BCA (Cloud Computing)
Semester-III

25BCC070T: Cloud Computing Networking

Course Objectives

- To understand basics of Network & Networking
- Enumerate the layers of OSI model and TCP/IP model.
- Acquire knowledge of Network layer paradigms and protocols.
- Study Session layer design issues, Transport layer services, and protocols.
- To study network security fundamentals.

Course Outcomes

1. Understand the fundamental concepts and components of computer network.
2. Apply networking concepts and protocols specific to cloud computing, such as virtual networks, load balancers, and software-defined networking.
3. Analyze the network layer protocols.
4. Evaluate various switching and communication techniques.
5. Create and configure a local area network.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	1	-	2	-	-	1	-	-	-	-
CO2	1	2	3	-	-	-	-	-	2	-	-	-
CO3	2	-	-	3	1	-	1	-	-	1	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	-	2	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I: Basics of Network & Networking   12 Hours

Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture-Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, media connectors (Fiber optic, Coaxial, and TP etc.).

Unit-II: Introduction of OSI Model   12 Hours

Introduction of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, ARP/RARP, Message format, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses. Network Devices- NIC, functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways and Other Networking Devices, Repeater, CSU/DSU, and modem, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components, Point-to-Point Protocol (PPP), PPP standards.

Unit-III: Network Layer   12 Hours

Network Layer: Internet Protocol (IP), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, ICMP, IGMP, Introduction to Routing and Switching concepts, Transport Layer: TCP, UDP, Overview of Ports & Sockets. Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP etc.

Unit-IV **12 Hours**
WAN, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet: PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fiber, Cellular Technologies, Connecting LANs: Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation.

Unit-V: Network security **12 Hours**
Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Security Threats. Troubleshooting Networks: Command Line interface Tools, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware Troubleshooting tools, system monitoring tools.

Total Hours: 60

Reference
1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback),
2. Wiley India, 2011
3. "Computer Networks" Andrew & Tanenbaum,
4. W. Richard Stevens, TCP/IP Illustrated Volume-I "The Protocols ", Addison W 2.

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/
3. https://www.edx.org/

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

BCA (Cloud Computing)
Semester-III

L-3 T-0 P-0 C-3

25BCC080T: Fundamental of Storage

Course Objectives

- To learn about fundamentals of information storage, including data types and the evolution of storage architecture.
- To know about evolution and components of Fibre Channel Storage Area Network
- To learn file sharing protocols, I/O operations, and implementations in NAS.
- To learn business impact analysis, single points of failure, and backup granularity.
- To know about uses of local replication, file system and database consistency, and local replication technologies.

Course Outcomes

1. Understand the evolution of storage architecture and the core elements of a data center.
2. Apply knowledge of FC SAN components to design and configure storage networks.
3. Analyze the comparison between hierarchical file systems and flat address space in object-based storage.
4. Evaluate the effectiveness of traditional backup approaches and image-based backup solutions in ensuring data availability and recovery.
5. Designing and implementing a comprehensive data replication strategy that integrates both local and remote replication technologies to effectively address business continuity requirements.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	-	2	-	1	-	-	-	-	-	-
CO2	-	2	3	-	1	-	-	-	2	-	1	-
CO3	2	-	-	3	-	-	1	-	-	1	-	-
CO4	-	1	1	-	3	-	-	1	-	-	-	1
CO5	-	-	-	2	-	3	-	-	-	-	-	-

High-3 Medium-2 Low-1

UNIT I Data Storage Fundamentals and Infrastructure   09Hours

Introduction to Information Storage : Data, Information, types of data, evolution of storage architecture, core elements of a data center, characteristics of data center, **Data Centre Environment:** Application and application virtualization, Components of host system, Compute and memory virtualization, Physical components of connectivity, Storage connectivity protocols, **Data Protection RAID :** Implementation methods, array components, techniques, Commonly used RAID levels(RAID 0, RAID 1, RAID 5, RAID 6, RAID 10) RAID impacts on performance, Hot spare, **Intelligent Storage System:** overview, components of ISS, Cache management.

UNIT II FC SAN: Components, Interconnectivity, Virtualization   09 Hours
Fibre Channel Storage Area Network (FC SAN): Evolution, Components, interconnectivity options, port types, protocol stack, addressing, WWN addressing, Structure and organization of FC data, Fabric services, Fabric login types, Benefits of zoning, Types of zoning, Block-level storage virtualization, Virtual SAN, **IP SAN and FCOE:** Drivers for IP SAN, **IP SAN Protocols:** iSCSI and FCIP, Components, topologies, and protocol stack for iSCSI and FCIP, **FCOE**: Drivers, Components of FCOE network, frame mapping, Converged Enhanced Ethernet (CEE).

UNIT III NAS Evolution, Benefits, Protocols, Virtualization   09 Hours
Network-Attached Storage (NAS): File sharing technology evolution, Benefits of NAS, components, file sharing protocols, I/O operations, implementations, File-level virtualization, **Object-based and Unified Storage**: Comparison of hierarchical file system and flat address space, Object-based storage model, Key components of object-based storage, storage and retrieval process in object-based storage devices, Unified Storage components, Unified Storage Data access.

UNIT IV Business Continuity Essentials: Planning, Backup   09 Hours
Introduction to Business Continuity: Business continuity, Information availability metrics, terminologies, planning, Business impact analysis, Single points of failure, **Backup and Archive:** Backup granularity, Backup method, Backup architecture, Backup and recovery operations, **Deduplication:** overview, methods, implementations, Key benefits, Traditional backup approach, Image-based backup, **Data Archive:** Fixed content, Data archive, Archive solution architecture.

UNIT V Local and Remote Replication Essentials   09 Hours
Local Replication: Uses of local replica, File system and database consistency, Local replication technologies, Restore and restart considerations, Mirroring of a virtual volume, Replication of virtual machines, **Remote Replication:** Synchronous and asynchronous replication, Bandwidth requirement, Host-based, storage array-based, and network-based replication technologies.

Total: 45 Hours

Reference Books:
1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained: Basic and application of fiber channels, SAN, NAS, iSESI, INFINIBAND and FCOE, Wiley India.
3. John W. Rittenhouse and James F. Ransome; Cloud Computing: Implementation, Management and Security, CRC Press, Taylor Frances Pub.
4. Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System & Application, Springer.
5. Anthony T. Velete, Toby J.Velk, and Robert Eltenpeter, Cloud Computing: A practical Approach, TMH Pub.
6. Saurabh, Cloud Computing: Insight into New Era Infrastructure, Wiley India.
7. Sosinsky, Cloud Computing Bible, Wiley India.

List of e-Learning Resources:

1. https://www.ibm.com/training/collection/ibm-storage-fundamentals-338
2. https://www.udemy.com/course/the-complete-storage-backup-fundamentals/?couponCode=ST20MT50724
3. https://education.oracle.com/fundamentals-of-storage-area-networks/courP_2065

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

BCA (Cloud Computing)
Semester-III

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

25BCC090T: Object Oriented Programming using C++

Course Objectives
- To learn basic concepts of object-oriented programming.
- To learn dynamic memory management and constructors and destructors.
- To learn inheritance and its types.
- To know about data hiding, operator and function overloading.
- To know about file handling and its functions.

Course Outcomes
1. Understand the basic syntax and data types in C++.
2. Apply OOP principles in problem-solving using C++.
3. Analyze different approaches to problem-solving using OOP in C++.
4. Evaluate the effectiveness of OOP principles in software development with C++.
5. Create C++ programs that incorporate multiple classes, inheritance, and polymorphism to solve real-world problems.

Articulation Matrix
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	-	-	2	-	1	-	1	-	-	-
CO2	1	-	3	-	1	-	-	-	-	2	-	-
CO3	-	-	1	3	-	2	-	-	-	-	-	-
CO4	-	1	-	2	3	-	-	3	-	-	1	-
CO5	1	-	-	-	2	3	-	-	3	-	-	1

High-3 Medium-2 Low-1

Unit I C++ Fundamentals and Programming Basics   12 Hours
History of C++, C++ Characteristics, Difference between C and C++, Basic Structure of a C++ program, Compiling and Executing C++ Program. Selection control statements in C++. Data types, Expression and control statements Iteration statements in C++, Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions.

Unit II Functions, Data Passing, Scope, Structures, Classes   12 Hours
Functions, Passing Data to Functions, Scope and Visibility of Variables in Functions, Structures in C++. Creating classes and Abstraction: Classes objects, data members, member functions, this Pointer, Friends, Friend Functions, Friend Classes, Friend Scope, and Static Functions.

Unit III Constructors, Destructors, Statics, Operator Overloading   12 Hours
Constructors and Destructors, Static variables and Functions in class. Operator Overloading in C++, Overloading Unary Operators, Overloading binary operators.

Unit IV Inheritance, Pointers, Polymorphism, Abstract Classes   12 Hours
Inheritance in C++, Types of Inheritance, Pointers, Objects and Pointers, Multiple Inheritance, Virtual Functions, Polymorphism, Abstract classes.

Unit-V C++ I/O, File Operations, Memory Management   **12Hours**

C++ I/O system, formatted I/O, file I/O basics, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, Storage Management: Static Memory allocation, Dynamic Memory Allocation: new and delete. Difference between static memory allocation and dynamic memory allocation.

                                                                  Total Hours: 60

Reference Books:
1. Robert Lafore; Object Oriented Programming in C++
2. Ken Barclay; Object Oriented design with C++
3. Balagurusamy; Object Oriented Programming in C++
4. Complete Reference C++

List of e-Learning Resources:
1. https://www.edx.org/
2. https://www.coursera.org/learn/cplusplus-crypto-i
3. https://www.mygreatlearning.com/academy

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

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

25BCC100T: Cloud Computing Applications – I

Course Objectives

- To learn basic concepts of internet technology.
- Learn to apply basic and advanced tags of HTML, HTML5 tags.
- Learn basic CSS concepts: selectors, CSS properties, CSS code structure etc.
- To learn basic concepts of JavaScript and design responsive web pages using HTML, CSS and add validation using JavaScript.
- Learn to apply PHP.

Course Outcomes

1. Understand the history and architecture of the internet and its protocols at the comprehension level.
2. Apply HTML elements and features to create static web pages effectively.
3. Analyze CSS styling techniques to enhance the presentation and layout of web content.
4. Evaluate JavaScript functions and statements to develop interactive web applications.
5. Create PHP-driven forms and database interactions for dynamic web page generation.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	-	-	-	-	-	-	-	-	-
CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	1	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I: Introduction to Internet Technology　　　　　　　　　　　　12 Hours

Introduction to Internet Technology: History of the internet, internetworking concepts, architecture, and protocol: TCP/IP and others main protocols, internet address and domains. World Wide Web (WWW), Web Clients, Web Servers, Hyper Text Transfer Protocol (Http), feature of HTTP protocol, HTTP request response model, Hyper Text Transfer Protocol Secure (HTTPS),proxy server, Firewall.

Unit-II: Introduction HTML　　　　　　　　　　　　　　　　　　　　12 Hours

Static Web page Development: Introduction to Hyper Text Markup Language (HTML), Elements of HTML, Basic structure of an HTML, document Head & Body Sections, inserting texts, Text alignment, using images in pages, Hyperlinks text, Forms in HTML, Backgrounds and Color controls, creating and using Tables in HTML, Creating Lists: Ordered List Tags, Unordered List Tag. Changing the Font Color, Marquee Tag.

Unit-III: Introduction to CSS　　　　　　　　　　　　　　　　　　　12 Hours

Dynamic Web page Development: Cascading Style Sheet: CSS, Defining Style with HTML Tags, Features of Style Sheet, Style Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with Lists and Tables, Style placement: Inline style, Span & div tags, header styles.CSS Id and Class Working with block elements and objects, CSS Color.

Unit-IV: JavaScript   **12 Hours**
JavaScript Overview: JavaScript and the WWW, Script, element, Functions: Functions introduction, calling functions, JavaScript Comments, Variables: Variables overview, declaring variables, Types of variables, Casting variables, Alert box, Prompt & confirm. Expressions: Arithmetic operators, Assignment operators, Logical operators, Expressions and precedence, Statements: If statement; for statement, while statement, Break/Continue.

Unit-V: PHP   **12 Hours**
Introduction to PHP: PHP data types, Variable, Constants, Variable scope, Operators, If, else if, switch statement, loops: while, do while, for, foreach, breaking out of loops: Break, Continue, and exit. **Working with Form:** GET and POST data, Combine HTML and PHP code, create user Forms using database.
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                                                                       Total Hours: 60

Reference Books:

1. HTML and Web designing - Kris Jamsa and Konrad King
2. Web Technology - N.P. Goplan, J. Akilandeswari
3. Internet Technology and Web Design - ISRD Group
4. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar & others, Cengage Learning
5. Ivan Bayross, HTML, DHTML, JavaScript, CSS, PHP, BPB Publications.
6. Ivan Bayross, PHP 5, BPB Publications
7. Andrew Curioso, Ronald Brad ford, Patrick Galbraith, Expert PHP and Mysql, Wiley Publishing

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/
3. http://www.udemy.com/

| **Prepared By** | **Academic Coordinator** | **HOD** | **Senior Faculty nominated by DOAA** |

L-0 T-0 P-4 C-2

25BCC090P: Object Oriented Programming using C++

Course Objectives
- To learn basic concepts of object-oriented programming**.**
- To learn dynamic memory management and constructors and destructors.
- To learn inheritance and its types.
- To know about data hiding, operator and function overloading.
- To know about file handling and its functions.

Course Outcomes
1. Students can understand basic syntax and structure by programming "Hello" output.
2. Students can swap variables using a third variable for understanding assignment operations.
3. Students can differentiate vowels and consonants through character checking.
4. Students can retrieve ASCII values for characters to understand character encoding.
5. Students can implement call by value and call by reference for function parameter passing comprehension.

Articulation Matrix
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	-	-	2	-	1	-	1	-	-	-
CO2	1	-	3	-	1	-	-	-	-	2	-	-
CO3	-	-	1	3	-	2	-	-	-	-	-	-
CO4	-	1	-	2	3	-	-	3	-	-	1	-
CO5	1	-	-	-	2	3	-	-	3	-	-	1

High-3 Medium-2 Low-1

Unit I Introduction to Programming Fundamentals   **12 Hours**
Introduces basic output functionality to display text on the screen. Teaches fundamental variable manipulation and assignment operations.Introduces decision-making using conditional statements to differentiate between vowels and consonants.

Unit II Understanding Character Manipulation and Function Parameters   12 Hours
Explores character data types and ASCII encoding, illustrating how to retrieve and display ASCII values. Introduces different methods of passing parameters to functions, highlighting the differences between passing by value and by reference.

Unit III Decision Structures and Iterative Control   **12 Hours**
Demonstrates nested conditional statements for decision-making in complex scenarios. Introduces iterative control structures, demonstrating how to compute factorial using a while loop. Teaches iterative reversal techniques, reinforcing loop-based logic.

Unit IV Arrays and Data Structures   **12 Hours**
Introduces basic data structures, focusing on arrays and their implementation in programming.Explores array traversal and comparison techniques to find maximum and

minimum values within an array. Introduces multidimensional arrays and their practical applications in handling structured data.

Unit-V Advanced Concepts in Pointers and Object-Oriented Programming   12 Hours
Introduces pointers and their role in memory management and manipulation.Illustrates advanced data structures by combining arrays and pointers. Introduces function pointers and demonstrates their use in dynamically calling functions.Explores pointer arithmetic and its applications in array traversal and manipulation.

Total Hours: 60

List of Experiments

1. Program to print "Hello".
2. Program to swap two variables using the third variable.
3. Program to check the entered alphabet is the vowel or consonant.
4. Program to print ASCII value of any alphabet.
5. Program to implement call by value.
6. Program for call by reference.
7. Program to find greatest among three numbers using nested if.
8. Program for factorial using while loop.
9. Program to print reverse of a number using a while loop.
10. Program for Fibonacci series.
11. Program for calculator using switch case.
12. Program to pass structure to the function.
13. Program to implement array of structure.
14. Program to implement an array.
15. Program to find maximum and minimum number entered in array.
16. Program for multidimensional array.
17. Program for implementing the concept of pointer.
18. Program to demonstrate array of pointers.
19. Program to implement pointer to a function.
20. Program for increment and decrement operation in pointer.
21. Program for arithmetic operations in array.
22. Program to demonstrate constructor and destructor.
23. Program for parameterized overloading constructor.
24. Program for copy constructor.
25. Program to implement the concept of inheritance.
26. Program to implement single level, multilevel, multiple, hybrid and hierarchical inheritance.
27. Program for function overloading and operator overloading.
28. Program for accessing private member of base class using friend function.

Total Hours: 60

Reference Books:
1. Robert Lafore; Object Oriented Programming in C++
2. Ken Barclay; Object Oriented design with C++
3. Balagurusamy; Object Oriented Programming in C++
4. Complete Reference C++

List of e-Learning Resources:

1. https://www.edx.org/
2. https://www.coursera.org/learn/cplusplus-crypto-i
3. https://www.mygreatlearning.com/academy

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

Semester-III

L-0 T-0 P-4 C-2

25BCC100P: Cloud Computing Applications – I

Course Objectives

- To learn basic concepts of internet technology.
- Learn to apply basic and advanced tags of HTML, HTML5 tags.
- Learn basic CSS concepts: selectors, CSS properties, CSS code structure etc.
- To learn basic concepts of JavaScript and design responsive web pages using HTML, CSS and add validation using JavaScript.
- Learn to apply PHP.

Course Outcomes

1. Students can create a basic webpage with HTML, including paragraphs and lists, to describe their department.
2. Students can add hyperlinks to specific words like "Wi-Fi" and "LAN" to link them to Wikipedia pages.
3. Students can insert an image into their webpage and make it clickable to navigate to another page.
4. Students can change the background color of their webpage and create a link at the bottom to scroll to the top.
5. Students can create a timetable using tables and use tables for layout to describe their university infrastructure in HTML.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	-	-	-	-	-	-	-	-	-
CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	1	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I:Introduction to HTML Basics   **12 Hours**
Understanding HTML Structure, Introduction to HTML tags, elements, and attributes. Writing HTML code to create a basic webpage. Using paragraph <p> and list `<ul>`, `<ol>`, `<li>` tags to structure content.

Unit-II: Hyperlinks and Images   **12 Hours**
Creating Hyperlinks, Adding hyperlinks (<a> tags) to navigate within the webpage and external websites. Creating anchor links for smooth scrolling within the webpage.
Inserting and Linking Images, Using <img> tag to insert images into a webpage. Making images clickable with <a> tags to link them to other webpages or resources.

Unit-III: Styling with CSS   **12 Hours**
Introduction to CSS, Basics of Cascading Style Sheets (CSS): syntax, selectors, properties, and values. Applying in-line CSS to change text color, background color, font size, and style within HTML elements.
External CSS, Creating separate `.css` files and linking them to HTML documents. Using classes and IDs to apply styles selectively and maintain consistency across webpages.

Unit-IV: Forms and Interactive Elements   **12 Hours**
Creating Forms, Using `<form>` tag to collect user input (e.g., name, age, address) with input fields, text areas, radio buttons, checkboxes, and submit button. Implementing form validation using HTML5 attributes and JavaScript for more advanced checks.
Interactive JavaScript, Writing JavaScript functions to manipulate DOM elements based on user interactions (e.g., bold, italic, underline text).

Unit-V: Advanced Topics and Responsive Design   **12 Hours**
Introduction to Bootstrap, Designing responsive web pages using Bootstrap framework for grid layout, navigation bars, and image sliders.
JavaScript and Dynamic Web Content, Using JavaScript to create dynamic web elements, such as pop-up boxes on page load or changing background colors after a delay.
Database Integration, Connecting HTML forms with backend databases using server-side scripting languages like PHP for database-driven web pages.

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                                                              Total Hours: 60

List of Experiments
1. Create a webpage with HTML describing your department. Use paragraph and list tags.
2. Create links on the words e.g., "Wi-Fi" and "LAN" to link them to Wikipedia pages.
3. Insert an image and create a link such that clicking on image takes user to other page.
4. Change the background color of the page. At the bottom create a link to take user to the top of the page.
5. Create a table to show your class time-table.
6. Use tables to provide layout to your HTML page describing your university infrastructure.
7. Use <span> and <div> tags to provide a layout to the above page instead of a table layout.
8. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.
9. Embed Audio and Video into your HTML web page.
10. Apply in-line CSS to change colors of certain text portions, bold, underline and italics certain words in your HTML web page. Also change the background color of each Paragraph using in-line CSS.
11. Write all the above styling in CSS in different files (.css) and link it to your webpage such that changes made in CSS file are immediately reflected on the page. Group Paragraphs into a single class and add styling information to the class in CSS.
12. Create a simple form to submit user input like his name, age, address and favorite subject, movie and singer.

13. Add form elements such as radio buttons, check boxes and password fields. Add a submit button.
14. Design a web page in bootstrap for shopping websites.
15. Make a navigation bar in bootstrap.
16. Make an image slider in bootstrap.
17. Create a form in HTML and put validation checks on values entered by the user using JavaScript (such as age should be a value between 1 and 150).
18. Write a JavaScript program to display an information box as soon as page loads.
19. Write a JavaScript program to change background color after 5 seconds of page load.
20. Write a JavaScript program to dynamically bold, italic and underline words and phrases based on user actions.
21. Write a JavaScript program to display a hidden div.
22. Using ideas from the above experiments, try to create a website for your department.
23. Create an e-book having the left side of the page name of the chapters and right side of the page the contents of the chapters clicked on the left side.
24. Create login and form and connect it with database.
25. Creating database driven web pages in PHP.
26. Creating PHP pages using JavaScript and HTML.
27. Creating Forms and Form Submission through GET and POST method.

Total Hours 60
Total Hours: 120

Reference Books:

1. HTML and Web designing - Kris Jamsa and Konrad King
2. Web Technology - N.P. Goplan, J. Akilandeswari
3. Internet Technology and Web Design - ISRD Group
4. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar & others, Cengage Learning
5. Ivan Bayross, HTML, DHTML, JavaScript, CSS, PHP, BPB Publications.
6. Ivan Bayross, PHP 5, BPB Publications
7. Andrew Curioso, Ronald Brad ford, Patrick Galbraith, Expert PHP and Mysql, Wiley Publishing

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/
3. http://www.udemy.com/

Prepared By   **Academic Coordinator**   **HOD**   **Senior Faculty nominated by DOAA**

L-0 T-0 P-8 C-4

25BCC110P: Server Operating System

Course Objectives:
- To learn about fundamentals of cryptography
- To Study abstract algebra, number theory, and modular arithmetic
- To know about the concept of Public Key Cryptosystems
- To learn about Digital Signatures, Key Management, and Key Exchange protocols
- To learn about attacks on Stream Ciphers and study Modern Stream Ciphers

Course Outcomes:
1. Students can understand the installation process of Windows Server 2012.
2. Students can manage disk storage using MBR, GPT, VHD, Basic disk, Dynamic disk, storage pool, and disk pool concepts.
3. Students can utilize NTFS file system features including file permissions, quota management, VSS, and offline files.
4. Students can comprehend IPv4 and IPv6 addressing schemes and their application in networking.
5. Students can deploy and configure DHCP services for network IP address management.

Articulation Matrix
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	-	-	2	-	-	-	-	1	-	-
CO2	2	-	3	-	-	-	-	-	1	-	-	-
CO3	-	2	-	3	-	-	1	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	-	-	1	-
CO5	2	-	-	2	-	3	-	-	-	-	-	2

High-3 Medium-2 Low-1

Unit 1: Introduction to Windows Server 2012 and File System Management

Installing Windows Server 2012: Overview of installation prerequisites, deployment options (GUI, Server Core), and post-installation tasks.

Disk Management: Understanding Master Boot Record (MBR) and GUID Partition Table (GPT) disk formats. Managing Virtual Hard Disks (VHDs), basic disks, and dynamic disks. Configuring storage pools and disk pools for efficient data management.

Unit 2: File System and Network Fundamentals

NTFS File System and its Features: Exploring NTFS features such as file permissions, quota management, Volume Shadow Copy Service (VSS), and offline files.

IPv4 **and** IPv6: Understanding IPv4 addressing, subnetting, and IPv6 transition strategies. Configuring IP addresses, DHCP, and DNS settings to ensure network connectivity.

Unit 3: Active Directory Services and Group Policy Management

Installing Active Directory Domain Controllers: Deploying domain controllers and configuring Active Directory Domain Services (AD DS). Understanding the roles and responsibilities of domain controllers within an Active Directory environment.

Active Directory User, Group, and OU Management: Creating and managing user accounts, security groups, and organizational units (OUs) to streamline administration. Implementing Group Policy Objects (GPOs) to enforce security settings and configurations across the network.

Unit 4: Network Services and Security Management

DNS Configuration: Configuring forward and reverse lookup zones for name resolution. Implementing primary, secondary, and stub zones, and configuring forwarders and root hints. Setting up caching-only DNS servers and Dynamic DNS (DDNS) for efficient name resolution.

DHCP Deployment and Configuration: Installing and configuring DHCP servers to automate IP address assignment and network parameter distribution. Managing DHCP scopes, leases, reservations, and options to optimize network resource utilization.

Unit 5: Advanced Server Management and Security Features

Server Security and Policies, Advanced Network Services, Data Management and Protection, Network Infrastructure Management, Advanced Active Directory Concepts.

List of Experiments

1. Installing windows server 2012
2. Disk Management – MBR, GPT, VHD, Basic disk, Dynamic disk, storage pool, disk pool
3. NTFS file system and its features – file permissions, quota, VSS, offline files
4. IPv4 and IPv6
5. DHCP – Deployment and configuration
6. DNS – Forward and reverse lookup, primary/secondary/stub zone, forwarders, root hints, caching only DNS, Dynamic DNS.
7. Installing Active Directory domain controllers
8. Active Directory user, group, OU management
9. Create and manage Group Policy objects (GPOs)
10. Configure security policies
11. Configure application restriction policies
12. Configure Windows Firewall
13. Deploy and manage Windows Deployment Services (WDS)
14. Install and configure Windows Server Update Service (WSUS)

15. Configure Distributed File system (DFS)
16. Configure File Server Resource Manager (FSRM)
17. Configure file and disk encryption
18. Configure routing
19. Configure NAT
20. Configure VPN
21. Configure RADIUS servers
22. Configure Network Access Protection
23. FSMO roles
24. Active Directory backup and restoration

Total Hours: 120

Reference Books:
1. WINDOWS SERVER 2012 R2. New features and enhancements by R. Salazar.
2. Windows Server 2012 R2 Storage, Security and Networking Pocket Consultant STANEK
3. Training Guide Installing and Configuring Windows Server 2012 R2 Mitch Tulloch

List of e-Learning Resources:
1. https://www.udemy.com/
2. https://www.udemy.com/
3. https://www.coursera.org

| **Prepared By** | **Academic Coordinator** | **HOD** | **Senior Faculty nominated by DOAA** |