

Subject Name	L	T	P	Credit
Cloud Computer Networking	3	-	-	3

Course Objectives:

- To analyze the traffic flow and the contents of protocol frames.
- Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- Acquire knowledge of Application layer and Presentation layer paradigms and protocols.
- Study Session layer design issues, Transport layer services, and protocols. Gain core knowledge of Network layer routing protocols and IP addressing.
- Study data link layer concepts, design issues, and protocols. Read the fundamentals and basics of Physical layer, and will apply them in real time applications.

Unit-I

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, 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: 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

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: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Security Threats. Trouble Shooting Networks: Command Line interface Tools, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware Trouble shooting tools, system monitoring tools

Reference Books:

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

Course Outcomes:

- Describe the functions of each layer in OSI and TCP/IP model.
- Explain the functions of Application layer and Presentation layer paradigms and Protocols.
- Describe the Session layer design issues and Transport layer services.
- Classify the routing protocols and analyze how to assign the IP addresses for the given network.
- Describe the functions of data link layer and explain the protocols.
- Explain the types of transmission media with real time applications.

Subject Name	L	T	P	Credits
Fundamentals of Storage	3	-	-	3

Course Objectives:

- Get introduced with advance computing like cloud computing, data storage has also undergone many transformations in terms of techniques and hardware used for the same.
- Learn different aspects of data storage.
- Learn fundamentals of data storage, covering topics like demands on data, how storage techniques have evolved over a period of time and vital information about storage topologies like DAS, NAS and SAN, along with their comparison features.
- Get knowledge about the different hardware required for storage like adapters, connectors, cables and their individual features.
- Learn about different storage protocols used like ATA, SATA, SPI and its sub-categories will be taught to students in the following units.

Unit-I

Introduction to Information Storage : Data, Information, types of data, evolution of storage architecture, core elements of a data center, characteristics of data center, **Data Center 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

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

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

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 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.

References:

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, iSER, INFINIBAND and FCOE, Wiley India.
3. John W. Rittinghouse 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.

Course Outcomes:

- Understand knowledge of data storage techniques using various storage topologies and their comparisons.
- Provide students to choose the best suitable data storage method for their programs and applications.
- Be trained in different storage protocols.
- Gain in knowledge in different hardware required for storage.
- Be able to understand the fundamentals of data storage.



Subject Name	L	T	P	Credit
Object Oriented Programming using C++	3	1	4	6

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 understand data hiding, operator and function overloading.
- To understand about file handling and its functions.

Unit I

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, 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 and Destructors, Static variables and Functions in class. Operator Overloading in C++, Overloading Unary Operators, Overloading binary operators.

Unit IV

Inheritance in C++, Types of Inheritance, Pointers, Objects and Pointers, Multiple Inheritance, Virtual Functions, Polymorphism, Abstract classes.

Unit-V

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

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++

Course Outcomes:

- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Demonstrate the use of file handling techniques.

List of Experiments

1. Program to print "Hello".
2. Program to swapping two variables using third variable.
3. Program to check entered alphabet is 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 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 concept of pointer.
18. Program for demonstrate array of pointer.
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 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 access private member of base class using friend function.

Subject Name	L	T	P	Credit
Cloud Computing Applications - I	3	1	4	6

Course Objectives:

- Basic concepts of Web and learn to design effective web pages.
- Learn to apply basic and advanced tags of HTML.
- Learn to apply HTML5 tags.
- Students will learn the basic CSS concepts: selectors, CSS properties, CSS code structure, CSS declarations, CSS unit types etc.
- Students will learn how to use JavaScript to manipulate page elements on the fly in conjunction with HTML and CSS.

Unit-I

Concept of WWW, Internet and www, HTTP protocol, HTTP Vs HTTPS, Web Browser, Browser architecture, what is client and server? Server-Side v/s Client-Side Scripting.

Web Design: Concepts of effective web design, Web design issues including Browser, Planning and publishing website.

Unit-II

HTML: Introduction to HTML, Basic HTML Tags, Body Tags, Coding Style, Formatting and Fonts, Commenting code, Lists- Unordered, Ordered, Insert Links- Linking to another Document, Internal Links, Email Links, Relative and Absolute Links, Insert Images- Clickable Images, Image Placement and Alignment, Image Size, Image margins, Image Formats, Image Maps- Defining an Image Map, Figure and Figcaption tag. Working with form tag- Basic structure of Form, Form tag Attribute, Difference between Get and Post method, fieldset and legend tag.

Unit-III

HTML: Working with **Table**- Basic structure of Table, Table Attributes, Table Cell Attributes, Table Row Attributes, Table Inside of Tables, Invisible Spacers. **Frame**- Create Windows, Single Window Frames, Creating Column, Creating Row Frames. Meta tags, Overview of **HTML5**- HTML5 tags, features of HTML5.

Unit-IV

Style Sheets: Introduction to CSS, basic syntax and structure using CSS, Type of CSS- Internal, External and Inline CSS, background images, colors, properties of CSS, manipulating texts, Creating borders and boxes, margins, padding using CSS, Create Divs with ID and Class. Overview and features of CSS3- Introduction of media query, Apply CSS in media query.

Bootstrap- Overview of Bootstrap, Create Navigation Bar, Create Slider etc.

Unit-V

JavaScript: Use of JavaScript in webpages, Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and

objects, Java Script own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations. Create small website using HTML, Bootstrap and JavaScript.

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

Course Outcomes:

- Students will learn the basic concepts of HTML, structure of a web page.
- Students will understand directory structures and how they impact html code and client and server computers interact.
- Students will learn CSS Tag selectors – how CSS code is used to target HTML tags, text and other elements in an HTML page.
- Students will learn CSS menu/navbar creation techniques. Students will learn JavaScript event handlers.
- Students will learn how to draw on screen with JavaScript and learn how to create animations with JavaScript.

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 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 portion, bold, underline and italics certain words in your HTML web page. Also change background color of each Paragraph using in-line CSS.
11. Write all the above styling in CSS in different file (.css) and link it to your webpage such that changes made in CSS file are immediately reflected on the page. Group Paragraphs into 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 field. Add a submit button.
14. Design a webpage in bootstrap for shopping website.
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 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 left side of the page name of the chapters and right side of the page the contents of the chapters clicked on left side.



Subject Name	L	T	P	CreditS
Server Operating System - I	-	-	8	4

Course Objectives

- Provide knowledge about Windows Server 2012 R2.
- Students will be familiar in Windows user experience that helps you manage users and safeguard business information.
- Student explores the method to install, upgrade, and deploy the Windows Server.
- Students will have the functional knowledge of configuring core network services and the active directory of Windows Server.

List of Experiments:

- Installing windows server 2012
- Disk Management – MBR, GPT, VHD, Basic disk, Dynamic disk, storage pool, disk pool
- NTFS file system and its features – file permissions, quota, VSS, offline files
- IPv4 and IPv6
- DHCP – Deployment and configuration
- DNS – Forward and reverse lookup, primary/secondary/stub zone, forwarders, root hints, caching only DNS, Dynamic DNS.
- Installing Active Directory domain controllers
- Active Directory user, group, OU management
- Create and manage Group Policy objects (GPOs)
- Configure security policies
- Configure application restriction policies
- Configure Windows Firewall
- Deploy and manage Windows Deployment Services (WDS)
- Install and configure Windows Server Update Service (WSUS)
- Configure Distributed File system (DFS)
- Configure File Server Resource Manager (FSRM)
- Configure file and disk encryption
- Configure routing
- Configure NAT



- Configure VPN
- Configure RADIUS servers
- Configure Network Access Protection
- FSMO roles
- Active Directory backup and restoration

Course Outcomes:

- Acquire knowledge and skills needed to install and configure windows server 2012 and configure local storage and other services like file sharing and print sharing.
- Configuring different types of servers.
- Making active directory.
- Windows Server 2012 administration.