

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
B. Voc. in Hardware & Networking (UGC)
(Effective for Academic Session 2024-2025)
Year-2 Diploma (SEMESTER – III)

Paper Title: UHWNV-301: COMPUTER PERIPHERAL AND DEVICES

Job Role: Hardware and Network Support Engineer

Course Objectives:

- To introduce the fundamental concepts and operational principles of various input and output devices, including keyboards, mice, monitors, printers, and other peripherals.
- To develop knowledge and practical skills for troubleshooting, maintaining, and repairing common hardware components used in computing systems.
- To familiarize students with different types of monitors and printers, along with their features, settings, and maintenance procedures.
- To enable students to understand the usage, functionality, and care of additional I/O devices, such as joysticks, webcams, pen drives, digital pads, and scanners.

Course Outcomes:

- CO 1: Demonstrate understanding of different types of keyboards and mice, including their components, functions, and routine maintenance techniques.
- CO 2: Analyze and compare various types of monitors and their specifications, and perform basic troubleshooting and maintenance tasks.
- CO 3: Operate, manage, and maintain inkjet and laser printers, including cartridge handling, paper jam resolution, and preference settings.
- CO 4: Effectively identify, connect, and use other I/O devices, such as joysticks, webcams, pen drives, digital pads, and scanners in real-world applications.

Maulana Abul Kalam Azad University of Technology, West Bengal
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(Effective for Academic Session 2024-2025)

Course Code:	UHWNV-301	
Course:	COMPUTER PERIPHERAL AND DEVICES	Credits: 3L+1T
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Keyboard: Types of keyboard, correcting problems, vacuum cleaners and keyboards, keyboard maintenance, Mouse: Mouse basics, working with a mouse, performing mouse actions, inside the mouse, adjusting mouse properties, mouse keys, mouse maintenance, Optical mouse, breakdown and break through.	13
Unit-II	Monitors: basic, VGA, DVI, viewable area, maximum resolution and dot pitch, power consumption, flat panel, monitor resolution, colour depth, degaussing, power option for monitor, display option for monitor, monitor maintenance.	17
Unit-III	Printers: printer characteristics, type quality, print speed, impact vs nonimpact, and fonts. Inkjet printers: common features, operations, parts of inkjet printer, control panel, trays, cartridges, cleaning cartridges, replacing cartridges, clearing paper jams. Laser Printers: common features, operations, technology, control panel, trays, output bin, cartridges, redistributing toner, internal cleaning, paper jams, cancel printing jobs, setting preferences and defaults of printing, breakdown and break through.	18
Unit-IV	Other I/O Devices: Demo on Joy Stick, Web Cam, Pen drive and Digital pad. Scanner	12
	Total:	60

Books Recommended:

- Modern All about Printer, Lotia
- Modern All about Keyboard and Mouse, Lotia
- Modern TFT & LCD Monitor Introduction and Troubleshooting, BPB Publication

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Paper Title: UHWNV-391 COMPUTER PERIPHERAL AND DEVICES LAB

Credit: 4P (Allotted Hours: 120)

List of Experiments: (Based on UHWNV-301)

- Demonstration on Keyboards and it's maintenance.
- Demonstration on Wireless Keyboards and Mouse
- Demonstration on Mouse and it's maintenance.
- Technical specification and features of display monitor
- Demonstration on CRT monitors and it's maintenance.
- Demonstration on LED monitors and it's maintenance.
- Demonstration on TFT monitors and it's maintenance.
- Demonstration on solid state monitors and it's maintenance.
- Simple problems and their solutions of TFT monitors.
- Common problems and their solutions of LED monitor
- Demonstration on inkjet Printer and it's maintenance.
- Mantling and Dismantling of Inject Printer
- Demonstration on Laser printer and it's maintenance.
- Mantling and Dismantling of Laser Printer
- Printer (inkjet and laser): Common features, control panel, trays, cartridges, cleaning cartridges, replacing cartridges, clearing paper jams., redistributing toner, internal cleaning, paper jams, cancel printing jobs, setting preferences and defaults.
- Demonstration on I/O devices (Joy Stick, Web Cam, Pen drive and Digital pad. Scanner) and it's maintenance

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Paper Title: UHWNV – 302: NETWORK FUNDAMENTALS

Job Role: Hardware and Network Support Engineer

Course Objectives:

- To introduce the fundamental concepts of computer networking, including types of networks, topologies, models, and protocols.
- To develop a foundational understanding of networking standards and transmission media, including both guided and unguided communication methods.
- To familiarize students with key networking protocols, devices, and IEEE standards, essential for establishing and maintaining computer networks.
- To equip students with practical skills in IP addressing, device configuration, and user account management, relevant to real-world network administration.

Course Outcomes:

- CO 1: Explain different types of computer networks, topologies, and network models, and identify their advantages, disadvantages, and suitable applications.
- CO 2: Distinguish between OSI and TCP/IP models, and describe various transmission media used in network communication.
- CO 3: Identify and configure network devices and explain the purpose of common network protocols and IEEE standards for local and wide area networks.
- CO 4: Configure IP addresses for various devices, manage user accounts, and apply basic security settings to support secure and efficient network operation.

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B. Voc. in Hardware & Networking (UGC)
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Course Code:	UHWNV-302	
Course:	NETWORK FUNDAMENTALS	Credits: 3L+1T
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Network concepts: Introduction to Network, characteristics, need, types of networks on the basis of area coverage: LAN, WAN, MAN; Advantages and Disadvantages of networks; Network Topologies: bus topology, ring topology, star topology, tree topology, mesh topology and hybrid topology. Network Models: Peer-to-Peer, protocol, client / server network and hybrid type network. Servers: Different types of servers, Network protocols	13
Unit-II	Introduction to network standards: OSI reference model, TCP/IP Model. Difference between OSI reference model & TCP/IP model, Transmission Media: Types, Guided Media: twisted pair cable, coaxial cable, fibre optics, Unguided Media: radio wave, microwave, light wave, infrared and satellite.	17
Unit-III	Networking protocols: DNS, FTP, Telnet, DHCP, HTTP, TFTP, SSH, SFTP, SMTP, POP, IMAP, NTP Network devices: HUB, Switch, Repeater, Bridges, Routers, Gateway: IEEE Standards: IEEE Standards for LAN and WAN: IEEE Standard 802.3 and Ethernet, IEEE Standard 802.4 Token Bus, IEEE Standard 802.5 Token Ring, IEEE Standard 802.6 Distributed Queue Dual Bus, IEEE Standard 802.2 Logical Link Control.	14
Unit-IV	IP address: Introduction, IP address format, classes of IP Address, subnet address, Configuration of IP Address in PC, Configuration of IP address in Switch, configuration of Wireless Devices, Access Points Network Interface card (NIC): working principle of NIC, MAC Address, User Management: overview of user account, managing user account and password security: adding user, setting and changing password, changing picture of user, deleting the user, setting account restriction for the user, renaming a local account.	16
	Total:	60

Books Recommended:

- Tannenbaum, A.S., 2003: Computer Networks, Prentice Hall.
- Networking: The Complete Reference 1st Edition, Mcgraw Hill Education
- Stallings, William, Local and Metropolitan Area Networks: Macmillan Publishing Co.
- Black: Data Network, Prentice Hall of India.
- CCNA Cisco Certified Network Associate Study Guide 3rd Edition, Mcgraw Hill Education
- Cisco a Beginner's Guide, Fifth Edition, McGraw-Hill/Osborne Media
- Bhavneet Sidhu, Computer Networks, Khanna Publishing House, New Delhi (AICTE Recommended Textbook)

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Paper Title: UHWNV-392 NETWORK FUNDAMENTALS LAB

Credit: 4P (Allotted Hours: 120)

List of Experiments: (Based on UHWNV-302)

- Identification of Twisted Pair Cable, Fiber Optic Cable, Coaxial Cable and their respective connectors
- Identification different type twisted pair, thin-net, thick-net, different type CAT cable
- Identification of different types of NIC and Wi-Fi cards and their specifications
- Identification of different networking devices like Bluetooth adaptor, Wi-Fi adaptor
- Identification of Hub, Switch, Router, ADSL Gateway, Access Point
- Identification of different type of switches, Layer1, Layer2, Layer3 sotto router
- Simple configuration of Cisco Switch, Cisco Router, ADSL Gateway, AP
- Simple configuration of sotto router, Wi-Fi adaptor, Wi-Fi portable devices
- Securing Cisco Switch, Cisco Router, ADSL Gateway, AP by user account and passwords
- Simple network setup using different topologies
- Simple configuration network using IP addresses
- Different classes IP network configuration
- LAN network configuration
- LAN network configuration using virtual environment
- Implementation of IP uses and basic subnetting
- Different IP classes uses and advantages

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B. Voc. in Hardware & Networking (UGC)

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Paper Title: UHWNV-393: PRACTICAL ON NETWORKING

Job Role: Hardware and Network Support Engineer

Course Objectives:

- To familiarize students with essential networking tools and components used in network installation and maintenance, including crimping tools, LAN testers, connectors, and network racks.
- To provide hands-on knowledge of network cable types, hubs, switches, and patching techniques used in setting up physical network infrastructure.
- To develop the ability to establish and configure LAN and internet connections, including switch setup, cable testing, and internet troubleshooting.
- To train students in the configuration and management of Wi-Fi and switch-based networks, including IP addressing, security settings, DHCP, VLANs, and backup procedures.

Course Outcomes:

- CO 1: Identify and operate various networking tools and components, including punch-down tools, testers, connectors, and faceplates used in structured cabling systems.
- CO 2: Demonstrate the ability to set up and manage wired LAN infrastructure, including cable crimping, patching, tagging, and connecting to network devices.
- CO 3: Establish internet connectivity using different types of connections, configure switches, and troubleshoot basic networking issues using diagnostic tools.
- CO 4: Configure and secure wireless access points and managed switches, including IP and DNS settings, MAC filtering, DHCP configuration, VLAN setup, and performing backup and restore operations.

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B. Voc. in Hardware & Networking (UGC)
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Course Code:	UHWNV-393	
Course:	PRACTICAL ON NETWORKING	Credits: 4P
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Networking Tools: Crimping tool, punching tool: Impact and Punch down Tool, Multi Punch Tool, RJ45 Punch Down Tool, Impact Tool, Computer Punch Tool – deluxe, Cable cutter, I/O device, I/O Face Plate, I/O Box, LAN Cards, Connectors: RJ-11 (Registered Jack), RJ-45 (Registered Jack), F-Type, ST (Straight Tip) and SC (Subscriber Connector or Standard Connector), Fiber LC (Local Connector), MT-RJ (Mechanical Transfer Registered Jack), USB (Universal Serial Bus), LAN Patch Panel, Network Switch Rack. Testing and Networking Tools: Introduction, Types of tools: LAN Testers, Application tools: IP scanner, Test Network Speed, Bandwidth Monitor 2 Lite Edition, Netbrute Scanner, piecework's IT Desktop, Ping, ipconfig, fstat, iproute, route, netstat, ipconfig /release, ipconfig /renew	16
Unit-II	Working of cables: Coaxial cable, Unshielded twisted pair (UTP), Types of UTP Cable, Shielded Twisted-Pair Cable, Fibre optics, Patch Cords: UTP Patch cords, Fibre patch cords, Cable Manager, Cable Tag, Cable stripper, Scissors. Working on Hub and Switch: Types of Hub: Active Hub, Passive Hub and Intelligent Hub, Types of switches: Unmanaged Network Switches, Managed Switches, Smart Switches. Setting up of network: UTP cables, Switch, LAN tester, Switch Rack, Patch Panel, Cable Manager, Cable tagging, I/O box, I/O face plate, patch cords, connectors, terminals.	14
Unit-III	Patching of LAN Cable: Strip cable end, Untwist wire ends, Arrange wires, Trim wires to size, Attach connector, Check, Crimp, and Test. Setting up of LAN: UTP cables, Switch, LAN tester, Switch Rack, Patch Panel, Cable Manager, Cable tagging, I/O box, I/O faceplate, patch cords, connectors, terminals. Internet connectivity: Different types of internet connection: Wireless, mobile, Hotspot, Dial-up, Broadband, DSL, Cable, Satellite, ISDN, Internet Service Provider (ISP), bandwidth or speed tester, Internet connectivity switch and PC, configuration of switch, managing of switching, troubleshooting of switching, testing application for switch.	17
Unit-IV	Wi-Fi Connectivity: Basic Configuration of Wi-Fi device or access point, IP address configuration, DNS Address, DHCP mode, Security and Password, Admin login and password, MAC Filtering, Monitoring, Backup and restore, etc. Switch connectivity: Managed and unmanaged switch, Basic configuration of switch, macfiltering, IP address configuration, DNS address, DHCP Mode, Admin login and Password, VLAN, backup file and restore settings.	13
	Total:	60

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Books Recommended:

- CCNA Cisco Certified Network Associate Study Guide 3rd Edition, Mcgraw Hill Education
- Cisco Networking Essentials, Author: mcmillan, troyauthor; John Wiley & Sons
- Vikas Gupta, Comdex Hardware and Networking Course Kit, 1st Edition, Dreamtech Press
- Crypto and Network Security, 3rd Edition, Mcgraw Hill Education
- Cisco a Beginner's Guide, Fifth Edition, McGraw-Hill/Osborne Media
- Networking: The Complete Reference 1st Edition, Mcgraw Hill Education
- Tannenbaum, A.S., 2003: Computer Networks, Prentice Hall.
- Stallings, William, Local and Metropolitan Area Networks: Macmillan Publishing Co.
- Black: Data Network, Prentice Hall of India.
- Bhavneet Sidhu, Computer Networks, Khanna Publishing House, New Delhi (AICTE

Recommended Textbook)

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Paper Title: UGEN – 381: VALUE EDUCATION & HUMAN RIGHTS

Course Objectives:

- To introduce the fundamental concepts of human values and value-based education, emphasizing personal development, character formation, and national/global significance.
- To create awareness about the ethical challenges in modern society, including cultural conflicts, media influence, and adolescent behavior and emotions.
- To promote inner well-being through therapeutic techniques, such as physical exercises, meditation, yoga, and practices for emotional regulation and stress management.
- To provide knowledge about human rights, including their origin, classifications, constitutional provisions, and mechanisms for protection and redressal at national and international levels.

Course Outcomes:

- CO 1: Understand the importance of human values and their role in personal and societal development, and apply these values to build a positive character and personality.
- CO 2: Analyze the ethical challenges arising from global development, media influence, and adolescent issues, and demonstrate strategies for managing such challenges.
- CO 3: Practice and apply mind-control techniques and holistic wellness approaches, such as meditation, yoga, and value-based activities for emotional balance and personal growth.
- CO 4: Demonstrate understanding of human rights concepts, legal frameworks, and institutional mechanisms, and identify ways to address human rights violations, particularly concerning women and children.

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Course Code:	UGEN – 381	
Course:	VALUE EDUCATION & HUMAN RIGHTS	Credits: 4P
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Concept of Value Education - Meaning, definition, objectives, and importance of value education. - Philosophical foundations of values – moral, ethical, spiritual, social, cultural, political, and economic values. - Role of values in personal and professional life. - Sources of values: family, society, religion, culture, and education. - Value crisis in the modern world – materialism, consumerism, and loss of human touch. - Role of education in value formation. - Case studies of value-based living (e.g., Mahatma Gandhi, Swami Vivekananda, Mother Teresa).	15
Unit-II	Human Rights: Foundations & Evolution - Definition, nature, and scope of human rights. - Historical development of human rights: Magna Carta, American Bill of Rights, French Revolution, UN Charter. - Universal Declaration of Human Rights (UDHR), 1948 – significance and key provisions. - International Covenants on Civil, Political, Economic, Social, and Cultural Rights. - Generations of Human Rights (Civil-Political, Economic-Social-Cultural, Collective-Solidarity Rights). - Role of UNESCO, UNHRC, and other international organizations.	25
Unit-III	Indian Perspective on Human Rights - Human rights in the Indian Constitution – Preamble, Fundamental Rights, and Directive Principles of State Policy. - Fundamental Duties and their significance. - Constitutional safeguards for minorities, women, SC/ST, and other vulnerable groups. - Role of National Human Rights Commission (NHRC), State Human Rights Commissions (SHRCs). - Human Rights and Social Justice in India – issues and challenges. - Landmark Supreme Court cases on human rights in India.	25
Unit-IV	Values in Personal and Social Life - Values in individual life: honesty, integrity, empathy, non-violence, tolerance, cooperation, and compassion. - Interpersonal values – respect, trust, forgiveness, gratitude. - Social values – equity, justice, freedom, secularism, pluralism, democracy. - Gender equity and dignity of labor. - Role of media and education in promoting social values. - Civic responsibility, environmental ethics, and sustainable development.	15
	Human Rights Issues & Challenges - Human rights violations – child labor, bonded labor, custodial violence, trafficking, discrimination, refugees. - Human rights of marginalized groups – women, children, elderly, differently-abled, tribals, LGBTQ+.	

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B. Voc. in Hardware & Networking (UGC)

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Unit-V	- Global issues: poverty, illiteracy, terrorism, displacement, communal violence, migration. - Environmental rights – right to clean water, air, and sustainable environment. - Human rights in the era of globalization and technology (digital rights, privacy, AI ethics). - Case studies of human rights violations and movements.	15
Unit-VI	Education for Values & Human Rights - Role of teachers, educational institutions, and curriculum in value inculcation. - Pedagogical approaches for value education – storytelling, group discussion, role play, debates, moral dilemmas. - Human rights education – objectives, strategies, and methodologies. - Value-based leadership and good governance. - Role of NGOs, civil society, and social movements in human rights protection. - Building a culture of peace and non-violence through education. - Project work, field visits, and community engagement.	25
	Total	120

Books Recommended:

- Value education and human rights, By R. P. Shukla, Sarup & Sons
- Professional Ethics and Human Values, By Dr. Premvir Kapoor, Khanna Publishing House (AICTE Recommended Textbook -2018)
- Value Education And Education For Human Rights, By V.C. Pandey, Gyan Publishing House.
- Education for Values, Environment and Human Rights, By Y. K. Sharma, Published by Deep and Deep Publications.
- Human Rights: Twenty First Century Challenges, edited by V.N. Viswanathan (ed. By), Gyan Publishing House.
- Education for Values, Environment and Human Rights, By J. C. Aggarwal, Shipra Publications, 2005
- Human Rights Education: A Global Perspective, edited by Hemlata Talesra, Nalini Pancholy, Mangi Lal Nagda, Published by Daya Books.

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Paper Title: UGEN – 382: BASIC ACCOUNTING

Course Objectives:

- To introduce the fundamental principles of accounting, including the accounting cycle, accounting equation, and the use of journals, ledgers, and T-accounts for recording business transactions.
- To develop the ability to prepare and manage essential accounting documents, such as a chart of accounts, general ledger, work sheet, and basic financial statements.
- To equip students with the skills to handle merchandising business transactions, including purchasing, sales, subsidiary ledgers, and adjustments for end-of-period reporting.
- To provide knowledge and practical experience in preparing payroll records and completing financial statements, including income statements, owner's equity statements, and balance sheets for merchandising businesses.

Course Outcomes:

- CO 1: Record financial transactions using journals and ledgers, apply the accounting equation, and prepare accurate balance sheets to reflect changes in owner's equity.
- CO 2: Post journal entries, reconcile bank statements, and prepare and correct accounting work sheets, ensuring proper planning and adjustment of entries.
- CO 3: Journalize and post entries for merchandising transactions, including purchases, sales, and use of subsidiary ledgers for accounts payable and receivable.
- CO 4: Prepare complete payroll documentation and generate final financial reports, including multi-step income statements, classified balance sheets, and owner's equity statements, with accurate adjustments and component analysis.

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(Effective for Academic Session 2024-2025)

Course Code:	UGEN – 382	
Course:	BASIC ACCOUNTING	Credits: 4P
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Introduction to Accounting • Meaning, objectives, and importance of accounting. • Users of accounting information – internal & external. • Bookkeeping vs. Accounting. • Basic accounting terms: assets, liabilities, capital, revenue, expenses, drawings, profit, loss, stock, etc. • Accounting principles: concepts (business entity, going concern, money measurement, accrual, conservatism, dual aspect, matching). • Accounting standards – overview.	20
Unit-II	Double Entry System & Accounting Process • Double entry principle and accounting equation. • Journal – meaning, features, format, rules of debit and credit. • Ledger – posting from journal to ledger, balancing of accounts. • Subsidiary books – cash book, purchase book, sales book, purchase return, sales return, petty cash book. • Trial Balance – objectives, preparation, errors and their rectification.	25
Unit-III	Bank Transactions & Reconciliation • Cash Book vs. Pass Book. • Causes of differences between Cash Book and Pass Book. • Bank Reconciliation Statement (BRS) – meaning, importance, preparation. • Adjusted Cash Book method.	15
Unit-IV	Final Accounts of Sole Proprietors • Meaning and preparation of Trading Account. • Profit & Loss Account – preparation and adjustments (outstanding expenses, prepaid expenses, accrued income, depreciation, bad debts, provisions). • Balance Sheet – preparation and classification of assets & liabilities. • Adjustment entries and their effect on final accounts.	20
Unit-V	Depreciation, Reserves & Provisions • Meaning, causes, and need for depreciation. • Methods of depreciation – straight line, written down value, annuity, depletion. • Accounting treatment of depreciation. • Provisions and reserves – differences and importance.	25
Unit-VI	Introduction to Partnership & Company Accounts • Partnership Accounts – features, partnership deed, capital accounts, interest on capital/drawings, profit-sharing ratio. • Admission of a partner – goodwill, revaluation of assets and liabilities. • Retirement & death of a partner – adjustments. • Introduction to Company Accounts – shares, debentures, issue and forfeiture of shares (basic concepts).	15
	Total:	120

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Books Recommended:

- Basic Accounting: The step-by-step course in elementary accountancy, By Nishat Azmat, Andy Lymer, Hachette UK.
- Basic Accounting, By Rajni Sofat, PHI Learning Pvt. Ltd.
- BASIC ACCOUNTING, By SOFAT, RAJNI , HIRO, PREETI, PHI Learning Pvt. Ltd.
- Accounting for Beginners, By Kokab Rahman, Createspace Independent Pub, 2013

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Year-2 Diploma (SEMESTER – IV)

Paper Title: UHWNV - 401: WINDOWS SERVER ADMINISTRATION

Job Role: Hardware and Network Support Engineer

Course Objectives:

- To provide foundational knowledge of various network operating systems including Windows Server, Linux, and Unix, and introduce key concepts of Active Directory and Group Policy.
- To train students in installing, configuring, and managing core network services such as Network Policy Server, VPN, Web Application Proxy, and File Services.
- To develop practical skills in managing and automating network services including DHCP, DNS, remote access, and terminal services in a Windows Server environment.
- To equip students with essential knowledge of Windows security, performance optimization, and troubleshooting techniques for administering a secure and reliable server environment.

Course Outcomes:

- CO 1: Describe and perform installation and deployment of network operating systems, and manage Active Directory Domain Services including user accounts and group policy infrastructure.
- CO 2: Configure and troubleshoot advanced network roles such as Network Policy Server, VPN, Direct Access, and implement file services using tools like File Server Resource Manager.
- CO 3: Administer essential network services including DHCP, DNS, remote access, and terminal services while demonstrating automation and storage management in Windows Server.
- CO 4: Apply best practices in Windows Server security, monitor system performance, and utilize system tools and registry settings to troubleshoot and maintain server health.

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Course Code:	UHWNV - 401	
Course:	WINDOWS SERVER ADMINISTRATION	Credits: 3L+1T
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Network Operating Systems: Windows Server Editions, Linux, Unix. Windows Server: different ways to install network operating system, pre-installation requirements. Deploying and Managing Windows Server, Introduction to Active Directory Domain Services, Installing Domain Controllers, Managing Active Directory Domain Services Objects Managing User and Service Accounts, Maintaining AD DS. Implementing a Group Policy Infrastructure, Managing User Desktops with Group Policy,	14
Unit-II	Installing and Configuring a Network Policy Server: Implementing Network Access Protection, Installing, Configuring, and Troubleshooting the Network Policy Server Role. Implementing Direct Access by Using the Getting Started Wizard Lab : Deploying an Advanced Direct Access Solution Lab : Implementing VPN Lab : Implementing Web Application Proxy, Optimizing File Services, Configuring Quotas and File Screening Using File Server Resource Manager Lab: Implementing Distributed File System, Configuring Encryption and Advanced Auditing, Deploying and Maintaining Server Images, Using Windows Deployment Services to Deploy Windows Server, Implementing Update Management, Monitoring Windows Server.	17
Unit-III	Microsoft Windows Server: Automating Active Directory Domain Services Administration, Implementing Dynamic Host Configuration Protocol, Implementing DNS, Configuring and Troubleshooting Domain Name System. Implementing Local Storage, Implementing File and Print Services. Terminal services: Dumb terminals, terminal server configuration, windows server as terminal server, Implementing Remote Access, application configuration with terminal server, advantages of terminal services.	16
Unit-IV	Windows Security: Firewalls, Spyware, viruses, User accounts security, Search strategies System performance, Troubleshooting tools, Windows registry. Administering Windows Server: Maintaining Active Directory Domain Services.	13
	Total:	60

Books Recommended:

- Windows Server Administration Fundamentals by Microsoft Official Academic Course
- Darril Gibson, Microsoft Windows Networking Essentials 1st Edition
- Tom Carpenter, Microsoft Windows Server Administration Essentials
- Jamsa, Kris A., 1993: Rescued by Windows 3.1, Galgotia. 5. Basandra, S.K., 1995 Computers Today, Galgotia.

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Paper Title: UHWNV-491 WINDOWS SERVER ADMINISTRATION LAB

Credit: 3P (Allotted Hours: 90)

List of Experiments: (Based on UHWNV-401)

- Installation of windows server.
- Promotion of windows server to domain controller. (show attended & unattended installation of domain controller both)
- Installation of different roles & features in windows server.
- Configuration of Different user management features of windows server.
- Configuration of domain user account, roaming user account, mandatory user account in windows server.
- Configuration of Organizational Unit (OU)
- Configuration of different group policies on domain user account.
- Automating Active Directory Domain Services Administration.
- Configure Network Access Protection (NAP) in windows server.
- Configure VPN.
- Configure file server.
- Configure Distributed File System(DFS)
- Configure disk quotas & file screening by using file server resource manager.
- Configure encryption in file server.
- Configure advance auditing & show how to filter & read log files.
- Configure Windows Deployment Service (WDS) & install images to client computer with it.
- Configure Windows Server Update Services (WSUS)
- Performance monitor of windows server.
- Configuration of DHCP server, DHCP reservation & DHCP scope backup & restore.
- Configuration of different DNS zones.
- Configuration of storage server.
- Configuration of print server.
- Practical on windows registry with the help of windows registry editor.

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Paper Title: UHWNV-402: SWITCHING AND ROUTING

Job Role: Hardware and Network Support Engineer

Course Objectives:

- To introduce the fundamental concepts, types, and configurations of switches, including their roles in different layers of a network.
- To explain switching mechanisms, services, VLANs, STP, and inter-VLAN routing, and train students in practical configuration techniques.
- To provide knowledge of routers, their types, components, functions, and step-by-step router configuration methods.
- To develop students' understanding of routing principles, including static and dynamic routing protocols and their practical implementation and verification.

Course Outcomes:

- CO 1: Understand the roles and types of network switches, and perform basic switch configuration tasks including setting hostnames, passwords, IP addresses, and port security.
- CO 2: Explain switching services, VLAN concepts, STP operations, and configure VLANs and inter-VLAN routing using appropriate protocols and tools.
- CO 3: Identify different types of routers and their functions, and configure router interfaces, passwords, banners, and manage router settings effectively.
- CO 4: Distinguish between static and dynamic routing protocols and configure and verify RIP, IGRP, OSPF, and EIGRP protocols in a routed network environment.

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
B. Voc. in Hardware & Networking (UGC)
(Effective for Academic Session 2024-2025)

Course Code:	UHWNV - 402	
Course:	SWITCHING AND ROUTING	Credits: 3L+1T
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Switch: introduction, roles of switches in network, types of switches: managed and unmanaged switch. Working of switch in different layers. Configuration of Switch: Command Mode, Setting Host Names, Setting Passwords, Setting IP Addresses and Default Gateways, Setting Operational Speed, Switch Port Security, Sticky MAC Addresses.	13
Unit-II	Switching: Introduction, Switching Services, Bridging vs LAN Switching, Switch Functions at Layer 2, Definition of Spanning Tree Protocol (STP), Operations of STP, STP Port States, Definition of VLAN, Typing of VLAN: Static and Dynamic, VLAN Identification Methods, VLAN Trunking Protocol (VTP), VTP Modes of Operation, Routing between VLANs, Configuring Inter- VLAN Routing	13
Unit-III	Router: Introduction, components of routers, Types of Routers: Broadband Routers, Wireless Routers, Edge Router, Subscriber Edge Router, Inter-provider Border Router, Core Router, Wired and Wireless Routers. Functions of routers, router modes, Configuration of Router: names, passwords, password encryption, interfaces name, creating a login banner, saving configuration and erasing configuration.	17
Unit-IV	Routing: Introduction, Types of routing: static and dynamic routing, Static routing: Configuring a static route, permanent keyword, static routes and administrative distance, configuring default route. Dynamic routing: Dynamic Routing Protocols: RIPv1, RIPv2, IGRP, EIGRP and OSPF. Delivery Semantics: unicast, anycast, multicast, broadcast, geocast. Configuring and Verifying RIP, IGRP, OSPF, EIGRP.	17
	Total:	60

Books Recommended:

- Lacoste, CCNP Routing and Switching TSHOOT 300 - 135: Official Cert Guide, Pearson India
- Todd Lammle, CCNA Routing and Switching Study Guide, Wiley India Pvt Ltd
- CCNA Cisco Certified Network Associate Study Guide 3rd Edition, McGraw Hill Education
- Mcmillan, Cisco Networking Essentials, Author: John Wiley & Sons
- Vikas Gupta, Comdex Hardware and Networking Course Kit, 1st Edition, Dreamtech Press
- Cisco a Beginner's Guide, Fifth Edition, McGraw-Hill/Osborne Media
- Networking: The Complete Reference 1st Edition, McGraw Hill Education
- Mastering PC Hardware & Networking, Ajit Mittal & Ajay Rana, Khanna Publishing House

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B. Voc. in Hardware & Networking (UGC)
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Paper Title: UHWNV-492 SWITCHING AND ROUTING LAB

Credit: 3P (Allotted Hours: 90)

List of Experiments: (Based on UHWNV-402)

- Demonstration of basic operation of Switch in Cisco Packettracer
- Demonstration of MAC Table management in Cisco Switch
- Configure simple Port-Security of Cisco Switch
- Demonstration of port performance of Cisco Switch (speed, duplex, portfast)
- Demonstarion on Password, management IP address, default gateway for Cisco Switch
- Demonstration of Switching loop
- Demonstration on switching loop management by Spanning Tree Protocol
- Demonstration on STP port states
- Demonstration on STP topology wrt Root Bridge, Root Port, Designated Bridge and Designated Port
- Demonstration on VLAN and L2 Broadcast Domain segmentation
- Demonstration on Standard and Extended VLAN, Management VLAN, Voice VLAN
- Demonstration on VLAN Trunking and VTP
- Demonstration on Inter VLAN communication
- Demonstrate basic management of Cisco Router
- Configure Static Route and Default Route
- Configure basic level RIPv1, RIPv2, EIGRP, OSPF
- Demonstrate Routing table wrt Administrative Distance and Cost
- Demonstrate how Routing Protocols decide route cost

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B. Voc. in Hardware & Networking (UGC)
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Paper Title: UHWNV – 493: PRACTICAL ON ROUTING CONFIGURATION & NETWORK CONNECTIVITY

Job Role: Hardware and Network Support Engineer

Course Objectives:

- To introduce students to fundamental router and switch functionalities including packet forwarding, lookup processes, and Cisco IOS command-line configuration.
- To enable learners to configure and verify device interfaces and diagnose network connectivity using tools such as ping, traceroute, telnet, and SSH.
- To explain routing protocols and concepts including static and dynamic routing, administrative distance, and OSPF configuration.
- To train students to configure inter-VLAN routing, manage Cisco IOS files, and implement EIGRP with concepts like feasible successors and load balancing.

Course Outcomes:

- CO 1: Configure and verify basic router and switch settings using Cisco IOS CLI, including hostnames, user access, interface IPs, and banners.
- CO 2: Verify interface operation status and troubleshoot connectivity using diagnostic tools; understand and perform device boot processes.
- CO 3: Compare routing methods and configure OSPF (v2/v3), including Router IDs, passive interfaces, and understand routing metrics and LSA types.
- CO 4: Implement and verify inter-VLAN routing, configure EIGRP in a single AS environment, and manage IOS files and licensing effectively.

Maulana Abul Kalam Azad University of Technology, West Bengal
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B. Voc. in Hardware & Networking (UGC)
(Effective for Academic Session 2024-2025)

Course Code:	UHWNV – 493	
Course:	PRACTICAL ON ROUTING CONFIGURATION & NETWORK CONNECTIVITY Credits: 4P	
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Functionality of Router and Switch: Describe basic routing concepts: packet forwarding, router lookup process, Process Switching/Fast Switching/CEF, Configure and verify utilizing the CLI to set basic Router configuration: hostname, local user and password, enable secret password, console and VTY logins, exec-timeout, service password encryption, Interface IPAddress, loopback, banner, motd, copy run start.	13
Unit-II	Configure and verify operation status of a device interface: Serial, Ethernet, Verify router configuration and network connectivity using, ping, extended, traceroute, telnet, SSH, shcdp neighbors. Describe the boot process of Cisco IOS routers, Configure and verify utilizing the CLI to set basic Router configuration, Configure and verify operation status of a device interface, both serial and Ethernet, Verify router configuration and network connectivity. IPRouting Technologies: Configure and verify routing configuration for a static or default route given specific routing requirements.	17
Unit-III	Differentiate methods of routing and routing protocols, Static versus Dynamic, 4.6.b Linkstate versus Distance Vector, next hop, ip routing table, Passive Interfaces (how they work),Admin Distance, and split horizon, metric. Configure and Verify OSPF: Benefit of singlearea, Configure OSPv2, Configure OSPv3, Router ID, Passive Interface, Discuss multi-areaOSPF, Understand LSA types and purpose.	17
Unit-IV	Configure and verify inter VLAN routing (Router on a stick), sub interfaces, upstream routing, encapsulation, Configure SVI interfaces, Manage Cisco IOS Files, Boot Preferences, Cisco IOS Images (15), Licensing, Show license, Change license, Configure and verify EIGRP (single AS), Feasible Distance/Feasible Successors/Administrative distance, Feasibility condition, Metric composition, Router ID, auto summary, Path Selection, Load Balancing, Unequal, Equal.	13
	Total:	60

Books Recommended:

- Lacoste, CCNP Routing and Switching TSHOOT 300-135: Official Cert Guide, Pearson India
- Todd Lammleccna, Routing and Switching Study Guide, Wiley India Pvt Ltd
- CCNA Cisco Certified Network Associate Study Guide 3rd Edition, Mcgraw Hill Education
- Mcmillan, Cisco Networking Essentials, Author: John Wiley & Sons
- Crypto and Network Security, 3rd Edition, Mcgraw Hill Education
- Cisco a Beginner's Guide, Fifth Edition, McGraw-Hill/Osborne Media

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(Effective for Academic Session 2024-2025)

Paper Title: UGEN – 481: ENVIRONMENTAL STUDIES

Course Objectives:

- To introduce the multidisciplinary nature of environmental studies, emphasizing natural resources, ecosystems, and the importance of conservation for sustainable living.
- To explain biodiversity, its classification, significance at various levels, threats, and conservation strategies including in-situ and ex-situ methods.
- To analyze types of environmental pollution, their causes, effects, control measures, and the role of individuals in pollution prevention and disaster management.
- To discuss environmental ethics, global environmental issues, relevant legislation, population dynamics, and the social aspects of environment and human health.

Course Outcomes:

- CO 1: Understand the scope of environmental studies, the role of natural resources, and ecosystem dynamics, and apply conservation principles for sustainable resource use.
- CO 2: Identify biodiversity components, assess threats to biodiversity, and evaluate conservation techniques to protect endangered and endemic species.
- CO 3: Analyze various types of pollution, their impacts, and control methods, and demonstrate knowledge of disaster management and urban environmental challenges.
- CO 4: Explain environmental laws and policies, assess the impact of population growth on environment and health, and discuss ethical and social dimensions of environmental protection.

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
B. Voc. in Hardware & Networking (UGC)
(Effective for Academic Session 2024-2025)

Course Code:	UGEN – 481	
Course:	ENVIRONMENTAL STUDIES	Credits: 4P
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Introduction to Environment & Natural Resources - Definition, scope, importance of Environmental Studies. - Components of environment – lithosphere, hydrosphere, atmosphere, biosphere. - Renewable & Non-renewable resources: - Forest resources – uses, deforestation, afforestation, forest conservation. - Water resources – uses, overexploitation, floods, droughts, conflicts over water, dams & their impacts. - Mineral resources – exploitation, environmental effects of mining. - Energy resources – renewable (solar, wind, hydro, biomass, geothermal) & non-renewable (coal, petroleum, natural gas, nuclear). - Food resources – world food problems, sustainable agriculture. - Role of an individual in conservation of natural resources.	20
Unit-II	Ecosystems - Concept, structure & function of an ecosystem. - Energy flow in an ecosystem – food chains, food webs, ecological pyramids. - Types of ecosystems: - Forest ecosystem - Grassland ecosystem - Desert ecosystem - Aquatic ecosystem (ponds, rivers, oceans, wetlands). - Biodiversity and its conservation: - Levels of biodiversity – genetic, species, ecosystem. - Value of biodiversity – consumptive, productive, social, ethical, aesthetic. - Threats to biodiversity – habitat loss, poaching, pollution, invasive species. - Conservation methods – in-situ & ex-situ.	25
Unit-III	Environmental Pollution - Definition, causes, effects, and control measures of: - Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear hazards - Solid waste management – causes, impacts, control measures. - Role of individuals and communities in pollution prevention.	15
Unit-IV	Social Issues and Environment - Sustainable development – concept and strategies. - Urban problems related to energy and environment. - Climate change, global warming, acid rain, ozone layer depletion.	25

Maulana Abul Kalam Azad University of Technology, West Bengal
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B. Voc. in Hardware & Networking (UGC)

(Effective for Academic Session 2024-2025)

	• Environmental ethics – issues and possible solutions. • Environmental impact of resettlement and rehabilitation projects. • Consumerism and waste products. • Environmental movements in India – Chipko, Silent Valley, Narmada Bachao Andolan. • Disaster management – floods, earthquakes, cyclones, landslides.	
Unit-V	Environmental Policies, Acts & Human Rights • Environment Protection Act, 1986. • Air (Prevention and Control of Pollution) Act, 1981. • Water (Prevention and Control of Pollution) Act, 1974. • Wildlife Protection Act, 1972. • Forest Conservation Act, 1980. • Issues involved in enforcement of environmental legislation. • Role of judiciary, public awareness, NGOs, and media. • Environmental rights as human rights.	15
Unit-VI	Human Population and Environment • Population growth, population explosion, and impact on environment. • Human health & environment – communicable and lifestyle diseases. • Family welfare programmes – role in controlling population. • Environment & human rights – equity and social justice. • Role of information technology in environment and human health (GIS, remote sensing, environmental monitoring). • Case studies: population & resource consumption, health epidemics, sustainable urban development.	20
Total:		120

Books Recommended:

- M.P. Poonia & S.C. Sharma, Environmental Studies, Khanna Publishing House
- Mike Hulme, Climates and Cultures.
- Mark Garrett, Encyclopaedia of Transportation Social Science and Policy.
- Steel, Science An A - to - Z Guide to Issues and Controversies.
- John A Matthews, Encyclopaedia of Environmental Change.
- O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House

Maulana Abul Kalam Azad University of Technology, West Bengal
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B. Voc. in Hardware & Networking (UGC)

(Effective for Academic Session 2024-2025)

Paper Title: UGEN – 482: QUALITY MANAGEMENT

Course Objectives:

- To introduce the fundamentals and evolution of quality management, including key quality philosophies and the concepts of product and service quality.
- To explain process quality and teach graphical and statistical techniques for quality improvement, focusing on essential quality control tools.
- To develop understanding of sampling, hypothesis testing, control charts, and advanced quality methodologies like TQM, Six Sigma, and international quality standards.
- To equip students with techniques for quality improvement, robust design, reliability analysis, and quality function deployment in product development.

Course Outcomes:

- Understand the evolution of quality management and apply Deming's, Juran's, and Crosby's quality philosophies to improve product and service quality.
- Utilize graphical and statistical tools, including the 7 QC tools, to analyze and enhance process quality effectively.
- Perform sampling, hypothesis testing, control charting, and implement advanced quality frameworks such as TQM, Lean, Six Sigma, and ISO standards.
- Apply quality improvement techniques such as Quality Function Deployment, Taguchi methods, and Failure Mode & Effect Analysis to optimize product reliability and development.

Maulana Abul Kalam Azad University of Technology, West Bengal
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B. Voc. in Hardware & Networking (UGC)
(Effective for Academic Session 2024-2025)

Course Code:	UGEN – 482	
Course:	QUALITY MANAGEMENT	Credits: 4P
Contents		
Chapter	Name of the Topic	Hours
Unit-I	Introduction to Quality Concepts - Definition of Quality – product-based, user-based, manufacturing-based, and value-based perspectives. - Evolution of Quality – from inspection to Quality Control, Quality Assurance, and Total Quality Management (TQM). - Importance of quality in business competitiveness. - Dimensions of product and service quality. - Quality gurus and their contributions – Deming, Juran, Crosby, Ishikawa, Taguchi, Feigenbaum. - Cost of quality – prevention, appraisal, internal and external failure costs.	25
Unit-II	Quality Planning & Quality Standards - Quality planning process – customer focus, requirement analysis, benchmarking. - Quality function deployment (QFD) – House of Quality. - ISO standards – ISO 9000 family, ISO 14000, ISO 22000, ISO 27000. - Six Sigma – principles, DMAIC methodology, belt levels (Green, Black, Master Black Belt). - Role of quality certification and auditing. - National and International Quality Awards – Deming Prize, Malcolm Baldrige National Quality Award, Rajiv Gandhi National Quality Award.	15
Unit-III	Statistical Quality Control - Role of statistics in quality management. - Process variation – common causes vs. special causes. - Control charts – - Variables (X-bar & R charts, X-bar & S charts). - Attributes (p-chart, np-chart, c-chart, u-chart). - Acceptance sampling – single, double, and multiple sampling plans. - Operating Characteristic (OC) curves. - Process capability analysis (Cp, Cpk, Cpm).	25
Unit-IV	Total Quality Management - Principles of TQM – customer focus, continuous improvement, employee involvement. - Kaizen, 5S, and Poka-Yoke. - Benchmarking – process, types, and benefits. - Business Process Reengineering (BPR) and its relationship with TQM. - Quality Circles – structure, role, and benefits. - Role of leadership in quality improvement.	15
Unit-V	Tools & Techniques for Quality Improvement - Basic quality tools – cause & effect diagram, check sheet, control chart, histogram, Pareto chart, scatter diagram, flow chart. - Advanced tools – affinity diagram, tree diagram, matrix diagram, arrow diagram, PDPC. - Failure Mode and Effect Analysis (FMEA).	20

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)

B. Voc. in Hardware & Networking (UGC)

(Effective for Academic Session 2024-2025)

	• Root Cause Analysis (RCA). • Just-In-Time (JIT) and Lean Manufacturing. • Taguchi method for robust design.	
Unit-VI	Quality in Services & Future Trends (20 Hours) • Service quality vs. manufacturing quality. • SERVQUAL model – dimensions of service quality (tangibles, reliability, responsiveness, assurance, empathy). • Customer relationship management (CRM) & customer satisfaction measurement. • Quality in education, healthcare, and IT services. • Role of technology in quality – Industry 4.0, Artificial Intelligence, and IoT in quality management. • Future trends – sustainable quality management, green quality, and ethical quality practices.	20
	Total:	120

Books Recommended:

- D. C. Montgomery, Introduction to Statistical Quality Control, John Wiley & Sons, 3rd Edition.
- M.P. Poonia & S.C. Sharma, Total Quality Management, Khanna Publishing House (AICTE Recommended Textbook)
- Mitra A. , Fundamentals of Quality Control and Improvement, PHI, 2nd Ed. , 1998.
- J Evans and W Linsay, The Management and Control of Quality, 6th Edition, Thomson, 2005
- Besterfield, D H et al. , Total Quality Management, 3rd Edition, Pearson Education, 2008.
- D. C. Montgomery, Design and Analysis of Experiments, John Wiley & Sons, 6th Edition, 2004
- D. C. Montgomery and G C Runger, Applied Statistics and Probability for Engineers, John Wiley & Sons, 4th Edition.