BCA (System Administration and Cyber Security)
Semester-III

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

25SACS070T: Web Technology

Course Objectives

- To know Basic concepts of Web and learn to design effective web pages.
- To learn about how to apply basic and advanced tags of HTML, HTML5 tags.
- To know about basic CSS concepts: selectors, CSS properties, CSS code structure, CSS declarations, CSS unit types etc.
- To learn basic concepts of JavaScript and design responsive web pages using HTML, CSS and add validation using JavaScript.
- To learn about how to apply JavaScript and PHP.

Course Outcomes

1. Understand the historical development of the internet.
2. Apply HTML elements to create basic web page structures and insert content.
3. Analyze the concept and application of Cascading Style Sheets (CSS) in web development.
4. Evaluate JavaScript features such as comments, alerts, prompts, and confirms.
5. Create and integrate user forms with HTML and PHP code, including database interactions.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation isindicated 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	1	-	-	-	-	-	-	-	-	-
CO2	1	2	3	1	-	-	-	-	2	-	-	-
CO3	1	1	2	3	-	-	1	-	-	-	-	-
CO4	1	-	2	-	3	-	-	-	-	-	-	-
CO5	1	1	-	2	-	3	-	-	-	-	-	-

High-3 Medium-2 Low-1

Unit-I Exploring History, Concepts, and Protocols   **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 Creating Static Web Pages   **12 Hours**

Static Web page Development: Introduction to Hyper TextMarkup 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 contro1s, creating and using Tables in HTML, Creating Lists: Ordered List Tags, Unordered List Tag. Changing the Font Color; Marquee Tag.

Unit-III Creating Dynamic Web page   **12Hours**

Dynamic Web page Development: Cascading Style Sheet:CSS, Defining Style with HTML Tags, Features of Style Sheet, StyleProperties, 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: Functions, Variables & Operators   **12Hours**

JavaScript Overview: JavaScript and the WWW, Script, element,Functions: Functions introduction, calling functions, JavaScript Comments, Variables: Variables overview, declaring variables, Types of variab1es, 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 Essentials: Basics of Data, Variables, and Control   **12Hours**

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.

                                                                  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

List of e-Learning Resources:

   1. https://www.coursera.org/courses?query=web%20technologies

   2. https://onlinecourses.swayam2.ac.in/nou24_cs09/preview

   3. https://www.udemy.com/course/web-technology-for-entrepreneurs/?couponCode=ST20MT50724

4. https://iisdt.in/product/certificate-in-web-technology

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

BCA (System Administration and Cyber Security)
Semester-III

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

25SACS080T: 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 isindicated 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	-	-	-
CO3	2	-	-	3	-	-	1	-	-	-	-	-
CO4	-	1	1	-	3	-	-	-	-	-	-	-
CO5	-	-	-	2	-	3	-	-	-	-	-	-

High-3 Medium-2 Low-1

UNIT I: Data Storage Fundamentals and Infrastructure   09 Hours
Introduction to Information Storage : Data, Information, types of data, evolution of storage architecture, core elements of a data centre, characteristics of data centre, **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

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

25SACS090T: 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	-	-	-	-
CO5	1	-	-	-	2	3	-	-	3	-	-	-

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

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BCA(System Administration and Cyber Security)
Semester-III

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

25SACS100T: System Security and Cryptography

Course Objectives

- To understand system security and cryptography basics.

- To explain cryptography principles and analyze system vulnerabilities.

- To apply cryptographic techniques in practical security measures.

- To evaluate cryptographic algorithm effectiveness and analyze security incidents.

- To design comprehensive security solutions integrating cryptography and managing cryptographic keys effectively.

Course Outcomes (COs)

1. Understand system security and cryptography fundamentals.

2. Explain cryptographic principles and analyze system vulnerabilities.

3. Apply cryptographic techniques and implement security measures.

4. Evaluate cryptographic algorithm effectiveness and analyze security incidents.

5. Design comprehensive security solutions and cryptographic key management strategies.

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	-	-	-	-	-
CO4	-	1	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I: Introduction to Cyber Security   12 Hours
Introduction to cryptography, Classical Cryptosystem, Block Cipher, Data Encryption Standard (DES), Triple DES, Modes of Operation, Stream Cipher, LFSR-based Stream Cipher.

Unit-II: Cryptography Fundamentals: Math and AES   12 Hours
Mathematical background, Abstract algebra, Number Theory Modular Inverse, Extended Euclid

Algorithm, Fermats Little Theorem, Euler Phi-Function, Eulers theorem. Advanced Encryption Standard (AES)

Unit-III: Introduction to Public Key Cryptosystem   06 Hours
Introduction to Public Key Cryptosystem, Diffie-Hellman Key Exchange Primarily Testing, ElGamal Cryptosystem, Elliptic Curve over the Reals, Elliptic curve Modulo a Prime.

Unit-IV: Types of Cryptosystem   08 Hours
Generalized ElGamal Public Key Cryptosystem, Rabin Cryptosystem, Message Authentication, Digital Signature, Key Management, Key Exchange, Hash Function. Cryptographic Hash Function, Secure Hash Algorithm (SHA), Digital Signature Standard (DSS).

Unit-V: Cryptanalysis   07 Hours
Cryptanalysis, Time-Memory Trade-off Attack, Differential and Linear Cryptanalysis, Cryptanalysis on Stream Cipher, Modern Stream Ciphers, Shamirs secret sharing and BE, Identity-based Encryption (IBE) Side-channel attack, The Secure Sockets Layer (SSL), Pretty Good Privacy (PGP), Introduction to Quantum Cryptography.

Total Hours: 45

Reference Books:

1. William Stallings (2006), Cryptography and Network Security: Principles and Practice, 4th edition, Pearson Education, India.

2. William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education, India.

3. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition, Prentice Hall of India, New Delhi.

List of e-Learning Resources:

1.https://www.w3schools.com/php/
2.https://www.geeksforgeeks.org/php-tutorial/

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

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

25SACS070P: Web Technology

Course Objectives

- To gain hands-on experience in creating web pages using HTML, CSS, JavaScript, and PHP.
- To learn practical implementation of web technologies for developing interactive and responsive websites.

Course Outcomes
1. Design and develop web pages using HTML and CSS.
2. Implement dynamic features on web pages using JavaScript.
3. Develop and validate user input using JavaScript.
4. Create and manage web forms with PHP.
5. Integrate PHP with databases to create dynamic web applications.

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

High-3 Medium-2 Low-1

Unit-I: HTML Basics and Web Page Layout   12 Hours

Introduction to HTML, Usage of HTML tags, Use text elements, lists, links, images, and tables to format and organize content.

Unit-II: Advanced HTML and CSS Styling   12 Hours

CSS Styling: colors, fonts, backgrounds, margins, padding, borders, and positioning elements, Introduction to CSS frameworks.

Unit-III: JavaScript Basics and DOM Manipulation   12 Hours
Dynamic Content with JavaScript, variables, operators, control structures, functions, and events, manipulate the Document Object Model (DOM) to dynamically update content.

Unit-IV: Advanced JavaScript and Validation   **12Hours**
Form Validation and Interactive Features, slideshows, modals, and dynamic content loading.

Unit-V: PHP and Database Integration   **12 Hours**
Server-Side Scripting with PHP, handle form data, interact with databases, and create dynamic web applications, basic SQL queries and connect to a database using PHP.

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 basic HTML page that includes a heading (`<h1>` tag), a paragraph describing your favorite food, and a list (`<ul>` or `<ol>` tag) of three ingredients used in that dish.

13. Write a CSS rule to change the background color of a `<div>` element to light gray (`#f2f2f2`) and center its content horizontally and vertically. Ensure the `<div>` takes up 80% of the width of its parent container.

14. Develop a simple JavaScript program that prompts the user to enter their name using `prompt()` function, and then displays a greeting message in an `<h2>` tag on the webpage saying "Hello, [name]!" (where `[name]` is the user-inputted name).

15. Create a simple form to submit user input like his name, age, address and favorite subject, movie and singer.

16. Add form elements such as radio buttons, check boxes and password fields. Add a submit button.

17. Design a web page in bootstrap for shopping websites.

18. Make a navigation bar in bootstrap.

19. Make an image slider in bootstrap.

20. 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).

21. Write a JavaScript program to display an information box as soon as page loads.

22. Write a JavaScript program to change background color after 5 seconds of page load.

23. Write a JavaScript program to dynamically bold, italic and underline words and phrases based on user actions.

24. Write a JavaScript program to display a hidden div.

25. Using ideas from the above experiments, try to create a website for your department.

26. 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.

27. Create login and form and connect it with database.

28. Creating database driven web pages in PHP.

29. Creating PHP pages using JavaScript and HTML.

30. Creating Forms and Form Submission through GET and POST method.

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

List of e-Learning Resources:

1. https://www.coursera.org/courses?query=web%20technologies

2. https://onlinecourses.swayam2.ac.in/nou24_cs09/preview

3. https://www.udemy.com/course/web-technology-for-entrepreneurs/?couponCode=ST20MT50724

4. https://iisdt.in/product/certificate-in-web-technology

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

BCA (System Administration & Cyber Security)
Semester-III

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

25SACS090P: Object Oriented Programming using C++

Course Objectives
- To provide hands-on experience with C++ programming.
- To implement object-oriented programming concepts through practical exercises.
- To develop problem-solving skills using C++.

Course Outcomes
1. Develop C++ programs using fundamental programming constructs.
2. Implement object-oriented programming concepts in C++.
3. Create and manage complex data structures using C++.
4. Design and implement class hierarchies and inheritance.
5. Apply file handling techniques in C++ programs.

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
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CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-
CO4	1	1	3	2	-	-	-	-	-	-	-	-
CO5	1	1	2	3	-	-	-	-	-	-	-	-

High-3 Medium-2 Low-1

Unit I: Introduction to Basic Programming Concepts   **12 Hours**
Basic syntax, data types, and control structures in C++

Unit II: Functions, Arrays, and Pointers   **12 Hours**
Working with Functions, Arrays, and Pointers, Loops

Unit III: Classes, Objects, and Constructors   **12 Hours**
Object-Oriented Programming with Classes and Objects: Implementation of classes, objects, and constructors to develop modular and reusable code.

Unit IV: Operator Overloading and Friend Functions   **12 Hours**
Advanced OOP Concepts: Operator overloading and friend functions.

Unit-V: File Handling and Advanced Memory Management   **12 Hours**

File Handling and Dynamic Memory Management

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.

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

BCA (System Administration and Cyber Security)
Semester-III

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

25SACS110P: Server Operating System - I

Course Objectives:
- To learn about the 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. Understand the fundamental principles of cryptography and classical cryptosystems.
2. Utilize mathematical principles to implement encryption algorithms.
3. Analyze the security implications of different types of cryptosystems.
4. Evaluate the reliability and security of digital signature mechanisms.
5. Create cryptanalysis techniques for identifying and addressing vulnerabilities in cryptographic systems.

Articulation Matrix

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CO2	2	-	3	-	-	-	-	-	1	-	-	-
CO3	-	2	-	3	-	-	1	-	-	-	-	-
CO4	2	-	2	-	3	-	-	-	-	-	1	-
CO5	2	-	-	2	-	3	-	-	-	-	-	2

High-3 Medium-2 Low-1

Units

Unit I: Introduction and Basic Configuration   **24 Hours**
Overview of Windows Server 2012: Installation and initial setup, understanding the server roles and features, configuring basic settings.

Unit II: Networking and DNS Configuration   **24 Hours**

Configuring Network Services: Understanding and setting up IPv4 and IPv6, deploying and configuring DHCP, and DNS server management.

Unit III: Active Directory and Group Policy   **24 Hours**

Managing Directory Services: Installation and configuration of Active Directory, user and group management, creating and managing Group Policy Objects (GPOs).

Unit IV: Server Security and Update Management   **24 Hours**

Enhancing Server Security: Implementing security policies, configuring firewalls, deploying Windows Deployment Services (WDS) and Windows Server Update Service (WSUS).

Unit V: Network Services and Backup   **24 Hours**

Advanced Networking and Backup Solutions: Setting up routing, NAT, VPN, RADIUS servers, network access protection, and managing FSMO roles. Backup and restore Active Directory.

Total Hours :120

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

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/courses/it-and-software/operating-systems/
2. https://www.udemy.com/topic/windows-server/
3. https://www.coursera.org/courses?query=windows%20server

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