Marwadi University
Faculty of Diploma studies
Information and Communication Technology

Subject Code: 09CT0404
Subject Name: Data Communication and Networking
Diploma Year – II (Semester IV)

Objectives: This subject aims understand the implementation and design of the network. The focus will be on various layers understanding and it's functionality to support the successful transmission. Students are expected to obtain requisite knowledge about hardware and software requirements of networks and acquire skills to establish a network using necessary hardware & software tools and configure various services over it.

Credits Earned: 05 Credits

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

1. Remember the functionality of various protocols, models and networks.
2. Compare the different types of signals, transmission technique and transmission medium.
3. Identify the role of various data corrections and access control protocol for reliable data transmission
4. Understand the various applications with its support protocols and functionality.
5. Built and test various network topologies and routing protocols for various network scenarios.

Pre-requisite of course: ICT Workshop, Digital Logic and Design, Analog and Digital Communication

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
4	0	2	5	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to Computer Networks** History of Internet, Protocols and Standards, different types of networks, OSI Layers, Comparison of OSI and TCP/IP protocol suite.	03
2	**Physical Layer** Different types of data and signals, Various types of digital and Analog Transmission, Guided and unguided transmission media, Circuit Switched Network, Datagram Networks, and Virtual Circuit Network.	08
3	**Data Link Layer** Introduction to link layer services, error detection and correction techniques, Flow Control, Medium Access Control Techniques	15
4	**Network Layer** Logical Addressing, Internet Protocol and Addressing in the internet, IP Subnetting and Variable Length Subnet Masks and troubleshooting IP, Unicast and Multicast Routing Protocol, Routing Algorithms	12
5	**Transport Layer** Different transport service, Basics of Transport protocol, User datagram protocol, Transmission control protocol	8
6	**Application Layer** Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP.	06
7	**Network Devices** Role of different devices , Repeaters, Hubs, Bridges, Switches (layer 2 and layer 3) , Routers, Access Points, Introduction to Network management system (OS, CLI, Administrative Functions, Interfaces)	12
	Total Hours	64 Hrs

Suggested Text books / Reference books:

1. Computer Networks by Andrew S Tannebaum, Pearson
2. Data Communication and Networking by Forouzen, Tata McGraw Hill
3. CCNA INTRO (Introduction to Cisco Networking Technologies) by Todd Lammle, Sybwx , WILEY (http://www.innos.in/downloads/CISCO%20-%20640-802-ccna.pdf)
4. Data and Computer Communication by Williams Stallings, Prentice Hall of India

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 and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
30%	30%	25%	10%	5%	--

Suggested List of Experiments:

1	Introduction to available network management software, installation, recent available devices, future scope and history of the subject.
2	Practice on basic network command and configuration command.
3	Compare Straight UTP, Cross UTP cable, Cross CAT5, CAT6, and RJ11 cable.
4	Performing an Initial Switch Configuration
5	Performing an Initial Router Configuration
6	Connecting a Switch and Configuring and Troubleshooting a Switched Network.
7	Configure a network using Link State Vector Routing protocol. (OSPF)
8	Configure a network using Distance Vector Routing protocol. (RIP)
9	Implementation of DNS, Web, DHCP and FTP server configuration.
10	Packet capture and header analysis by Wireshark (TCP, UDP, IP)
11	Configure and implementation of Router Access Control List (ACL)
12	Implementation and testing of LAN, VLAN and VLAN trunking.

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. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
2. https://nptel.ac.in/courses/106/105/106105183/
3. https://www.lammle.com/courses/cisco-ccna/
4. https://www.youtube.com/channel/UCcpFFuABMD9s1HuqQCt6kiQ
5. http://www.innos.in/downloads/CISCO%20-%20640-802-ccna.pdf (online pdf book)
6. https://www.freeccnaworkbook.com/workbooks/ccna/configuring-static-routing
7. https://www.netacad.com/