Name of Faculty	:	Faculty of Computer Science & Applications
Name of Program	:	Master of Computer Application with Cyber Security
Course Code	:	2MCA02
Course Title	:	Computer Networks and Data communication
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:		Basic Concept of Operating systems, Programming Language, Data Structures.
Course Objective	:		**Learn** the basic concepts of computer networks and data communication systems. Learn basic networking protocols and **usage,** Explore various advanced networking concepts
Course Outcomes	:		At the end of this course, students will be able to:
	CO 1		Understand concepts of networking and gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
	CO 2		Identify the components required to build different types of networks.
	CO 3		Obtain the skills of subnetting and routing mechanisms
	CO 4		Have a working knowledge of datagram.
	CO 5		Trace the flow of information from one node to another node in the network

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
2	0	4	4	70	30	30	20	150

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P** – Practical, **C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars /Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Introduction to Computer Networks and Internet:** Introduction to computer network and Internet, Application of Computer network, History of the computer network, the network edge, Understanding of Delay, Loss and Throughput in the packet switching network, OSI layers and their service model.	5	15%	CO1

2	**Application Layer:** Principles of computer applications, Web and HTTP, E-mail, Domain Name Systems, Socket programming with TCP and UDP.	5	15%	CO1
3	**Transport Layer:** Introduction and transport layer services, Multiplexing and Demultiplexing, Connectionless transport (UDP), Principles of reliable data transfer, Connection-oriented transport (TCP), Congestion control, TCP congestion control.	6	15%	CO2
4	**Network Layer:** Introduction to forwarding and routing, Network Service models, Virtual and Datagram networks, study of router, IP protocol and addressing in the Internet, Routing algorithms: Distance Vector & Link state, Broadcast and Multicast routing.	6	20%	CO2 CO3
5	**Datalink Layer:** Introduction to link layer services, error-detection and correction techniques, Multiple access protocols, addressing, Ethernet, switches, VLAN. Sliding Window protocols, Example data link protocols.	4	20%	CO4
6	**Physical Layer:** Guided Transmission Media, Twisted Pairs, Coaxial Cable, Fiber Optics, Wireless Transmission, Radio Transmission, Microwave Transmission, Infrared Transmission, Digital Modulation and Multiplexing, Public Switched Telephone Networks.	4	15%	CO5

Suggested List of Experiments/Tutorials

Suggested Distribution of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20%**	**30%**	**30%**	**10%**	**5%**	**5%**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	**It is intended as an in-campus IT infrastructure industrial visit for students:** To make the students aware about the IT/Network infrastructure of institute. Introduction to the lab infrastructure, the cabling/cable type and specifications/switch/topology /router/network infrastructure, Internet Connectivity, Wi-fi	6

	Connectivity of department and how it is connected with the overall institute level IT infrastructure, How the institute obtains Internet Connectivity from its ISP, The Bandwidth, and other specifications, Visit to the Computer Center of the Institute, Introduction to various Enterprise Servers/Servers of Licensed Software, Server hardware configuration, Server Management Tools, Enterprise Level Firewall, etc. The Students are to prepare a report of this, Mention the model/make of various network interface devices (NIC card, switch, router) used in their lab/department/institute, download their technical specifications from their respective web-site and attach those specifications in the report. Also include the significance and interpretation of these specifications (With help the faculty member during the corresponding lab/lecture hours pertaining to that device)..	
2	To make the students aware about and learn the detailed use of the following OS level TCP/IP diagnostic and troubleshooting commands: ping, ns lookup.	6
3	To make the students aware about and learn thedetailed use of the following OS level TCP/IP diagnostic and troubleshooting commands: ipconfig, arp, netstat, tracert, telnet.	6
4	Implement a simple TCP socket-based client server program in Python in which the client connects to the server. The server displays the ip address and port number of client and sends an acknowledgement message back to client. The client displays the received acknowledgement message on screen.	6
5	Implement a simple UDP socket-based client server program in Python in which the client connects to the server. The server displays the ip address and port number of client and sends an acknowledgement message back to client. The client displays the received acknowledgement message on screen.	5
6	Wireshark Installation, understanding the Wireshark Environment / Menu System, to startand stop live capture of traffic from given wired ethernet network interface, capturing options, store captured data in different supported file formats, to open already stored captured data file.	5
7	Learn and use view level filters and capture levelfilters in Wireshark for different traffic types likeEthernet, ARP, IP, TCP, UDP, DNS, HTTP, etc. For each captured category, observe how different headers are encapsulated within each other. E.g., TCP encapsulated within IP, HTTP encapsulatedwithin TCP, etc.	5
8	Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: Ethernet and ARP	6
9	Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: IP and ICMP.	6
10	Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: TCP and UDP.	6

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Install Windows 2003/Windows 2008 Network operating System.
2	Install & Configure File Server.
3	Install & Configure Print Server
4	Install & Configure Mail Server
5	Install & Configure Proxy Server
6	Install & Configure Web Server
7	Install & Test Router, Repeater and Bridge.
8	Install a small wireless network.

Suggested Learning Websites

Sr. No.	Name of Website
1	http://swayam.gov.in/
2	https://www.netacad.com/courses/packet-trace

Textbooks:

Sr. No.	Name of Textbooks
1	A.S. Tanenbaum, Computer Networks, Pearson Education

Reference books:

Sr. No.	Name of Reference Books
1	Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth Edition
2	Kurose and Ross, Computer Networking- A Top-Down approach, Pearson, 5th edition
3	Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach",
4	Morgan Kaufmann Publishers, Fifth Edition, 2011.
5	Fred Halsall, Computer Networking and the Internet, Addison Wesley, (5th edition)
6	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source
7	Approach", Mc Graw Hill Publisher, 2011
8	Bhushan H Trivedi, "Computer Networks", Oxford University Press