : Web Programming

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Gain knowledge of client side scripting, validation of forms and AJAX programming
2. Have understanding of server side scripting with PHP language
3. Have understanding of what is XML and how to parse and use XML Data with Java
4. To introduce Server side programming with Java Servlets and JSP

Unit-I: Scripting

Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script- Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML5- CSS3- HTML 5 canvas - Web site creation using tools. Introduction to PHP Declaring variables, Data types, arrays, string operations, control structures, functions, Connecting to database(MySQL), executing simplequeries, handling results.

Unit-II: Java

Introduction to object-oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming –Input/Output– Files– Utility Classes– String Handling.

Unit-III: JDBC

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets – UDP sockets, Java Beans –RMI.

Unit-IV: Applet

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – Interface(Common Gate Way CGI) ,life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

Unit-V: XML and Webservices

Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services- UDDI- WSDL-Java web services – Web resources. Parsing XMLData: DOM and SAX in Java.

Paper BCA 404 : Data Communication and Networks

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Students should be understand and explore the basics of Computer Networks and various protocols. She/he will be in a position to understand the World Wide Webconcepts.
2. Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and adhoc networks.

Unit-I: Data Communications

Data Communications: Internet history and administration, Protocols and Standards Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN Physical layer: Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

Unit-II: Data Link Layer

Data link layer: Bridges, repeaters, hubs, bridges routers and gateways, Framing, and Error – Detection and Correction – Parity – LRC– CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN– Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.

Unit-III: Network Layer

Network layer: Logical Addressing, Internetworking, Tunnelling, Address mapping, ICMP,IGMP, ARP, RARP, DHCP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

Unit-IV: Transport Layer

Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

Unit-V: Application Layer

Application Layer: Introduction ,providing services, Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP,SSH.

Paper BCA 405 : Data Analytics using R

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. To carry out standard data visualization and formal inference procedures
4. Design Data Architecture; Understand various Data Sources

Unit-I: Data Management

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing & Processing.

Unit-II: Data Analytics

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

Unit-III: Regression

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc. Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

Unit-IV: Object Segmentation

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

Unit-V: Data Visualization

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Paper BCA 406 : Object Oriented Software Engineering

COURSE OUTCOMES

1. To understand software process models such as waterfall and evolutionary models.
2. To understand software requirements and SRS document.
3. Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
4. To understand software testing approaches such as unit testing and integration testing.
5. To understand quality control and how to ensure good quality software through quality assurance.

Unit-I: Introduction to Software Engineering

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Unit-II: Software Requirements

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioral models

Unit-III: Design Engineering

Design Engineering: Design process and design quality, design concepts, the design model.

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modelling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

Unit-IV: Testing Strategies

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, Unit Testing, Integration Testing, validation testing, system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

Metrics for Process and Products: Software measurement, metrics for software quality

Unit-V: Risk Management

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.