
CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY
KANPUR



SYLLABUS
(B.C.A)

BACHELORS OF COMPUTER
APPLICATION

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY
SCHOOL OF ENGINEERING & TECHNOLOGY

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY

SCHOOL OF ENGINEERING & TECHNOLOGY

Vision

To achieve excellence in engineering education, empower students to be technically competent professionals and entrepreneurs with strong ethical values so as to significantly contribute as agents for universal development and societal transformation

Mission

To provide affordable quality education at par with global standards of academia and serve society with harmonious social diversity

To encourage new ideas and inculcate an entrepreneurial attitude amongst the students, and provide a robust research ecosystem

To practice and encourage high standards of professional ethics and accountability amongst students

Program Outcomes (PO's)

- **PO1: Computing knowledge** Apply the knowledge of computing fundamentals to Identify, formulate, and solve problems in the areas of computer applications.
- **PO2: Problem Analysis and Design of solutions** Apply analytical skills in solving computer based problems using fundamentals of computer science and application domains.
- **PO3: Modern tool usage:** Ability to select and apply modern IT Tools and technologies for innovative software solutions and applications.
- **PO4: Technical Skill Development** To develop and sharpen their IT/ programming, networking and data management skills required for identifying problems and issues relating to the????Disciplinary area and field of study/ higher education.
- **PO5: Societal Concern:** Recognize & appreciate the role of computing to design state-of-the-art methodologies for solving real life problems for the betterment of the society.
- **PO6: Environment and Sustainability** Actively involved with knowledge, skills and right attitude to give sustainable solutions for the benefit of environment.
- **PO7: Ethics:** Pertain ethical principles and entrust to professional ethics and responsibilities in a global economic environment.
- **PO8: Individual and team work** Ability to work effectively as an individual, and in assorted teams.
- **PO9: Communication:** Development of good communication skills in both written and verbal form in a substantial technical manner.
- **PO10: Life-long learning** Ability to engage in independent and life-long learning through professional activities.

PSO's

- **PSO1: Multimedia Applications** Professionally trained in the areas of multimedia, animation, web designing, effective media management, and to acquire knowledge in various domain multimedia applications.
- **PSO2:** Develop competence in the field of, system analysis and design, multimedia and graphics, web design, data & information security, networking, and recent areas of cloud computing.
- **PSO3:** To be able to understand problem, think of best suitable approach to solve the problem, develop and evaluate effective solutions as per the local/regional/ national/ global requirements and availability of resources/ technologies.

Programme Educational Objectives (PEO)

- **PEO-1** The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Science and Engineering.
- **PEO-2** The graduates will provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.
- **PEO-3** The graduates will become employable, successful entrepreneur as an outcome of Industry-Academia collaboration.
- **PEO-4** The graduates will embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities.

Semester-Ist

| Course Code | Course Name | L | T | P | C |
|-------------|---|---|---|---|----|
| BCA-1001 | Computer Fundamental & Problem solving Techniques | 3 | 0 | 0 | 3 |
| BCA-1002 | C Programming | 3 | 0 | 0 | 3 |
| BCA-1003 | Principle of Management | 4 | 0 | 0 | 4 |
| BCA-1004 | Business Communication | 3 | 1 | 0 | 4 |
| BCA-1005 | Mathematics –I | 4 | 0 | 0 | 4 |
| BCA-1001P | Computer Laboratory and Practical Work of Office Automation | 0 | 0 | 3 | 2 |
| BCA-1002P | Computer Laboratory and Practical Work of C Programming | 0 | 0 | 3 | 2 |
| | | | | | 22 |

Semester-IInd

| Course Code | Course Name | L | T | P | C |
|-------------|---|---|---|---|----|
| BCA-2001 | Object Oriented Programming Using C++ | 3 | 0 | 0 | 3 |
| BCA-2002 | Internet Technology and Web Design | 3 | 1 | 0 | 4 |
| BCA-2003 | Organization Behavior | 4 | 0 | 0 | 4 |
| BCA-2004 | Financial Accounting & Management | 3 | 1 | 0 | 4 |
| BCA-2005 | Mathematics II | 4 | 0 | 0 | 4 |
| BCA-2001P | Computer Laboratory and Practical Work of C++ Programming | 0 | 0 | 6 | 3 |
| | | | | | 22 |

Semester-IIIrd

| Course Code | Course Name | L | T | P | C |
|-------------|--|---|---|---|----|
| BCA-3001 | Python Programming | 3 | 0 | 0 | 3 |
| BCA-3002 | Data Structure Using C & C++ | 3 | 0 | 0 | 3 |
| BCA-3003 | Operating System | 3 | 1 | 0 | 4 |
| BCA-3004 | Digital Electronics & Computer Organization | 3 | 1 | 0 | 4 |
| BCA-3005 | Elements of Statistics | 3 | 1 | 0 | 4 |
| BCA-3001P | Computer Laboratory and Practical Work of Python | 0 | 0 | 3 | 2 |
| BCA-3002P | Computer Laboratory and Practical Work of DS | 0 | 0 | 3 | 2 |
| | | | | | 22 |

Semester-IVth

| Course Code | Course Name | L | T | P | C |
|-------------|-------------------------------------|---|---|---|----|
| BCA-4001 | Computer Graphics & Animation | 3 | 1 | 0 | 4 |
| BCA-4002 | Database Management System | 3 | 0 | 0 | 3 |
| BCA-4003 | Software Engineering | 3 | 1 | 0 | 4 |
| BCA-4004 | Optimization Techniques | 3 | 1 | 0 | 4 |
| BCA-4005 | Mathematics-III | 4 | 0 | 0 | 4 |
| BCA-4001P | Computer Graphics & DBMS Laboratory | 0 | 0 | 6 | 3 |
| | | | | | 22 |

Semester-Vth

| Course Code | Course Name | L | T | P | C |
|-------------|---|---|---|---|----|
| BCA-5001 | Knowledge Management | 3 | 1 | 0 | 4 |
| BCA-5002 | Java Programming and Dynamic Webpage Design | 3 | 0 | 0 | 3 |
| BCA-5003 | Computer Network | 3 | 1 | 0 | 4 |
| BCA-5004 | Numerical Methods | 3 | 1 | 0 | 4 |
| BCA-5005 | Minor Project | 0 | 1 | 2 | 2 |
| BCA-5006 | Viva-Voice on Summer Training | 0 | 0 | 2 | 1 |
| BCA-5002P | Computer Laboratory and Practical Work of Java Programming & Dynamic Webpage Design | 0 | 0 | 6 | 3 |
| | | | | | 21 |

Semester-VIth

| Course Code | Course Name | L | T | P | C |
|-------------|---|---|---|---|----|
| BCA-6001 | Information & Cyber Security | 4 | 0 | 0 | 4 |
| BCA-6002 | Internet Of Things | 3 | 1 | 0 | 4 |
| BCA-6003 | E-Commerce | 4 | 0 | 0 | 4 |
| BCA-6004 | Data Science and Machine Learning | 3 | 1 | 0 | 4 |
| BCA-6005 | Major Project | 0 | 3 | 6 | 5 |
| BCA-6006 | Presentation/Seminar based on Major Project | | | | 1 |
| | | | | | 22 |

| | |
|-----|---|
| CO1 | Describe the usage of computers and why computers are essential components in business and society. |
| CO2 | Understanding the concept of Computer memory and input/output devices of Computers and how it works and recognize the basic terminology used in computer programming. |
| CO3 | Demonstrate the use of Operating system commands. Understand the basic concepts of computational thinking, including sequential logic, abstractions and problem-solving techniques. |
| CO4 | Possess the ability to design and develop programs to solve basic computational problems, develop algorithms and flowcharts. Explain the working of important application software and their use to perform any engineering activity. |
| CO5 | Possess the ability to extend their knowledge towards learning behavior on windows operating system and Hands on training on MS Office Automation. |

Course Outcomes: At the end of the course, the student will be able to,

UNIT-I

Introduction to Computers

Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Data Organization, Drives, Files, Directories, Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Binary Arithmetic Simple Addition, Subtraction, Multiplication

UNIT-II

Memory Organization

Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display). Cache, Virtual memory, RAID.

UNIT-III

Operating System and Services in O.S.

History, Files and Directories, DOS (Internal and External Commands), Batch Files, Types of Operating System, File Management System. Introduction to Linux – Features of Linux , Components of Linux

UNIT-IV

Problem solving techniques

Understanding the problem, Analyzing the problem, Developing the solution, **Algorithm and Flowcharts** - Definition, Characteristics, Expressing Algorithms, Analysis of Algorithms, Advantages and disadvantages, Examples Flowchart: Definition, Define symbols of flowchart, Limitations of Using Flowcharts, Advantages and disadvantages, Activities involved in Program Design, Coding and implementation.

UNIT-V

Windows Operating Environment & Office Automation

Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush, MS-Word, Purpose, usage, command, MS-Excel, MS-Access, , MS-PowerPoint.

Referential Books :

1. Fundamental of Computers – By V. Rajaraman B.P.B. Publications
2. Fundamental of Computers – By P.K. Sinha
3. Computer Today- By SureshBasandra
4. Unix Concepts and Application – By SumitabhaDas
5. MS-Office 2000(For Windows) – By SteveSagman

| Course Code | Course Name | L | T | P | C |
|-------------|---------------|---|---|---|---|
| BCA-1002 | C Programming | 3 | 0 | 0 | 4 |

Course Outcomes: At the end of the course, the student will be able to:

| COs | Description |
|-----|--|
| CO1 | Able to understand the basic knowledge of Computer fundamental and its application in computers. |
| CO2 | Able to understand the basic knowledge of Computer fundamental and its application in computers. |
| CO3 | Able to design and develop various programming problems using C programming concepts. |
| CO4 | Able to Implement advance C programming concepts like function, pointer, structure and Union |
| CO5 | Able to understand the file handling using C Programming language. |

UNIT-I

Fundamentals of C programming and Control Structures: History, Structure of a C program, C Conventions, Character Set, Identifiers, Keywords, Simple Data types, Modifiers, Variables, Constants, Operators, Operator precedence. Input and Output operation: Single character input and output, formatted input and output. Control Structures, Conditional statement and switch statement. Goto statement. Looping statement, break and continue, nested for statement.

UNIT-II

Arrays and Functions: Introduction (One and multi-dimensional), Declaration of arrays, Initialization of arrays, processing with arrays. String manipulation, declaration of string arrays, string operations. Functions: Introduction, advantages of functions, Function definition, function call, Actual and formal arguments, local and global variables, function prototypes, types of functions, recursive functions, arrays and functions.

UNIT-III

Searching and Sorting: selection sort, bubble sort, insertion sort, quick sort, merge sort Searching: linear and binary search methods, comparison of sorting and searching methods.

UNIT-IV

Structures and Pointers: Introduction to structures, Advantages of structures, accessing elements of a structure, nested structures, array of structures, functions and structures, Pointers: Introduction, pointer variable, pointer operator, pointer arithmetic, pointers and arrays, pointers and strings, array pointers, dynamic allocation.

UNIT-V

Files, Preprocessor, standard library and header files: Files: Introduction, File data type, opening and closing a file, file functions (getc, putc, getw, putw, fscanf, fprintf, fread, fwrite, fgets, fputs, feof). Preprocessor: #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions

Referential Books :

1. Let us C-Yashwant Kanetkar.
2. Programming in C-Balguruswamy
3. The C programming Lang., Pearson Ecl – Dennis Ritchie
4. Structured programming approach using C- Forouzah & Ceilber Thomson learning Publication.
5. Pointers in C – Yashwant Kanetkar
6. How to solve it by Computer – R.G. Dromy

Course Code **Course Name**
BCA-1003 **Principle of Management**

L **T** **P** **C**
4 **0** **0** **4**

Course Outcomes: At the end of the course, students will be able to,

| | |
|------------|---|
| CO1 | Understand the concepts related to business. |
| CO2 | Define Management and Demonstrate the roles, skills and Levels of management. |
| CO3 | Describe major management theories, Business ethics and social responsibility in the context of management. |
| CO4 | To analyze and discuss planning, Organizing, controlling, decision making, motivation, leadership, Management of change |
| CO5 | Develop theoretical and critical thinking skills relevant to both academic and management practices. |

UNIT-I

Nature of Management: Meaning, Definition, nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Management Skills, Levels of Management.

UNIT-II

Evolution of Management Thought: Contribution of F.W. Taylor, Henri Fayol, Elton Mayo, Chester Bernard & Peter Drucker to the management thought. Business Ethics, Social Responsibility of business.

UNIT-III

Functions of Management: Part-I Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels – advantages & limitations. Forecasting- Need & Techniques Decision making-Types - Process of rational decision making & techniques of decision making Organizing – Elements of organizing & processes: Types of organizations, Delegation of authority – Need, difficulties Delegation – Decentralization Staffing – Meaning & Importance Direction – Nature – Principles.

UNIT-IV

Functions of Management: Part-II Motivation – Importance – theories, Leadership – Meaning –styles, qualities & function of leader, Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need – Importance.

UNIT – V

Management of Change: Meaning, Features of change, Force for Change, Models for Change, Resistance to change , overcoming resistance to change , New Trends in Organization Change, Stress Management.

Referential Books:

1. Essential of Management – Horold Koontz and Itainz Weibrich- McGraw Hills International
2. Management Theory & Practice –J.N. Chandan
3. Essential of Business Administration – K. Aswathapa, Himalaya Publishing House
4. Principles & practice of management – Dr. L.M. Parasad, Sultan Chand & Sons – New Delhi
5. Business Organization & Management – Dr. Y.K. Bhushan
6. Management: Concept and Strategies By J.S. Chandan, Vikas Publishing
- Principles of Management, By Tripathi, Reddy Tata McGraw Hills

Course Code **Course Name**
BCA-1004 **Business Communication**

L **T** **P** **C**
3 **1** **0** **4**

Course Outcomes: At the end of the course, students will be able to,

| | |
|-----|--|
| CO1 | To participate in an online learning environment successfully. |
| CO2 | To distinguish among various levels of organizational communication and communication barriers while developing an understanding of Communication as a process in an organization. |
| CO3 | To draft effective business correspondence with brevity and clarity. |
| CO4 | To stimulate their Critical thinking by designing and developing clean and lucid writing skills. |
| CO5 | To demonstrate their verbal and non-verbal communication ability through presentations. |

UNIT-I

Means of Communication: Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication.

UNIT-II

Types of Communication: Oral Communication: Meaning, nature and scope – Principle of effective oral communication – Techniques of effective speech – Media of oral communication (Face-to-face conversation – Teleconferences – Press Conference –Video Conferencing– Demonstration – Radio Recording –Meetings –Grapevine – Group Discussion – Mobile Phone Conversation– Oral report). The art of listening – Principles of good listening.

UNIT-III

Written Communication: Purpose of writing, Clarity in Writing, Principles of Effective writing, Writing an e-mail, SMS.

UNIT-IV

Business Letters & Reports: Need and functions of business letters – Planning & layout of business letter – Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports.

UNIT-V

Drafting of business letters : Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters – Circular letters Application for employment and resume

Referential Books :

1. Business Communication – K.K. Sinha – Galgotia Publishing Company, New Delhi.
2. Media and Communication Management – C.S. Rayudu – Himalaya Publishing House, Bombay.
3. Essentials of Business Communication – Rajendra Pal and J.S. Korlhalli- Sultan Chand & Sons, New Delhi.
4. Business Communication (Principles, Methods and Techniques) Nirmal Singh – Deep &Deep Publications Pvt. Ltd., New Delhi.

| Course Code | Course Name | L | T | P | C |
|-------------|----------------|---|---|---|---|
| BCA-1005 | Mathematics –I | 4 | 0 | 0 | 4 |

- CO1** Find out matrix representation of any data.
CO2 Apply the concepts of limit, continuity and differentiability in different science fields.
CO3 Apply Taylors and Maclaurin’s theorem to find the expansion of functions as infinite series.
CO4 Evaluate the integrals of complex functions and to find area, volume.
CO5 Apply the concept of vector algebra, scalar triple product, vector triple product.

UNIT-I

Matrices and Determinants: Matrix, Types of matrices, Addition, subtraction, scalar multiplication of a matrix, product of two matrices, Determinants of a square matrix, Co-factor of element of a square matrix, Adjoint, Inverse of a Square Matrix, Cayley Hamilton theorem (statement only) and problems.

UNIT-II

Limits and Continuity: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Indeterminate Forms, L’ Hospitals Rule, Continuity at a Point, Continuity Over an Interval.

UNIT-III

Differentiation: Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle’s Theorem, Mean Value Theorem), Maxima & Minima. Taylor’s and Maclaurin’s Theorem

UNIT-IV

Integration: Fundamental Theorem of Calculus (without proof), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions.

UNIT-V

Vector Algebra: Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product.

Referential Books :

1. B.S. Grewal, “Elementary Engineering Mathematics”, 34th Ed., 1998.
2. “Advanced Engineering Mathematics”, S. Chand & Company, 9th Revised Edition, 2001.
3. Shanti Narayan, “Integral Calculus”, S. Chand & Company, 1999.
4. Shanti Narayan, “Differential Caluculs”, S.Chand & Company, 1998.

| Course Code | Course Name | L | T | P | C |
|--------------------|---|----------|----------|----------|----------|
| BCA-1001P | Laboratory Computer Fundamental & Problem solving techniques | 0 | 0 | 3 | 2 |

| Course Code | Course Name | L | T | P | C |
|--------------------|---|----------|----------|----------|----------|
| BCA-1002P | Laboratory and Practical Work of C Programming | 0 | 0 | 3 | 2 |

Course Code **Course Name**
BCA-2001 **Object Oriented Programming Using C++**

L **T** **P** **C**
3 **0** **0** **3**

Course Outcomes: At the end of the course, the student will be able to:

| | |
|-----|--|
| CO1 | Identify classes, objects, members of a class and relationships among them needed for a specific problem |
| CO2 | Implement C++ application programs using OOP principles and proper program structuring. |
| CO3 | Demonstrate the concepts of polymorphism, inheritance using C++ programming. |
| CO4 | Using Generic function Template function to build generic programs. |
| CO5 | Using Files Streams and Exception Handling to handle streams and exceptions. |

UNIT-I

Introduction Introducing Object – Oriented Approach, Relating to other paradigms {Functional, Data decomposition}. Basic terms and ideas Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.

UNIT-II

Classes and Objects Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, abstract classes.

UNIT-III

Inheritance and Polymorphism Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Operator overloading.

UNIT-IV

Generic function Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.

UNIT-V

Files and Exception Handling Streams and files, Exception handling

Referential Books:

1. A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997.
2. S.B. Lippman & J. Lajoie, “ C++ Primer”, 3rd Edition, Addison Wesley, 2000.
3. R. Lafore, “Object Oriented Programming using C++”, Galgotia Publications, 2004
4. D. Parsons, “Object Oriented Programming using C++”, BPB Publication.

Course Code **Course Name**
BCA-2002 **Internet Technology and Web Design**

L **T** **P** **C**
3 **1** **0** **4**

Course Outcomes: At the end of the course, the student will be able to,

| | |
|-----|--|
| CO1 | Analyze a web page and identify its elements and attributes. |
| CO2 | Create web pages using XHTML and Cascading Style Sheets |
| CO3 | Build dynamic web pages using JavaScript (Client side programming) |
| CO4 | Create XML documents and Schemas. |

UNIT-I

Introduction to Internet: Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet.

UNIT-II

Internet Connectivity & Network: Connectivity types: level one, level two and level three connectivity, modem, dedicated connections through the telephone system, ISDN, Protocol options – Shell, SLIP, PPP, Service options – E-mail, WWW, News Firewall etc. Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security.

UNIT-III

Internet Security Management Concepts: Overview of Internet Security, Firewalls, Internet Security, Management Concepts and Information Privacy.

UNIT-IV

Introduction to Java: The JDK Directory Structure, Java History; Java Features; Structure of Java Program; Compiling and Interpreting Applications; Java Tokens; Java Character set; Keywords and Identifiers, Primitive Data types Declarations, Non-Primitive data types; Operators and Expressions; Implicit and Explicit Type Conversions: The Cast Operator; Control Statements: If- else – if statement and Switch-case; Loops: While, Do While and For; Object Oriented Concepts: Abstraction and Encapsulation, Data Hiding; Introduction to Classes and Object; Access Controls; Implementation of Inheritance and Polymorphism; Methods in Java; Access Modifiers; Constructors and its types. HTML Programming Basics: HTML page structure, HTML Text, HTML links, HTML document tables, HTML Frames, HTML Images.

UNIT-V

Web Publishing and Browsing: Overview, SGML, Web hosting, HTML. CGL, Documents Interchange Standards, Components of Web Publishing, Document management, Web Page Design Consideration and Principles, Search and Meta Search Engines, WWW, Browser, HTTP, Publishing Tools.

Referential Books:

1. Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGrawHill,2007.
2. Godbole AS & Kahate A, “Web Technologies”, Tata McGrawHill,2008.
3. B. Patel & Lal B. Barik, ” Internet & Web Technology “, Acme Learning Publishers
4. Leon and Leon, “Internet for Everyone”, Vikas Publishing House.

| | | | | | |
|--------------------|------------------------------|----------|----------|----------|----------|
| Course Code | Course Name | L | T | P | C |
| BCA-2003 | Organization Behavior | 4 | 0 | 0 | 4 |

Course Outcomes: On completion of this course, the students will be able to,

| | |
|-------------|---|
| CO 1 | Describe conceptual inputs to manage behavior in organizations and assess the basic design elements of organizational structure and evaluate their impact on employees. |
| CO 2 | Evaluate individual human behavior in the workplace as influenced by personality, values, perceptions, and motivation. |
| CO 3 | Analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior. |
| CO 4 | Examine the cause of stress and analyze the effect of stress on individual , group and organization level. |
| CO 5 | Examine the causes, outcomes and the different ways of managing individual, interpersonal and Group behavior in the context of Organizational set up. |

UNIT-I

Fundamentals of Organizational Behavior : Nature, Scope, Definition, Fundamental Concepts of Organizational Behavior; Models of Organizational Behavior; Emerging aspects of Organizational Behavior: Meaning Cultural Diversity

UNIT-II

Perception, Attitude, Values and Motivation: Concept, Nature, Process, Importance, Management, Behavioral aspect of Perception. Effects of employee attitudes; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory, Mc Gregors's Theory 'X' and Theory 'Y'

UNIT-III

Personality : Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Trait Theory, Myres-Briggs Indicator; Locus of Control, Type A and Type B Theory of Personality

UNIT-IV

Work Stress : Meaning and definition of Stress, Symptoms of Stress; Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors, Extra Organizational Stressors; Effect of Stress – Burnouts; Stress Management – Individual Strategies, Organizational Strategies

UNIT-V

Group Behavior and Leadership : Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders

Referential Books:

1. Organizational Behavior Text, Cases and Games- By K. Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J.W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition (2007)
3. Organizational Behavior – Fred Luthans
4. Organizational Behavior – Super Robbins

| | | | | |
|--------------------|----------|----------|----------|----------|
| Course Code | L | T | P | C |
| Course Name | 4 | 0 | 0 | 4 |

BCA-2004 Financial Accounting & Management

Course Outcomes: On completion of this course, the students will be able to-

| | |
|------|---|
| CO 1 | Prepare consolidated financial statements using international accounting standards. |
| CO 2 | Manage the financial operations including revenues, expenses, assets, liabilities and capital and calculate the various ratios through financial statements and its impact on the short and long term position of the firm. |
| CO 3 | Determine the long term sources of finance to fulfill the long term finance needs of organization. |
| CO 4 | Demonstrate the applicability of the concept of Financial Management to understand Capitalization and Capital Structure, break-even point, fixed and variable costs and all the costs incurred in conducting the business. |
| CO 5 | Evaluate and determine the organization's motives for holding cash, Cash budget, Managing Inventory and Receivables. |

UNIT-I

Overview - Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India.

UNIT-II

Basics of accounting – Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept. Ratio analysis.

UNIT-III

Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.

UNIT-IV

Concept & Components of working Capital. Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts

UNIT-V

Cash Management, Inventory Management and Receivables Management.

Referential Books:

1. Maheshwari & Maheshwari, “An Introduction to Accountancy”, 8th Edition, Vikas Publishing House, 2003
2. Gupta R.L., Gupta V.K., “Principles & Practice of Accountancy”, Sultan Chand & Sons, 1999.
3. Khan & Jain, “Financial Accounting”
4. Maheshwari S.N., “Principles of Management Accounting”, 11th Edition, Sultan Chand & Sons, 2001.
5. Shukla and Grewal, “Advanced Accounts”, 14th Edition, Sultan Chand & Sons.

Course Code **Course Name**
BCA-2005 **Mathematics II**

L **T** **P** **C**
4 **0** **0** **4**

Course Outcomes: On completion of this course, the students will be able to,

| | |
|-----|---|
| CO1 | Ability to learn the basic concepts about relations, functions and to draw different diagrams like Lattice, Hasse diagrams. |
| CO2 | Ability to learn the basic concepts about relations, functions |
| CO3 | To draw different diagrams like Lattice, Hasse diagrams. |
| CO4 | Identify the application of partial differentiation and apply for evaluating maxima, minima |
| CO5 | Illustrate the working methods of multiple integral and apply for finding area, volume |

UNIT-I

SETS

Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

UNIT-II

RELATIONS AND FUNCTIONS

Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

UNIT-III

PARTIAL ORDER RELATIONS AND LATTICES

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebraic Systems, Principle of Duality, Basic Properties, sublattices, Distributed & Complemented Lattices.

UNIT-IV

FUNCTIONS OF SEVERAL VARIABLES

Partial Differentiation, Chain Rule, Extrema of Functions of 2 Variables, Euler's Theorem.

UNIT-V

MULTIPLE INTEGRATION

Double Integral in Cartesian and Polar Coordinates to find Area, Change of Order of Integration, Triple Integral to Find Volume of Simple Shapes in Cartesian Coordinates.

Referential Books:

1. Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI,1996.
2. S.K. Sarkar, "Discrete Maths"; S. Chand & Co.,2000
3. "Discrete Mathematics", Schaum's Outlines

| CourseCode | CourseName | L | T | P | C |
|-------------------|--|----------|----------|----------|----------|
| BCA-2001P | Computer Laboratory and Practical Work of C++ Programming | 0 | 0 | 6 | 3 |

Practical will be based on Paper Object Oriented Programming Using C++: Covers UNIT-III, UNIT-IV, UNIT-V of Syllabus

Course Code **Course Name**
BCA-3001 Python Programming

L **T** **P** **C**
3 **0** **0** **3**

Course Outcomes: On completion of this course, the students will be able to,

| | |
|------|---|
| CO 1 | Understand the structure, syntax, and semantics of the Python language. |
| CO 2 | Solve real world problems by applying the Python Data Structures, Objects, Functions and Modules. |
| CO 3 | Apply the fundamental principles of Object Oriented Programming. |
| CO 4 | Apply the basics of data science using advanced Python libraries. |
| CO 5 | Build practical applications in Python. |

UNIT-I

Python: Features of Python, Environmental setup, Installation and tools required for running, Basic Types Variable types and operators : Assigning values to variables Multiple Assignments Standard Data Types Set Map Single line comments using Multi-line comments using triple quote, Data Type Conversion Operators, Types of Operator, Conditional statement, Looping statements with else-Pass-Break continue.

UNIT-II

Number and List: Accessing values in List-Delete, update List element-Basic List operations-Indexing, Slicing and Matrices Built in methods and Functions for List-Accessing values in Tuple-Delete, List element-Basic Tuple operations Indexing, Slicing and Matrices Built in methods and Functions for Tuple.

UNIT-III

Dictionary and Function: Accessing values in Dictionary-Updating Dictionary-Deleting Dictionary –elements-Properties of Dictionary keys-Built in Dictionary Functions and Methods Defining Function-Calling function- Pass by reference vs value Function Arguments-Required arguments-Keyword arguments-Default arguments-Variable-length arguments Recursion.

UNIT-IV

Modules and Packages: The Time Module and its functions-Calendar modules and its functions-Other modules and Functions Sum and Difference f time and date Import From import statement From import statement Executing modules, Local functions-Reload function Packages in Python.

UNIT-V

Exception handling: Exception handling and assertions-Standard Exceptions-Assertions in Python-Handling an exception-Except clause with no exception-Except Clause with multiple exception-Try-Finally Clause-Argument of an Exception Raising an Exception.

Referential Books:

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

| | | | | | |
|--------------------|------------------------------|----------|----------|----------|----------|
| Course Code | Course Name | L | T | P | C |
| BCA-3002 | Data Structure Using C & C++ | 3 | 0 | 0 | 3 |

Course Outcomes: On completion of this course, the students will be able to,

| | |
|------|---|
| CO 1 | Understand the structure, syntax, and semantics of the Python language. |
| CO 2 | Solve real world problems by applying the Python Data Structures, Objects, Functions and Modules. |
| CO 3 | Apply the fundamental principles of Object Oriented Programming. |
| CO 4 | Apply the basics of data science using advanced Python libraries. |
| CO 5 | Build practical applications in Python. |

UNIT-I

Introduction to Data Structure and its Characteristics

Array

Representation of single and multidimensional arrays; Sparse arrays – lower and upper triangular matrices and Tri-diagonal matrices with Vector Representation also.

UNIT-II

Stacks and Queues

Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

UNIT-III

Lists

Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, two way lists and Use of headers

UNIT-IV

Trees

Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree

UNIT-V

Graphs: Graph terminology, Representation of graphs, path matrix, BFS (breadth first search), DFS (depth first search), topological sorting, Warshall's algorithm (shortest path algorithm.)

Referential Books:

1. E. Horowitz and S. Sahani, "Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S. Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co. (P)Ltd.,2002
3. Y. Langsam et. Al., "Data Structures using C and C++", PHI,1999

Course Code **Course Name**
BCA-3003 **Operating System**

L **T** **P** **C**
3 **1** **0** **4**

| | |
|-----|--|
| CO1 | Understand the basics of operating systems like kernel, shell, types and views of operating systems. |
| CO2 | Describe the various CPU scheduling algorithms and remove deadlocks. |
| CO3 | Explain various memory management techniques and concept of thrashing |
| CO4 | Use disk management and disk scheduling algorithms for better utilization of external memory. |
| CO5 | Recognize file system interface, protection and security mechanisms. |
| CO6 | Explain the various features of distributed OS like Unix, Linux, windows etc |

UNIT-I

Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time-Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems.

Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation

Virtual Memory: Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations

UNIT-II

Processes: Process Concept, Process Scheduling, Operation on Processes

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling.

UNIT-III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-IV

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering.

UNIT-V

Information Management: Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection.

Referential Books:

1. Silberschatz and Galvin, “ Operating System Concepts”, Person, 5th Ed.2001
2. Madnick E., Donovan J., “ Operating Systems, Tata McGrawHill,2001
3. Tannenbaum, “Operating Systems”, PHI, 4th Edition,2000

| Course Code | Course Name | L | T | P | C |
|-------------|---|---|---|---|---|
| BCA-3004 | Digital Electronics & Computer Organization | 3 | 1 | 0 | 4 |

| | |
|-----|---|
| CO1 | An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified. |
| CO2 | An ability to understand the functions of various hardware components and their building blocks |
| CO3 | An ability to understand and appreciate Boolean algebraic expressions to digital design |
| CO4 | An in depth understanding of sequential! Combinational circuits |
| CO5 | An in depth understanding of realization of different combinational/sequential circuits |

UNIT-I

Number System & Boolean Algebra Number System: Binary, Octal, Decimal, Hexadecimal; Conversion of Number System; Binary Arithmetic & Complement, Binary Codes: Weighted & Non Weighted, Gray Code, Excess-3 Code. Boolean Function; Boolean Postulates; De-Morgan's Theorem; Boolean Expressions: Sum of Product, Product of Sum, Minimization of Boolean Expressions using K-Map; Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR; Implementations of Logic Functions using Gates; NAND- NOR Implementations; Multilevel gate Implementations.

UNIT-II

Combinational Circuits Adders & Subtractors: Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Adder Subtractor; Magnitude Comparator: Two Bit Magnitude Comparator, Three Bit Magnitude Comparator; Multiplexer & De-Multiplexer: 4*1 Multiplexer, 8*1 Multiplexer; Decoder & Encoder; Parity Checker & Generator; Code Converter.

UNIT-III

Sequential Circuit: Introduction to Flip Flops: SR, JK, T, D, Master Slave Flip Flops; Conversion of Flip Flops; Characteristic Table & Equation; Edge Triggering & Level Triggering; Excitation Table; State Diagram; State Table; State Reduction; Design of Sequential Circuits.

UNIT-IV

Registers Introduction of Registers; Classification of Registers; Register with Parallel Load; Shift Registers; Bidirectional Shift Register with Parallel Load. Counters Introduction of Counter; Asynchronous/Ripple Counters; Synchronous Counters; BCD Counter; 4-bit Binary Counter with Parallel Load; Design of Synchronous Counters; Ring Counter; Johnson Counter.

UNIT-V Memory Organization:

Basic cell of static and dynamic RAM; Building large memories using chips; Associative memory; Cache memory organization and Virtual memory organization.

Referential Books:

1. Digital Logic and Computer design (PHI) 1998 : M.M. Mano
2. Computer Architecture (PHI) 1998 : M.M. Mano
3. Digital Electronics (TMH) 1998 : Malvino and Leach
4. Computer Organization and Architecture : William Stallings
5. Digital fundamentals (Universal Book Stall) 1998 : Floyd, L.Thomas
6. Computer Organization (MC Graw-Hill, Signapore) : Hamcher, Vranesic and Zaky

Course Code **Course Name**
BCA-3005 **Elements of Statistics**

L **T** **P** **C**
3 **1** **0** **4**

Course outcomes (CO): At the end of the course, the students will be able to:

| | |
|-----|--|
| CO1 | Organize, manage and present data. |
| CO2 | Analyze statistical data graphically using frequency distributions and cumulative frequency distributions. |
| CO3 | Analyze statistical data using measures of central tendency, dispersion and location. |
| CO4 | Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events. |
| CO5 | Translate real-world problems into probability models. |

UNIT-I

Population, Sample and Data Condensation

Definition and scope of statistics, concept of population and sample with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

UNIT-II

Measures of Central Tendency

Concept of central Tendency, requirements of a good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

UNIT-III

Measures of Dispersion:

Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation.

UNIT-IV

Permutations and Combinations

Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). ${}^n P_r = n!/(n-r)!$ (without proof). Combinations of 'r' objects taken from 'n' objects. ${}^n C_r = n!/(r!(n-r)!)$ (without proof) . Simple examples, Applications.

UNIT-V

Sample space, Events and Probability

Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples.

Classical definition of probability, Addition theorem of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems.

UNIT-VI

Statistical Quality Control

Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}

Referential Books:

2. S.C. Gupta - Fundamentals of statistics - Sultan Chand & sons ,Delhi.
3. D.N. Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.

4. Montgomery D.C. – Statistical Quality Control - John Welly and Sons
5. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. New York.
6. Gupta S.P. – Statistical Methods , Pub – Sultan Chand and sons New Delhi

| Course Code | Course Name | L | T | P | C |
|--------------------|---|----------|----------|----------|----------|
| BCA-3001P | Computer Laboratory and Practical Work of Python | 0 | 0 | 3 | 2 |

Practical will be based on Paper Python Programming: Covers UNIT-II, UNIT-III, UNIT-IV, UNIT-V of Syllabus

| Course Code | Course Name | L | T | P | C |
|--------------------|---|----------|----------|----------|----------|
| BCA-3002P | Computer Laboratory and Practical Work of DS | 0 | 0 | 3 | 2 |

Practical will be based on Paper Data Structure: Covers UNIT-III, UNIT-IV, UNIT-V of Syllabus

Course Code **Course Name**
BCA-4001 **Computer Graphics and Animation**

L **T** **P** **C**
3 **0** **0** **3**

Course outcomes: At the end of the course, the students will be able to,

| | |
|-----|---|
| CO1 | Understand the basics of computer graphics, different graphics systems and applications of computer graphics. |
| CO2 | Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. |
| CO3 | Use of geometric transformations on graphics objects and their application in composite form. |
| CO4 | Extract scene with different clipping methods and its transformation to graphics display device. |
| CO5 | Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. |
| CO6 | Render projected objects to naturalize the scene in 2D view and use of illumination models for this. |

UNIT-I

Introduction: Interactive Computer Graphics, Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Conceptual Framework for Interactive Graphics, Classification of Application Development of Hardware and software for computer Graphics.

UNIT-II

Scan Conversion: Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses.

Clipping: point clipping, Cohen-Sutherland line clipping Algorithm, Midpoint Subdivision Algorithm, polygon clipping (Sutherland-Hodgeman)

UNIT-III

Geometrical Transformation: 2D Transformation (translation, rotation, scaling, reflection and shearing), Homogeneous Coordinates and Matrix Representation of 2D Transformations, Successive and composite 2D Transformations, the Window-to-Viewport Transformations, Introduction to 3D Transformations Matrix.

UNIT-IV

Curves & Surfaces: Polygon Surfaces and polygon meshes, Quadratic and super quadrics surfaces, Spline curve and representation.

UNIT-V

Computer Animation: introduction, Application of animation, Morphing, Keyframe system, Motion specifications in Animation, Types of animation, Sequencing of Animation Design and Fundamental principles of animation.

Referential Books:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & practice, 2000.
2. D.J. Gibbs & D.C. Tsichritz: Multimedia programming Object Environment & Frame work, 2000
3. Ralf Skinmeiz and Klana Naharstedt, Multimedia: computing, Communication and Applications, Pearson, 2001
4. D. Haran & Baker. Computer Graphics Prentice Hall of India, 1986.

| | | | | | |
|--------------------|-----------------------------------|----------|----------|----------|----------|
| Course Code | Course Name | L | T | P | C |
| BCA-4002 | Database Management System | 3 | 0 | 0 | 3 |

Course outcomes: At the end of the course, the students will be able to,

| | |
|-----|--|
| CO1 | Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models. |
| CO2 | Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing. |
| CO3 | Learn and apply Structured query language (SQL) for database definition and database manipulation. |
| CO4 | Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. |
| CO5 | Understand various transaction processing, concurrency control mechanisms and database protection mechanisms. |

UNIT-I

Introduction: Characteristics of database approach, data models, DBMS architecture and data independence.

UNIT-II

E-R Modeling: Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

UNIT-III

Data Normalization: Functional Dependencies, Normal form up to 5th normal form, Data base design using EER to relational language.

UNIT-IV

Relational Data Model: Relational model concepts, relational constraints, relational algebra
SQL: SQL queries, programming using SQL.

UNIT-V

Concurrency Control: Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security

Referential Books:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A.K. Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.
4. Bipin Desai, "An Introduction to database systems", Galgotia Publications, 1991.

Course Code **Course Name**
BCA-4003 **Software Engineering**

L **T** **P** **C**
3 **1** **0** **4**

Course outcomes: At the end of the course, the students will be able to,

| | |
|-----|---|
| CO1 | How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment. |
| CO2 | An ability to work in one or more significant application domains. |
| CO3 | Work as an individual and as part of a multidisciplinary team to develop and deliver quality software |
| CO4 | Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle. |
| CO5 | Demonstrate an ability to use the techniques and tools necessary for engineering practice |
| CO6 | An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |

UNIT-I

Software Engineering: Definition and paradigms, A generic view of software engineering.

UNIT-II

Requirements Analysis: Statement of system scope, isolation of top level processes and entities and their allocation to physical elements, refinement and review.

UNIT-III

Designing Software Solutions: Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document.

UNIT-IV

Software Implementation: Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style.

UNIT-V

Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance.

UNIT-VI

Comprehensive examples using available software platforms/case tools, Configuration Management.

Referential Books:

1. K.K. Aggarwal & Yogesh Singh “Software engineering”, 2nd Ed., New Age International 2005.
2. I. Sommerville, “Software Engineering”, Addison Wesley, 2002.
3. James Peter, W. Pedrycz, “Software Engineering: An Engineering Approach” John Wiley & Sons.

Course Code **Course Name**
BCA-4004 **Optimization Techniques**

L **T** **P** **C**
3 **1** **0** **4**

Course outcomes: At the end of the course, the students will be able to,

| | |
|-----|--|
| CO1 | Understand the basic concepts of linear programming, duality and methods for solving linear programming problem. |
| CO2 | Understand the mathematical formulation of transportation and assignment problems and solution |
| CO3 | Solve simple games using various techniques. |
| CO4 | Solve nonlinear unconstrained optimization problems. |

UNIT-I

Linear programming

Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.

UNIT-II

Game theory

Introduction, Two-person zero-sum game, pure strategies (Minmax and Maxmin principles), Mixed strategies, The rules principles of Dominance, Algebraic method to solve games without saddle point, Graphical method to solve the games.

UNIT-III

Replacement Theory

Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.

UNIT-IV

PERT and CPM

Project management origin and use of PERT, origin and use of CPM, Applications of PERT and CPM, Project Network, Diagram representation, Critical path calculation by network analysis and critical path method (CPM).

UNIT-V

Job Sequencing

Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines

Referential Books:

1. Gillet B.E. "Introduction to Operation Research"
2. Taha, H.A. "Operation Research – An Introduction"
3. Kanti Swarup "Operation Research"
4. S.D. Sharma "Operation Research"
5. Hira & Gupta "Operation Research"

Course Code **Course Name**
BCA-4005 **Mathematics-III**

T **P** **C**
0 **0** **4**

| | |
|------------|---|
| CO1 | Find out nth roots of complex numbers |
| CO2 | Apply the concepts of vector calculus |
| CO3 | Find out Directional Derivatives, Divergence and Curl |
| CO4 | Find out Fourier series of periodic functions |
| CO5 | To solve various differential equations and to apply these analytical methods in different engineering applications |

UNIT-I

COMPLEX VARIABLES: Complex Number System, Algebra of Complex Numbers, Polar Form, Powers and Roots, Functions of Complex Variables, Elementary Functions.

UNIT-II

VECTOR CALCULUS: Differentiation of Vectors, Scalar and Vector Fields, Gradient, Directional Derivatives, Divergence and Curl and their Physical Meaning.

UNIT-III

FOURIER SERIES: Periodic Functions, Fourier series, Fourier Series of Even and Odd Functions, Half Range Series.

UNIT-IV

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER: Variable- Separable Method, Homogeneous Differential Equations, Exact Differential Equations, Linear Differential Equations, Bernoulli's Differential Equations, Differential Equations of First Order and First Degree by Integrating Factor.

UNIT-V

ORDINARY DIFFERENTIAL EQUATIONS OF SECOND ORDER:

Homogenous Differential Equations with Constant Coefficients, Cases of Complex Roots and Repeated Roots, Differential Operator, Solutions by Methods of Direct Formulae for Particular Integrals, Operator Method for Finding Particular Integrals, (Direct Formulae).

Referential Books:

1. A.B. Mathur and V.P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers, 1999.
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Co., 9th Revised Ed.

| Course Code | Course Name | L | T | P | C |
|--------------------|---|----------|----------|----------|----------|
| BCA-4001P | Computer Laboratory and Practical Work of Computer Graphics and DBMS | 0 | 0 | 6 | 3 |

Practical will be based on Paper Computer Graphics and DBMS Lab

| Course Code | Course Name | L | T | P | C |
|-------------|----------------------|---|---|---|---|
| BCA-5001 | Knowledge Management | 3 | 1 | 0 | 4 |

| | |
|------|---|
| CO 1 | Introduce students business intelligence and importance and technologies involved in decision support system. |
| CO 2 | Characterize expert systems, OLAP & OLTP. Introduction and use of data warehouse and data marts in knowledge management system. |
| CO 3 | Apply appropriate tool for data mining and knowledge discovery form databases. |
| CO 4 | Describe key components of KM solutions: infrastructure, mechanisms and technologies, systems and processes. Clear understanding of importance of intellectual capital in gaining a competitive advantage of organization |

UNIT-I

Business Intelligence and Business Decisions: Modeling Decision Process; Decision support systems; Group decision support and Groupware Technologies.

UNIT-II

Executive Information and support Systems: Business Expert System and AI, OLTO & OLAP; Data Warehousing; Data Marts, Data Warehouse architecture; Tools for data warehousing.

UNIT-III

Multi- Dimensional analysis: Data mining and knowledge discovery; Data mining and Techniques; Data mining of Advance Databases.

UNIT-IV

Knowledge Management Systems: Concept and Structure KM systems, techniques of knowledge management appreciation & limitation.

Referential Books:

1. Decision support system, EIS, 2000
2. W.H.Inmon, "Building Data Warehousing", Willey,1998.
5. Han, Jiawei, Kamber, Michelinal, " Data Mining Concepts & Techniques", Harcourt India, 2001

| Course Code | Course Name | L | T | P | C |
|-------------|---|---|---|---|----|
| BCA-5002 | Java Programming and Dynamic Webpage Design | 3 | 0 | 0 | 3F |

Course Outcomes: At the end of the course, the student will be able to:

| | |
|-----|--|
| CO1 | Use the syntax and semantics of Java programming language and basic concepts of OOPs. |
| CO2 | Develop reusable Programs using the concept of Inheritance |
| CO3 | Apply the concepts of Multithreading. |
| CO4 | Design event driven GUI. |
| CO5 | Identify categories of program, systems software and application organize and work with file and folder. |

UNIT-I

Java Programming: Data types, control structured, arrays, strings, and vector, classes (inheritance, package, exception handling) multithreaded programming.

UNIT-II

Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions)

UNIT-III

JDBC: JDBC Fundamentals, Establishing Connectivity and Working with Connection Interface, Working with Statements, Creating and Executing SQL Statements, Working with ResultSet Objects.

UNIT-IV

Java Servlets: Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking.

UNIT-V

Java Server Pages: Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment, Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output.

Referential Books:

1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference" 199, TMH.
2. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998.
3. Ivor Horton, "Beginning Java-2" SPDPublication
4. Jason Hunter, "Java Servlet Programming" O'Reilly
5. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998
6. Hans Bergsten, "Java Server Pages", 3rd Ed. O'Reilly

Course Code **Course Name**
BCA-5003 **Computer Network**

L **T** **P** **C**
3 **1** **0** **4**

Course Outcomes: At the end of the course, the student will be able to:

| | |
|-----|---|
| CO1 | Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission |
| CO2 | Apply channel allocation, framing, error and flow control techniques. |
| CO3 | Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism. |
| CO4 | Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism. |
| CO5 | Explain the functions offered by session and presentation layer and their Implementation. |
| CO6 | Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN. |

UNIT-I

Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks.

OSI and TCP/IP Models: Layers and their functions, comparison of models.

Digital Transmission: Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems.

UNIT-II

Transmission Media: Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon capacity, comparison of media.

UNIT-III

Telephony: Multiplexing, error detection and correction: Many to one, One to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching.

Data link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures.

Point to point controls: Transmission states, PPP layers, LCP, Authentication, NCP.

ISDN: Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.

UNIT-IV

Devices: Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Internetworking, Network-Layer in the internet.

UNIT-V

Transport and upper layers in OSI Model: Transport layer functions, connection management, functions of session layers, presentation layer and application layer.

Referential Books:

1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4th Ed.2003.
2. Behrouz A.Forouzan, "Data Communication and Networking", 3rd Ed. Tata MCGraw Hill, 2004.
3. William stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.

Course Code **Course Name**
BCA-5004 **Numerical Methods**

L **T** **P** **C**
3 **1** **0** **4**

Course Outcomes: At the end of the course, the student will be able to:

| | |
|-----|--|
| CO1 | Apply Numerical Methods to find solution of Algebraic and transcendental equation |
| CO2 | Apply Various Interpolation techniques to interpolate the complicated functions for given data into much simpler one like polynomial |
| CO3 | Evaluate numerically differentiation and integration of a tabular function if analytical methods are not given |
| CO4 | Solve system of linear equations in large size with the help of different iterative methods |
| CO5 | Solve the ordinary differential equations using different numerical methods |

UNIT-I

Roots of Equations: Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.

UNIT-II

Interpolation and Extrapolation : Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals.

UNIT-III

Numerical Differentiation Numerical Integration : Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula.

UNIT-IV

Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel iterative method.

UNIT-V

Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Runga – Kutta method.

Referential Books:

1. Scarbourogh, "Numerical Analysis".
1. Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata, 3. S.S.Shashtri, "Numerical Analysis", PHI

| Course Code | Course Name | L | T | P | C |
|--------------------|----------------------|----------|----------|----------|----------|
| BCA-5005 | Minor Project | 0 | 1 | 2 | 2 |

Evaluation will be based on Summer Training held after fourth semester and will be Conducted by the college committee only.

| Course Code | Course Name | L | T | P | C |
|--------------------|--------------------------------------|----------|----------|----------|----------|
| BCA-5006 | Viva-Voice on Summer Training | 0 | 0 | 2 | 1 |

The viva will be conducted based on summer training of four weeks after the end of fourth Semester and will be Conducted by the college committee only.

| Course Code | Course Name | L | T | P | C |
|--------------------|--|----------|----------|----------|----------|
| BCA-5002P | Computer Laboratory and Practical Work of Java Programming and Dynamic Webpage Design | 0 | 0 | 6 | 3 |

Practical will be based on Paper Java Programming & Dynamic Webpage Design : on Whole Syllabus

Course Code **Course Name**
BCA-6001 **Information & Cyber Security**

L **T** **P** **C**
4 **0** **0** **4**

Course Outcomes: At the end of the course, the student will be able to:

| | |
|------------|--|
| CO1 | Introduce the cyber world and cyber law in general. To explain about the Information Technology Act 2000 |
| CO2 | Enhance the understanding of problems arising out of online transactions and provoke them to find solutions. |
| CO3 | Introduce the students to various cyber laws and standards. |
| CO4 | Introduce the students to various wireless networks and security. |
| CO5 | To explain about the various facets of cyber crimes and ethical hacking. |

UNIT-I

Concept of Cyberspace: Netizens Technology, Law and Society Object, Scope of the Information Technology Act, 2000, Electronic Records and Electronic Commerce. Intrusion Detection System, Intrusion Prevention System, Public Key Infrastructure.

UNIT-II

Internet Security: Computer Security and Threats, Hacking, Cracking, sneaking, Viruses, Trojan Horses, malicious code, Worms and Logic Bombs. Network attack and Defense Most Common Attacks, Scripts Kiddies and Packaged Defense.

UNIT-III

Wireless Network Security: Wireless Network Components, Security issues in Wireless Networks, Securing a Wireless Network, Mobile Security, The Smartphone Pentest Framework

UNIT-IV

Cyber Laws and Standards: ISO 27001, Cyber Law (Information Technology Act, 2000), International Standards maintained for Cyber Security, Security Audit, Investigation by Investing Agency, Cyber Security Solutions.

UNIT-V

Security Management: Disaster Recovery, Digital Signature, Ethical Hacking, Penetration Testing, Computer Forensics

Referential Books:

1. GautamKumawat, Ethical Hacking & Cyber Security Course : A Complete Package, Udemy Course, 2017
2. Georgia Weidman , Penetration testing A Hands-On In t r o d u c t i o n to Hacking, no starch press, 2014
3. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
4. William Stallings-Cryptography and Network Security: Principles and Practice Publication

Course Code **Course Name**
BCA-6002 **Internet Of Things**

L **T** **P** **C**
3 1 0 4

Course Outcomes: At the end of the course, the student will be able to:

| | |
|------|--|
| CO 1 | Understand the concept of IoT and its significance in the current technological landscape. |
| CO 2 | Familiarize with the hardware and software components that comprise an IoT system. |
| CO 3 | Get acquainted with various hardware platforms as Raspberry pi, NetArduino etc. |
| CO 4 | Explore different communication protocols and networking technologies used in IoT |
| CO 5 | Develop skills in programming with Arduino to create and manage IoT applications. |
| CO 6 | Learn about emerging trends and applications of IoT in various industries and fields. |

UNIT-I

Internet of Things (IoT): Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples.

UNIT-II

M2M vs IoT An Architectural Overview: Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. Reference Architecture and Reference Model of IoT.

UNIT-III

Hardware for IoT: Sensors, Digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology. Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms.

UNIT-IV

Network & Communication aspects in IoT: Wireless Medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery.

UNIT-V

Domain specific applications of IoT: Home automation, Industry applications, Surveillance applications, Other IoT application.

Referential Books:

1. ArshdeepBahga, Vijay Madiseti “Internet of Things (A hands on approach)” 1ST edition, VPI publications,2014
2. Jeeva Jose, Internet of Things, Khanna Publishing House
3. Michael Miller “The Internet of Things” by Pearson
4. Raj Kamal “INTERNET OF THINGS”, McGraw-Hill, 1ST Edition, 2016

Course Code **Course Name**
BCA-6003 **E-Commerce**

Course Outcomes: At the end of the course, the student will be able to:

| | |
|-----|--|
| CO1 | Use the Plate-form of E Commerce |
| CO2 | Use the porter's Value chain Model |
| CO3 | Apply the concept of E Commerce |
| CO4 | Design and develop of E Commerce |
| CO5 | Identify the categories of program, system software applications file and folder |

UNIT-I

Introduction to E-Commerce: The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective.

UNIT-II

Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B Ec, Procurement Management Using the Buyer's Internal Marketplace, Just in Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet Based EDI, Integration with Back-end Information System, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.

UNIT-III

Internet and Extranet : Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The structures of Extranets, Extranet products & services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues.

Electronic Payment Systems : Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored – value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.

UNIT-IV

Public Policy: From Legal Issues to Privacy : EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC.

UNIT-V

Infrastructure For EC : It takes more than Technology, A Network Of Networks, Internet Protocols, Web-Based client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.

Referential Books:

1. David Whiteley, "E-Commerce", Tata McGraw Hill,2000
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 2000

Course Code **Course Name**
BCA-6004 **Data Science and Machine Learning**

L **T** **P** **C**
3 **1** **0** **4**

Course Outcomes: At the end of the course, the student will be able to:

| | |
|-----|--|
| CO1 | Introduction to Data Science, Evolution of Data Science, Application of Data Science |
| CO2 | Gain knowledge of data collection and pre-processing of data. |
| CO3 | Develop an in-depth understanding of popular methods like regression, Skewness and Kurtosis, Introduction to Machines learning from data, Supervised and Unsupervised learning |
| CO4 | Learn optimization formulations to minimize errors and build accurate models. |
| CO5 | Understanding the basic concepts and principles of neural networks: Students should be able to describe the structure and functioning of neural networks |

UNIT-I

Introduction to Data Science: Evolution of Data Science, Data Science Roles, Stages in a Data Science Project, Applications of Data Science in various fields, Data Security Issues.

UNIT-II

Data Collection and Data Pre-Processing: Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction.

UNIT-III

Exploratory Data Analytics: Descriptive Statistics - Mean Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Correlation Statistics – ANOVA.

UNIT-IV

Introduction: Idea of Machines learning from data, Classification of problem – Regression and Classification, Supervised and Unsupervised learning.

UNIT-V

Neural Networks: History, Artificial and biological neural networks, Artificial intelligence and neural networks, Biological neurons, Models of single neurons, Different neural network models.

Referential Books:

1. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O’Reilly, 2015.
2. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013
3. Machine Learning, Tom M. Mitchell
4. Introduction to Machine learning, Nils J.Nilsson

Course Code Course Name
BCA-6005 Major Project

L T P C
0 3 6 5

Evaluation will be based on held after fourth semester and will be
Conducted by the college committee only.

Course Code Course Name

L T P C

BCA-6006 Presentation/Seminar based on Major Project Presentation/Seminar
based on Major Project will be evaluated