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| **BACHELOR OF COMPUTER APPLICATIONS (BCA)** | | | | |
| BCA I Sem | **PC Packages (Word, Excel**  **& Power Point)** | CO 1 | Recall and define the history and versions of DOS, and identify internal and external commands like DIR, COPY, XCOPY, CHKDSK, and FORMAT, as well as their functions in managing files and directories.. |
|  |  | CO2 | List the main features and benefits of Windows operating system, including components such as the Control Panel, Taskbar, Recycle Bin, and My Computer, and explain how they assist in system management. |
|  |  | CO3 | Explain the purpose and functionality of wildcard characters in DOS commands and describe their use in simplifying file operations like searching and organizing files and directories. |
|  |  | CO4 | Describe the functionality of MS Office tools such as Menus, Toolbars, Shortcuts, Hotkeys, and Formatting tools in MS Word, Excel, and PowerPoint, and how they help streamline the process of creating and editing documents, spreadsheets, and presentations. |
|  |  | CO5 | Apply DOS commands such as COPY, DEL, XCOPY, FORMAT, and external commands like CHKDSK, and use Windows features like Control Panel and Taskbar to configure system settings, manage files, and optimize system performance for efficient use. |
| BCA I Sem | **Mathematics** | CO 1 | Define and identify key mathematical terms |
|  |  | CO2 | Summarize and explain the steps involved in solving linear equations |
|  |  | CO3 | Apply mathematical operations to solve real-world problems |
|  |  | CO4 | List the properties of geometric shapes, and recognize their characteristics in various contexts. |
|  |  | CO5 | Compare and contrast different methods for calculation |
| BCA I Sem | **Programming in C** | CO 1 | Understand and Apply Basic Programming Concepts. |
|  |  | CO2 | Design and Develop Algorithms, for solving computational problems |
|  |  | CO3 | Implement Control Structures and Functions, and functions to develop efficient and functional C programs.. |
|  |  | CO4 | Work with Arrays, Pointers, Structures, and Unions in C, and understand their memory representations and practical applications. |
|  |  | CO5 | Handle Files and Debug Programs, to perform file operations and debug C programs to identify and resolve issues related to program logic and execution. |
| BCA I Sem | **General English I** | CO 1 | Identify and define key vocabulary words from assigned readings, demonstrating their ability to recall information accurately. |
|  |  | CO2 | Summarize the main ideas of a given text in their own words, showing their understanding of the material presented. |
|  |  | CO3 | Explain the themes and characters in a selected literary work |
|  |  | CO4 | Apply grammar rules by constructing sentences that correctly use different tenses and parts of speech in writing exercises. |
|  |  | CO5 | Demonstrate effective communication skills through role-play scenarios that require them to use appropriate language and expressions in various contexts. |
| BCA I Sem | **Anuvad Kala** | CO 1 | अनुवाद की परिभाषा, प्रकृति और महत्व, अनुवाद उपकरण अनुवाद अनुवाद के रूप, का अर्थ, इसका स्वरूप और अनुवाद का महत्व समझने में सक्षम होंगे। |
|  |  | CO2 | विभिन्न क्षेत्रों के लिए अनुवाद के मुद्दे चिकित्सा, प्रौद्योगिकी और विज्ञान जैसे क्षेत्रों में अनुवाद की समस्याएँ, मशीनी अनुवाद की समस्याएँ और उनके समाधान क्षेत्रों में अनुवाद में आने वाली चुनौतियों को हल करने में सक्षम होंगे। |
|  |  | CO3 | कविता का अनुवाद, कहानी, अन्य गद्य कृतियों, कविताओं का अनुवाद अनुवाद के सिद्धांतों और प्रक्रियाओं को समझने में सक्षम होंगे। |
|  |  | CO4 | समाचार का अनुवाद, विज्ञापनों का अनुवाद, नोटिस का अनुवाद समाचार लेखों का अनुवाद। |
|  |  | CO5 | अनुवाद के सिद्धांतों और प्रक्रियाओं को समझने और विभिन्न क्षेत्रों में अनुवाद में आने वाली चुनौतियों को हल करने में सक्षम होंगे। |
| BCA I Sem | **Introduction to Health Economics** | CO 1 | Define key terms related to health economics |
|  |  | CO2 | Identify major health care systems around the world and their economic implications. |
|  |  | CO3 | Explain the importance of economic principles in health care decision-making and policy formulation. |
|  |  | CO4 | Summarize the role of supply and demand in the health care market and how it affects pricing and access to services. |
|  |  | CO5 | Demonstrate the ability to apply economic concepts |
| BCA I Sem | **Yoga and Meditation** | CO 1 | Identify and list the basic principles of yoga and meditation practices |
|  |  | CO2 | Explain the benefits of regular yoga practice and meditation on physical and mental health |
|  |  | CO3 | Demonstrate a series of foundational yoga poses |
|  |  | CO4 | Recall and describe the historical origins of yoga and meditation |
|  |  | CO5 | Summarize various styles of yoga |
| BCA II Sem | **Numerical Methods** | CO 1 | Define key terms and concepts related to numerical methods |
|  |  | CO2 | Explain the principles behind various numerical methods |
|  |  | CO3 | Apply numerical methods to solve real-world problems |
|  |  | CO4 | Analyze the sources of error in numerical computations and assess the accuracy of their solutions |
|  |  | CO5 | Implement algorithms for numerical methods in a programming language |
| BCA II Sem | **OOP’s Using C++** | CO 1 | Demonstrate Knowledge of Object-Oriented Programming Principles explain and identify the core concepts of Object-Oriented Programming, including classes, objects, inheritance, polymorphism, encapsulation, and abstraction, and their significance in software development. |
|  |  | CO2 | Implement Basic C++ Programs with Proper Syntax and Structure. |
|  |  | CO3 | Utilize Functions and Arrays to Solve Problems in C++ to design and implement functions, pass parameters, return values, and use arrays (single and multidimensional) for effective data handling and problem-solving in C++. |
|  |  | CO4 | Create and Manipulate Classes and Objects in C++ to define classes and objects in C++, implement constructors and destructors, overload functions and operators, and demonstrate how objects interact within a program as both data types and physical entities. |
|  |  | CO5 | Apply Inheritance and Polymorphism to Create Reusable and Flexible C++ Programs |
| BCA II Sem | **Digital Electronics** | CO 1 | Identify and define key concepts related to number systems and codes. |
|  |  | CO2 | Explain the principles of Boolean algebra and their applications in simplifying logic expressions. |
|  |  | CO3 | Apply minimization techniques to simplify complex Boolean expressions. |
|  |  | CO4 | Design combinational circuits such as adders, multiplexers, and decoders using appropriate logic gates based on given specifications. |
|  |  | CO5 | Implement sequential circuits using flip-flops and counters. |
| BCA II Sem | **Data Structures** | CO 1 | Demonstrate Understanding of Data Structures((arrays, stacks, queues, linked lists, trees, graphs)) and Their Implementations |
|  |  | CO2 | Analyze the time and space complexity of algorithms using Big O notation, and compare the efficiency of different algorithms for solving the same problem. |
|  |  | CO3 | Implement Advanced Data Structures and Operations ((arrays, stacks, queues, linked lists, trees, graphs)) and Their Implementations |
|  |  | CO4 | Solve Problems Using Appropriate Data Structures and Algorithms for a given problem based on its requirements (e.g., time complexity, space efficiency). |
|  |  | CO5 | Apply Sorting and Searching Algorithms to Real-World Problems . |
| BCA II Sem | **Environmental Science** | CO 1 | Identify and list the major components of ecosystems |
|  |  | CO2 | Explain the concept of biodiversity and its importance to ecosystem stability |
|  |  | CO3 | Summarize the impact of human activities on climate change |
|  |  | CO4 | Demonstrate the ability to assess local environmental issues by conducting a simple field study and presenting their findings. |
|  |  | CO5 | Apply principles of sustainable development by proposing a project that addresses a specific environmental issue in their community. |
| BCA II Sem | **General Hindi I** | CO 1 | छात्र हिंदी गद्य की विविधता को समझने में सक्षम होंगे। |
|  |  | CO2 | छात्र हिंदी पद्य की विविधता को समझने में सक्षम होंगे। |
|  |  | CO3 | छात्र हिंदी भाषा और शब्दावली को समझने में सक्षम होंगे। |
|  |  | CO4 | छात्र कार्यालयी हिंदी को समझने में सक्षम होंगे। |
|  |  | CO5 | इन इकाईयों के माध्यम से छात्रों को हिंदी गद्य ,पद्य, भाषा और शब्दावली की गहरी समझ प्राप्त होगी,  जो छात्रों को ज्ञान को समझने, विश्लेषण करने और मूल्यांकन करने की क्षमता प्रदान करता है। |
| BCA II Sem | **Event Management** | CO 1 | Identify key components of event planning |
|  |  | CO2 | List various types of events and their unique characteristics |
|  |  | CO3 | Explain the importance of stakeholder engagement in the event planning process. |
|  |  | CO4 | Summarize the steps involved in creating an event proposal |
|  |  | CO5 | Demonstrate the ability to create a basic event timeline |
| BCA III Sem | **Mathematics II** | CO 1 | Define the terms related to differential equations |
|  |  | CO2 | Identify different types of linear differential equations with constant coefficients |
|  |  | CO3 | Explain the representation of complex numbers in the Argand diagram |
|  |  | CO4 | Describe various methods for testing primality and factorization |
|  |  | CO5 | Apply standard techniques for solving linear differential equations |
| BCA III Sem | **Computer Organization** | CO 1 | Identify and describe the basic data types used in computer systems. |
|  |  | CO2 | Explain the concepts of register transfer language, bus and memory transfers, and the different types of micro-operations. |
|  |  | CO3 | Discuss the role of instruction codes, computer registers, and timing control in basic computer organization. |
|  |  | CO4 | Apply their knowledge to program the basic computer effectively. |
|  |  | CO5 | Design a simple control unit using microprogramming techniques. |
| BCA III Sem | **Visual Programming Using VB.Net** | CO 1 | Identify and list the fundamental components of VB.Net programming, |
|  |  | CO2 | Explain the purpose and functionality of key programming concepts |
|  |  | CO3 | Demonstrate the ability to create a simple VB.Net application |
|  |  | CO4 | Recall the syntax rules for writing basic statements in VB.Net |
|  |  | CO5 | Summarize the steps involved in debugging a VB.Net program |
| BCA III Sem | **Database Management**  **System** | CO 1 | **define** key database concepts |
|  |  | CO2 | **explain** the differences between relational and non-relational databases. |
|  |  | CO3 | **summarize** the process of database normalization and its importance in reducing data redundancy. |
|  |  | CO4 | **demonstrate** how to create a simple database schema |
|  |  | CO5 | **solve** basic queries using SQL to retrieve specific data from a given database. |
| BCA III Sem | **Artificial Intelligence** | CO 1 | Define key concepts related to artificial intelligence. |
|  |  | CO2 | Explain the various problem-solving techniques along with their applications in real-world scenarios. |
|  |  | CO3 | Summarize the principles of game playing in AI and discuss their effectiveness in solving problems. |
|  |  | CO4 | Apply knowledge representation techniques to build a simple knowledge base for an intelligent agent. |
|  |  | CO5 | Demonstrate the use of supervised learning algorithms. |
| BCA IV Sem | **Software Engineering** | CO 1 | Define key software engineering concepts and the various life cycle models. |
|  |  | CO2 | Explain the software life cycle model’s applicability in various project scenarios. |
|  |  | CO3 | Apply requirements engineering techniques to gather and document software requirements effectively. |
|  |  | CO4 | Analyze the effectiveness of different software processes in relation to project needs and constraints, enabling them to select the most appropriate model for a given scenario. |
|  |  | CO5 | Evaluate the impact of Agile methodologies on software development practices, assessing their strengths and weaknesses in terms of project management and team collaboration. |
| BCA IV Sem | **Operating System** | CO 1 | Identify and define key concepts related to operating systems, including application programs, system programs, and the functions of an operating system. |
|  |  | CO2 | Describe the architecture of operating systems, including subsystems (top layer, middle layer, bottom layer) and the bootstrap process. |
|  |  | CO3 | Explain the differences between processes and threads, including their contexts, states, and management techniques. |
|  |  | CO4 | Apply CPU scheduling algorithms to manage processes effectively in various scenarios. |
|  |  | CO5 | Utilize inter-process communication mechanisms to facilitate communication between processes. |
| BCA IV Sem | **Web Technologies (HTML,**  **CSS, Java Script)** | CO 1 | Demonstrate the ability to create a basic web page using HTML, including the correct use of elements, tags, and attributes to structure content effectively. |
|  |  | CO2 | Apply CSS techniques to style web pages by utilizing various CSS properties and selectors, ensuring a visually appealing and user-friendly design. |
|  |  | CO3 | Utilize JavaScript to enhance web forms by implementing validation techniques, managing user input, and creating dynamic interactions within the web page. |
|  |  | CO4 | Implement client-server technology concepts by setting up a simple web server and configuring it to host a website. |
|  |  | CO5 | Analyze and apply different internet protocols in practical scenarios to facilitate data transfer and communication over the internet. |
| BCA IV Sem | **Programming in Java** | CO 1 | Apply the fundamental principles of Object-Oriented Programming to design and implement Java classes and objects that model real-world scenarios. |
|  |  | CO2 | Demonstrate the ability to declare and use various Java data types, variables, and operators, along with control to create dynamic and functional Java applications. |
|  |  | CO3 | Design classes with appropriate methods and constructors in Java. |
|  |  | CO4 | Implement exception handling mechanisms to manage errors gracefully in Java applications, ensuring robust program execution. |
|  |  | CO5 | Create multithreaded programs in Java effectively. |
| BCA IV Sem | **Information and Cyber security** | CO 1 | Students will be able to explain the fundamental principles of information security, including information classification, policy frameworks, and role-based security. |
|  |  | CO2 | Students will be equipped to identify various security threats and vulnerabilities, including intruders, malware, and specific threats to desktop and email security. |
|  |  | CO3 | Students will learn to implement effective security measures based on established best practices. |
|  |  | CO4 | Students will gain an understanding of security management concepts, including access control, intrusion detection systems, and the legal aspects of information security. |
|  |  | CO5 | Students will be able to describe and apply various cryptographic techniques, including symmetric and asymmetric key cryptography. |
| BCA V Sem | **Human Values and Professional Ethics** | CO 1 | Identify key concepts and principles of human values and professional ethics. |
|  |  | CO2 | Explain the significance of ethical theories in the context of professional practices. |
|  |  | CO3 | Apply ethical decision-making frameworks to analyze case studies in various professional settings. |
|  |  | CO4 | List the fundamental human rights recognized in international ethics. |
|  |  | CO5 | Summarize the impact of cultural differences on ethical decision-making |
| BCA V Sem | **Programming in PHP** | CO 1 | Identify and list the basic syntax and structure of PHP code. |
|  |  | CO2 | Explain the role of variables, data types, and operators in PHP. |
|  |  | CO3 | Demonstrate the ability to write simple PHP scripts to perform basic tasks |
|  |  | CO4 | Compare and contrast different PHP frameworks |
|  |  | CO5 | Assess the performance and security implications of various coding practices |
| BCA V Sem | **Unix Operating System and**  **Shell Programming** | CO 1 | Define key Unix concepts |
|  |  | CO2 | Explain the purpose and functionality of various Unix commands and their options |
|  |  | CO3 | Demonstrate the ability to write basic shell scripts |
|  |  | CO4 | Apply Unix commands in real-world scenarios |
|  |  | CO5 | Solve common problems encountered in Unix environments |
| BCA V Sem | **Software Project**  **Management System** | CO 1 | List and define key software project management terminology |
|  |  | CO2 | Explain the phases of the software development life cycle |
|  |  | CO3 | Demonstrate the use of project management tools |
|  |  | CO4 | Identify various software development methodologies |
|  |  | CO5 | Summarize the roles and responsibilities of a software project manager within a team setting. |
| BCA V Sem | **Software Testing** | CO 1 | Identify and define key concepts related to software quality and testing. |
|  |  | CO2 | Explain the role and objectives of software testing within the software development lifecycle. |
|  |  | CO3 | Discuss the differences between white-box and black-box testing techniques. |
|  |  | CO4 | Apply various test case selection strategies based on sources of information. |
|  |  | CO5 | Implement a simple unit testing framework for a given software module. |
| BCA VI Sem | **Cloud Computing** | CO 1 | To define key concepts related to cloud computing, including its definition, characteristics, and the different service models (SaaS, PaaS, IaaS). This outcome focuses on recalling and recognizing fundamental terminologies. |
|  |  | CO2 | To explain the benefits and limitations of cloud computing in various organizational scenarios, demonstrating comprehension of how cloud solutions can impact business operations. |
|  |  | CO3 | To deploy applications over cloud platforms such as Amazon EC2 and Google App Engine, applying their knowledge of cloud services to practical scenarios. |
|  |  | CO4 | To compare and contrast different cloud service models (SaaS, PaaS, IaaS) and their respective platforms, analyzing their suitability for specific organizational needs. |
|  |  | CO5 | To analyze the role of virtualization technologies in cloud computing, including hypervisors and their applications in enterprises, identifying potential pitfalls associated with virtualization. |
| BCA VI Sem | **Computer Networks** | CO 1 | Define key concepts related to data communication, including the OSI reference model, TCP/IP model, and various network components. This outcome focuses on recalling fundamental terminologies and definitions. |
|  |  | CO2 | Explain the functions of each layer in the OSI and TCP/IP models, demonstrating an understanding of how these layers interact and their roles in data communication. |
|  |  | CO3 | Apply knowledge of routing algorithms to analyze different routing techniques such as shortest path routing and distance vector routing, illustrating their use in real-world networking scenarios. |
|  |  | CO4 | Compare and contrast various network technologies, including Ethernet, Frame Relay, and Wireless LAN, evaluating their benefits and limitations in different organizational contexts. |
|  |  | CO5 | Demonstrate the ability to design a simple data link layer protocol, incorporating flow control and error control techniques, and analyze its performance in a simulated environment. |
| BCA VI Sem | **Android Programming** | CO 1 | Students will be able to list the main components of Android architecture, including Activities, Services, and Broadcast Receivers. |
|  |  | CO2 | Students will be able to describe how the Open Handset Alliance contributes to the development and standardization of the Android platform. |
|  |  | CO3 | Students will be able to outline the stages of an Android application's lifecycle and explain how they affect application behavior. |
|  |  | CO4 | Students will be able to develop a basic Android application that includes user interface elements and responds to user interactions. |
|  |  | CO5 | Students will be able to apply debugging techniques using tools like LogCat and DDMS to identify and resolve issues within an Android application. |
| BCA VI Sem | **Multimedia Technology** | CO 1 | Identify and list the various multimedia elements such as text, images, sound, animation, and video used in multimedia applications. |
|  |  | CO2 | Explain the differences between mono and stereo sound, including their attributes and effects on multimedia experiences. |
|  |  | CO3 | Demonstrate the ability to create a simple multimedia presentation using PowerPoint, incorporating various elements like text, images, and sound. |
|  |  | CO4 | Knowledge of sound file formats by selecting appropriate formats (e.g., WAV, MP3) for specific multimedia projects based on their characteristics. |
|  |  | CO5 | Identify and list the various multimedia elements such as text, images, sound, animation, and video used in multimedia applications. |
|  |  |  |  |