FACULTY OF COMPUTER SCIENCE
Master of Computer Application (Sem-IV)
In Effect from Academic Year 2017-18

Subject Code : 1CS2010401	**Subject Title: FUNDAMENTALS OF NETWORKING**
Pre-requisite :	A strong understanding of bits bytes and characters, and information of how computers lay out data in memory

Course Objective:
The objectives of the course are to:

1. Introduces students to computer networks and focusing on firm foundation for understanding Data Communications based around the OSI Reference Model, TCP/IP model and interactions between them.
2. Provides the students with fundamental knowledge of the various aspects of computer networking and enables students to realize recent developments in the area.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory		Practical		
Lecture	Tutorial	Practical	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total
3	1	3	7	60	40	30	20	150

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Computer Networks** Uses of computer network, Network hardware – LAN, MAN, WAN. Network software – protocol hierarchies, Design issues for layers, Connection oriented and connectionless services, OSI model, TCP/IP model, and Comparison of OSI and TCP/IP model.	8	15
2	**The Physical Layer** Guided Media - Twisted Pair, coaxial cable, Fiber optics. Unguided transmission media - Radio wave, micro wave and infrared, light Transmission, Communication Satellites, Multiplexing and De-multiplexing– FDM, TDM, WDM. Switching – Circuit switching, Packet switching, 1G mobile Phone, 2G mobile Phone, 3G mobile Phone	10	20
3	**The Data Link Layer:** Design Issues - Framing, Error control, Flow control, Error Detection and correction. Elementary data link protocols, sliding window protocols.	8	15
4	**The Network Layer:** Introduction, Duties of Network Layer, Connection Oriented Forwarding using Virtual Circuits, Connection Less Forwarding using Datagram, Connection Oriented Vs Connectionless Forwarding, Forwarding Examples, Routing Algorithms, Congestion, Network Layer Switching.	10	20
5	**The Transport Layer :** Introduction, Duties of Transport Layer Connection Management at Transport Layer, Congestion Control, Comparison with Data Link Layer	6	15
6	**The Application Layer** Introduction, Domain Name System: Name Space, Registration Process, Name Servers, Resource Records, Types of Resource Records, Dynamic DNS, overview of Electronic mail, and HTTP, Bluetooth	6	15

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Course Outcome:

At the end of this course, the student would be able

- To recognize the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
- To understand the Internet structure and Computer Network Architecture and can see how standard problems are solved in that context.

List of references:

1. Computer Network- Andrew S. Tanenbaum, Fifth edition, Pearson.
2. Computer Networks- Bhushan H Trivedi ,Oxford University Press.
3. Data Communications and Networking- Behrouz A. Forouzan, Tata McGraw-Hill, Fifth Edition

Note:

- All the programs mentioned in this list are to be performed in GNU C /Linux/UNIX environment
- These programs are intended to simulate various aspects like flow control, error control and various ARQs of the LLC sub-layer protocols
- Two separate programs have to be created. The sender and the receiver.
- The sender and receiver communicate with each other using the Linux IPC mechanism Named Pipes/FIFO. The no. of pipes to be created depends upon the application.
- Various Systems Calls like read (), write (), open (), delay (), etc, may be used.

Sr. No	Practical Exercise
1.	**FRAMING TECHNIQUES:** 1.1 Write a program to demonstrate Character Count. 1.2 Write a program to demonstrate Bit Stuffing. 1.3 Write a program to demonstrate Byte Stuffing.
2.	**ERROR DETECTION/CORRECTION TECHNIQUES** 2.1 Write a program to implement Single Bit Parity (VRC) method. 2.2 Write a program to implement Block Parity (LRC) Method 2.3 Write a program to implement CRC checksum Method 2.4 Write a program to implement **1's** Complement based Checksum 2.5 Write a program to implement Hamming Code (for single bit error correction) 2.6 Write a program to implement Hamming Code (for Burst Error Correction)
3.	**DATA LINK LAYER PROTOCOL** 3.1 Write a program to demonstrate Protocol for an Ideal Channel and Ideal Nodes 3.2 Write a program to demonstrate One Way Stop and Wait Protocol for Noiseless channel and Slow Receiver. 3.3 Write a program to demonstrate One Way Stop and Wait Protocol for Noisy channel and Slow Receiver.