# DSC12/DSC06/GE6a: COMPUTER NETWORKS

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lectur e	Tutorial	Practical/ Practice		
Computer Networks	4	3	0	1	Pass in Class XII	NIL

# **Course Objectives**

The course objectives of this paper are to:

- Understand the concepts behind computer networks and data communication.
- Learn the different types of networks, network topologies and their characteristics.
- Learn the working of protocols used at various layers.
- Understand the utility of different networking devices.

# **Learning Outcomes**

Upon successful completion of the course, students will be able to:

- differentiate between various types of computer networks and their topologies.
- understand the difference between the OSI and TCP/IP protocol suit.
- distinguish between different types of network devices and their functions.
- design/implement data link and network layer protocols in a simulated networking environment.

### <u>Syllabus</u>

Unit 1 (8 hours)

### Introduction:

Types of computer networks, Internet, Intranet, network topologies (bus, star, ring, mesh, tree, hybrid topologies), network classifications. layered architecture approach, OSI Reference Model, TCP/IP Reference Model. Transmission Modes: simplex, half duplex and full duplex, network devices and their role.

Unit 2 (9 hours)

#### **Physical Layer:**

Analog signal, digital signal, the maximum data rate of a channel, transmission media (guided transmission media, wireless transmission, satellite communication), multiplexing (frequency division multiplexing, time-division multiplexing, wavelength division multiplexing). Guided Media (Wired) (Twisted pair, Coaxial Cable, Fiber Optics. Unguided Media (Radio Waves, Infrared, Micro-wave, Satellite).

Unit 3 (10 hours)

# **Data Link and MAC Layer:**

Data link layer services, error detection and correction techniques, error recovery protocols (stop and wait, go back n, selective repeat), multiple access protocols with collision detection, MAC addressing, Ethernet..

Unit 4 (8 hours)

# **Network layer:**

Networks and Internetworks, virtual circuits and datagrams, addressing, subnetting, Dijkstra Routing algorithm, Distance vector routing, Overview of Network Layer protocols- (ARP, IPV4, ICMP, RARP, IPV6)

Unit 5 (10 hours)

# **Transport and Application Layer:**

Process to process Delivery- (client-server paradigm, connectionless versus connection-oriented service); User Datagram Protocols, TCP/IP protocol, Flow Control. FTP (File Transfer Protocol), SMTP (Simple Mail Transfer Protocol), Telnet (Remote login protocol), WWW (World Wide Web), HTTP (HyperText Transfer Protocol), URL (Uniform Resource Locator), DNS, DHCP, BOOTP.

# **Essential/recommended readings**

- 1. Tanenbaum, A.S. & Wethrall, D.J.. Computer Networks, 5th edition, Pearson Education, 2012.
- 2. Forouzan, B. A.. Data Communication and Networking, 4th edition, McGraw-Hill Education, 2017.

#### **Additional References**

- 1. Comer, D. E.. Computer Networks and Internet, 6th edition, Pearson education, 2015.
- 2. Stallings, W., Data and Computer Communications, 10th edition, Pearson education India, 2017.

#### Practicals.

Introduce students to any network simulator tool and do the following:

- 1. To Study basic network command and Network configuration commands.
- 2. To study and perform PC to PC communication.
- 3. To create Star topology using Hub and Switch.
- 4. To create Bus, Ring, Tree, Hybrid, Mesh topologies.
- 5. Perform an initial Switch configuration.
- 6. Perform an initial Router configuration.
- 7. To implement Client Server Network.
- 8. To implement connection between devices using a router.
- 9. To perform remote desktop sharing within LAN connection.