

COURSE TITLE	SERVER MANAGEMENT
COURSE CODE	01CC0506
COURSE CREDITS	3

Objective:

- 1 Students will gain the ability to select appropriate server hardware, install operating systems such as Windows Server and Linux, and configure essential services using both graphical and command-line tools. They will develop skills to install, configure, and troubleshoot core network services including DNS, DHCP, web servers, and file sharing across platforms. The course also equips students to monitor server performance, manage logs, apply updates, and automate routine tasks through scripting and scheduled jobs. Emphasis is placed on securing server environments through hardening techniques, firewall configuration, and enforcement of security policies. Additionally, students will work with virtualization, manage containers using Docker, and perform basic cloud administration tasks. They will also learn to create and deploy Bash and PowerShell scripts to automate administrative activities such as user management, backups, and service monitoring.

Course Outcomes: After completion of this course, student will be able to:

- 1 Apply knowledge to deploy and configure server hardware, operating systems, and virtualization platforms, including post-installation tasks.
- 2 Administer core network services such as DNS, DHCP, web servers, and file sharing across Windows and Linux environments.
- 3 Use system tools to monitor server performance, manage logs, apply patches, and automate routine maintenance tasks.
- 4 Analyze and implement server security measures, including account policies, firewall configurations, vulnerability scanning, and intrusion prevention.
- 5 Design and implement virtualized and cloud-based server environments by integrating virtual machines, Docker containers, and cloud networking for scalable and secure operations.

Pre-requisite of course: Basic understanding of computer hardware components. Familiarity with fundamental networking concepts (IP addressing, DNS, routing). Proficiency in using a command-line interface (either Windows Command Prompt/PowerShell or Linux Bash). An introductory course in operating systems is beneficial.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Server Deployment and Core OS Administration Server Hardware Overview (focus on selection, installation, and basic troubleshooting), Server Operating System Installation: Planning, unattended installations, post-installation tasks for Windows Server and a major Linux distribution, Introduction to Server Virtualization Platforms (Hyper-V, VMware ESXi, KVM): Installation and basic VM creation/management., Command-line and GUI Administration Tools: Mastering essential tools for server interaction., Managing Local Users, Groups, and Permissions (practical application on servers). File Systems Management: Partitioning, formatting, mounting, and managing storage using OS tools	7
2	Essential Network Services Administration DNS Server Configuration and Management: Installing, configuring zones, managing records, and troubleshooting DNS issues on Windows Server and Linux (BIND), DHCP Server Configuration and Management: Installing, configuring scopes,, and troubleshooting DHCP issues., Web Server Administration: Installation, basic configuration, virtual hosts, and managing modules/extensions for Apache, Nginx, and IIS. File Sharing Services Configuration: Setting up and securing file shares using Samba (Linux-Windows),, NFS (Linux), and Windows Shared Folders. Remote Access Services: Configuring SSH server on Linux and RDP on Windows Server, securing remote connections.	7
3	Server Maintenance and Monitoring Server Updates and Patch Management: Implementing strategies for applying OS and application updates (WSUS, package managers), scheduling updates. Monitoring Server Performance: Using OS-native tools (Task Manager, Performance Monitor, top, htop, sar) to monitor CPU, memory, disk, and network. Log Management and Monitoring: Configuring system logs, using log viewing tools, basic log analysis for operational issues, Scheduled Tasks and Automation: Creating and managing cron jobs (Linux) and Task Scheduler tasks (Windows) for routine maintenance, Server Backup and Restoration: Implementing basic backup strategies using OS tools or simple backup software, performing test restores.	6
4	Server Security Implementation Server Hardening Practices: Disabling unnecessary services and features,, securing default accounts. Configuring OS-Level Firewalls: Implementing and managing firewall rules (iptables/firewalld Windows Firewall) to restrict network access, Account Security: Implementing password policies, account lockout, and auditing login attempts, Introduction to Server Security Scanning Tools (basic usage for vulnerability identification),, Securing Remote Administration Interfaces. Basic Intrusion Detection/Prevention Configuration (e.g., fail2ban on Linux)	6

Contents : Unit	Topics	Contact Hours
5	Advanced Server Topics and Cloud Management Scripting for Server Administration: Developing practical scripts (Bash, PowerShell) for automating common tasks (user creation, file backups, service restarts)., Introduction to Configuration Management Concepts (Puppet, Chef, Ansible - conceptual overview)., Managing Servers in a Virtualized Environment: Advanced VM configuration, snapshots, resource allocation., Introduction to Container Management (Docker): Building and running basic containers. Cloud Server Administration: Deploying and managing virtual machines in a cloud environment., understanding basic cloud networking and storage for servers. Disaster Recovery Concepts for Servers.	6
Total Hours		32

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Practical 1 Automated OS Installation: Performing an unattended installation of a Windows Server or Linux distribution.	2
2	Practical 2 Advanced Disk Management: Configuring LVM in Linux or creating dynamic disks and RAID volumes in Windows Server.	2
3	Practical 3 Scripting for User Management: Writing scripts to automate the creation, modification, or deletion of multiple user accounts.	2
4	Practical 4 Configuring and Securing SSH and RDP: Setting up SSH key-based authentication on Linux and securing RDP access on Windows Server.	2
5	Practical 5 Advanced Web Server Configuration: Configuring virtual hosts, SSL certificates (self-signed), and basic access control for a web server.	2
6	Practical 6 Implementing and Testing Server Backups and Restores: Configuring a backup job and performing a full or partial restoration of server data.	2
7	Practical 7 Configuring Advanced Firewall Rules: Implementing more complex firewall rules based on ports, protocols, and source/destination IP addresses.	2
8	Practical 8 Setting up Centralized Logging (Basic): Configuring multiple servers to send logs to a central log collection point and viewing them.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
9	Practical 9 Monitoring Server Performance and Setting Alerts: Using monitoring tools to track key performance indicators and configure alerts for thresholds.	2
10	Practical 10 Deploying and Managing a Basic Server in the Cloud: Launching a virtual machine instance in a cloud environment (e.g., AWS EC2, Azure VM) and performing basic administration tasks.	2
Total Hours		20

Textbook :

- 1 "Windows Server 2019 & PowerShell All-in-One For Dummies, ara Perrott & Jeffrey R. Shapiro, -, -

References:

- 1 Linux Administration: A Beginner's Guide (Eighth Edition), Linux Administration: A Beginner's Guide (Eighth Edition), Wale Soyinka, Mc graw hill, 2020
- 2 Mastering VMware vSphere 7, Mastering VMware vSphere 7, Nick Marshall, -, -

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	25.00	30.00	15.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

- 1 “Microsoft Learn – Windows Server Documentation” <https://learn.microsoft.com/en-us/windows-server/>
- 2 “Red Hat or Ubuntu Server Guides (Linux Server Administration)”
https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/
- 3 “Docker Documentation” <https://docs.docker.com/>
- 4 CIS Benchmarks (Server Security) - <https://www.cisecurity.org>
- 5 NIST Security Guidelines