NETWORK MANAGMENT AND ADMINISTRATION	Course Code : 316007

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Data Sciences/ Computer Hardware & Maintenance/**
Programme Code	**: AI/ AN/ DS/ HA**
Semester	**: Sixth**
Course Title	**: NETWORK MANAGMENT AND ADMINISTRATION**
Course Code	**: 316007**

I. RATIONALE

Network Management and Administration is an important aspect of networking and computing technologies. Network administrators utilize various tools, protocols, and processes to maintain and optimize network operations. This course aims to provide students with hands-on experience in both the Windows Server operating system and the Linux platform, focusing on server configuration, virtualization, and backup and recovery in network environments.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified outcomes through various teaching learning experiences: Perform Network Management and Administration with Windows and Linux Server.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Explain critical features of Windows Server and Linux Operating System.
- CO2 - Configure Active Directory for managing objects.
- CO3 - Configure different web services.
- CO4 - Create virtual environment.
- CO5 - Apply Backup and Recovery services.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316007	NETWORK MANAGMENT AND ADMINISTRATION	NMA	AEC	2	-	4	-	6	3	-	-	-	-	-	25	10	25@	10	-	-	50

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Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning
Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian
Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain the features of Network Operating Systems. TLO 1.2 Differentiate the features of different editions of Windows Server. TLO 1.3 Explain the features of Linux Environment w.r.t. Server Management and Administration.	**Unit - I Introduction to Network Server Environment** 1.1 Network Operating Systems (NOS), Key features of NOS 1.2 The Windows Server family(and editions), Key features - Security features, support for hybrid cloud environments, performance and scalability, Hardware requirements 1.3 Overview of Linux Environment w.r.t. Server Management and Administration	Lecture Using Chalk-Board Demonstration
2	TLO 2.1 Explain the process of configuring Active Directory. TLO 2.2 Illustrate the process of deploying Domain Controller. TLO 2.3 Describe the significance of group policies.	**Unit - II Server Deployment** 2.1 Active Directory and Domain Services (ADDS) - Fundamentals -Domain, tree domain, Forest, Organizational Units (OUs), Comparing a domain with a workgroup 2.2 Installing and configuring ADDS - Promoting a server to a domain controller, Managing domain users, groups, and computers, Organizational Units 2.3 Group Policy - Managing, Configuring and Processing Group Policy Objects, Group Policy Editors	Lecture Using Chalk-Board Demonstration

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Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Configure Web Server. TLO 3.2 Install DNS, DHCP Server. TLO 3.3 Manage Remote access services.	**Unit - III Role Assignment for Server Environment** 3.1 IP address –IPV4, Classification of IP address, overview of IPV6, Subnetting, Supernetting a network 3.2 Server Roles – Web Server, FTP, DNS, DHCP, telnet 3.3 Installing Server Roles Using Server Manager – Add Roles and Features Wizard, Select Server Role and features 3.4 Post installation tasks for server roles, Managing and Removing Roles	Hands-on Demonstration
4	TLO 4.1 Explain Virtualization. TLO 4.2 Install Virtual Machine. TLO 4.3 Implement Active Directory to the Cloud for Hybrid environments.	**Unit - IV Introduction to Server Virtualization** 4.1 Hyper-V Architecture, Installing and Configuring Hyper-V 4.2 Creating a Virtual Machine (VM), Managing a VM's memory 4.3 Hybrid cloud environments, Active Directory and Hybrid Identity, Hybrid cloud environments, Active Directory and Hybrid Identity	Demonstration Hands-on
5	TLO 5.1 Deploy file sharing permissions. TLO 5.2 Configure disk volumes. TLO 5.3 Apply backup and recovery strategy.	**Unit - V File and Storage Management** 5.1 File Server Role-Configuring file sharing, File permissions and NTFS vs Share permissions, Advanced file sharing features (Access-based enumeration) 5.2 Storage Management – Introduction to storage technologies, Creating and managing volumes using Disk Management, Dynamic Disks and RAID configurations (RAID 0, 1, 5, etc.) 5.3 Backup and Data Recovery - Configuring Windows Server Backup, Restoring data from backups, File and Folder Backup, Recovery options (VSS, system state backup)	Demonstration Hands-on

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Install Network Operating System.	1	* Installation of Network Operating System on a. Windows Server b. Linux	2	CO1
LLO 2.1 Install device drivers. LLO 2.2 Uninstall device drivers .	2	* Install device drivers a. Install and configure hardware device drivers b. Uninstall device drivers	1	CO1

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 3.1 Install Active Directory for creating various objects.	3	* Install the Active Directory on a Windows Server	1	CO2
LLO 4.1 Implement Domain Controller.	4	Promote the Server to a Domain Controller on Windows Server	1	CO2
LLO 5.1 Create Domains, Tree Domains and Forests to manage objects.	5	* Creating Domains, Tree Domains and Forests on Windows Server	2	CO2
LLO 6.1 Deploy trust relationship of objects across domains.	6	Set up trust relationships between different domains for resource sharing on Windows Server	1	CO2
LLO 7.1 Create and manage user accounts.	7	* Creating user accounts a. Create Domain users in Windows Server with rights and permissions b. Create user accounts in Linux using command-line / GUI with rights and permissions	4	CO2
LLO 8.1 Create and manage groups to organize users.	8	Create groups using a. Windows Server b. Linux	2	CO2
LLO 9.1 Add computers with access rights in domain.	9	Add computer accounts in the domain using Windows Server	1	CO2
LLO 10.1 Create Organizational Units.	10	* Create Organizational Units (OUs) in Windows Server	1	CO2
LLO 11.1 Assign permissions to specific users and groups under OU.	11	* Delegate administrative control over an OU to specific users or groups in Windows Server	2	CO2
LLO 12.1 Create Group Policy Object. LLO 12.2 Link Group Policy Object (GPO) to OU.	12	* Create a Group Policy Object (GPO) and link to OU in Windows Server	2	CO2
LLO 13.1 Manage GPO.	13	Perform operations on GPO in Windows Server a. Modify existing GPO b. Copy existing GPO c. Delete existing GPO	2	CO2
LLO 14.1 Implement Backup and Restore GPOs.	14	Backup and Restore GPOs in Windows Server	2	CO2
LLO 15.1 Configure HTTP services. LLO 15.2 Configure FTP Server.	15	* Install the Web Server to configure a. HTTP Server on Windows and Linux Server b. FTP Server Windows and Linux Server	4	CO3

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 16.1 Assign permissions to access web resources.	16	* Set the correct directory permissions for the website to allow proper access to web applications hosted on a. Windows Server b. Linux Server	2	CO3
LLO 17.1 Install Domain Name Server (DNS).	17	* Install the DNS on a. Windows Server b. Linux Server	2	CO3
LLO 18.1 Configure DNS Zones. LLO 18.2 Assign DNS Records. LLO 18.3 Integrate DNS Zones to Active Directory.	18	* Create and configure DNS zones on a. Windows Server b. Linux	4	CO3
LLO 19.1 Install DHCP. LLO 19.2 Configure DHCP Scope.	19	* Install and configure DHCP server on a. Windows Server b. Linux Server	2	CO3
LLO 20.1 Install Remote login utility.	20	* Install telnet / SSL services on a. Windows Server b. Linux Server	4	CO3
LLO 21.1 Install Hyper-V.	21	* Install the Hyper-V to enable virtualization on Windows Server.	2	CO4
LLO 22.1 Create virtual machine.	22	a.Create a virtual machine to run guest operating systems on Hyper-V using Windows Server b.Manage VMs Using Power Shell using Windows Server	2	CO4
LLO 23.1 Install Remote login utility.	23	Create a virtual machine to run guest operating system on Linux	2	CO4
LLO 24.1 Create Disk volumes. LLO 24.2 Manage Disk volumes.	24	a.Create and Manage Volumes on Windows Server b.Convert a basic disk to a dynamic disk and manage dynamic volumes on Windows Server	2	CO5
LLO 25.1 Create Disk volumes.	25	* Create Disk volumes in Linux a Mount and Unmount Local Disks b Create Partition and Logical Volume	2	CO4
LLO 26.1 Configure RAID.	26	Configure RAID (0-3)	2	CO5

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 27.1 Configure Server Backup.	27	* Install/ Configure Server Backup in a. Windows Server b. Linux Server	2	CO5
LLO 28.1 Configure System State Backup.	28	Configure and perform a System State Backup to protect server configurations in Windows Server	2	CO5
LLO 29.1 Implement Volume Shadow Copy Service.	29	Implement Volume Shadow Copy Service (VSS) for Backup to create snapshots of data in Windows Server	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) : NOT APPLICABLE

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Server Computer (64-bit processor, 2GB RAM, 32GB HDD)	All
2	Networking Equipment (Switches, Routers, Cables)	All
3	Virtualization Platform	All
4	External Hard Drives or Network Attached Storage	All
5	Client Machines	All
6	Windows Server 2022 and onwards	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction to Network Server Environment	CO1	4	0	0	0	0
2	II	Server Deployment	CO2	8	0	0	0	0
3	III	Role Assignment for Server Environment	CO3	6	0	0	0	0
4	IV	Introduction to Server Virtualization	CO4	6	0	0	0	0
5	V	File and Storage Management	CO5	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

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- Continuous assessment based on process and product related performance indicators. Each practical will be assessed considering 1) 60% weightage is to process 2) 40% weightage to product

Summative Assessment (Assessment of Learning)

- Lab Performance, Viva-voce

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	-	-	3	1	-	3			
CO2	2	2	2	2	2	2	3			
CO3	2	2	2	3	1	3	2			
CO4	2	2	3	3	2	3	3			
CO5	2	2	2	3	1	2	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Jordan Krause	Mastering Windows Server 2022	Packt Publishing; 4th ed. edition ISBN-10 - 1837634505
2	Bekim DautiBekim Dauti	Windows Server 2022 Administration Fundamentals	Packt Publishing; 3rd ed. edition ISBN-1803232153
3	Alexandru Calcatinge	Mastering Linux Administration	Packt Publishing; 2nd ed. edition, ISBN-10-1837630690
4	Wale Soyinka	Linux Administration A Beginner's Guide	McGraw Hill Education, ISBN-10-1259061183

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://youtu.be/uFWaxzk6VfU?si=1dKiDehJ1RrCdjYu	Practical guidance
2	https://learn.microsoft.com/en-us/windows-server/get-started/get-started-with-windows-server	Windows Server Administration
3	https://www.tutorialspoint.com/linux_admin/index.htm	User Management, FTP, Disk Management, Backup and Recovery
4	https://www.serveracademy.com/blog/active-directory-101-a-step-by-step-tutorial-for-beginners/	Active Directory Object Mangement

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Sr.No	Link / Portal	Description
5	https://learn.microsoft.com/en-us/windows-server/virtualization/hyper-v/get-started/install-hyper-v?pivots=windows	Hyper-V

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

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