**ICT 2255: COMPUTER NETWORK PROTOCOLS [4 0 0 4]**

**Objectives:**

* To provide basic knowledge of networking technologies and network protocol concepts
* To understand the functions of each layer and gain knowledge in different applications that use computer networks.
* To provide the student with fundamental knowledge of the various aspects of computer networking and enable students to appreciate recent developments in the area
* To be familiar with contemporary issues in networking technologies.

**Abstract:**

Introduction to Computer Networks: Definition, Network Layer, Network Layer services, Interfacing - Bridges, IP addressing, Subnetting and Supernetting, IPv6 addressing, Delivery Forwarding, and Routing of IP Packets, Internet Protocol **-** Datagram, Fragmentation, Options, Checksum, Introduction to Routing Protocols, Interior and Exterior routing, Dynamic IP Routing Protocols - RIP, RIP Version 2, OSPF, Routing between peers – BGP, ARP and RARP, Internet Control Message Protocol, User Datagram Protocol, Transmission Control Protocol and Introduction to application layer, Domain Name System (DNS), DHCP, FTP, SNMP.

**Syllabus:**

**Introduction to Network Layer:**

Introduction, Switching, Circuit switching at network layer, Network Layer services, Interfacing - Bridges **[6 Hours]**

**IPv4 and IPv6:**

Classful addressing, Classless addressing, Subnetting, Masking, Variable length subnetting, supernetting, Special address, NAT, IPv6 addressing **[5 Hours]**

**Delivery and Forwarding of IP Packets**:

Direct and Indirect Delivery, Forwarding, Internet Protocol **-** Datagram, Fragmentation, Options, Checksum & IP Design. [**7 Hours]**

**Unicast Routing Protocols:**

Interior and Exterior routing, Dynamic IP Routing Protocols - RIP, RIP Version 2, OSPF, Routing between peers – BGP **[6 Hours]**

**ICMP, ARP and RARP:**

ARP and RARP, Internet Control Message Protocol **-** Types of messages, message format, error reporting, query, Checksum & ICMP Design. **[4 Hours]**

**User Datagram Protocol:**

Process-To-Process Communication, User datagram, UDP operation, Uses of UDP. **[3 Hours]**

**Transmission Control Protocol:**

TCP services, A TCP connection**,** State Transition Diagram, Flow control, Error Control, Congestion control, TCP Timer. **[8 Hours]**

**Application Layer Protocols:**

Introduction to application layer, Domain Name System (DNS) – Namespace, Resolution, DNS Messages, Types of Records, Host Configuration: DHCP , Remote login : Telnet, File Transfer – FTP, Network Management : SNMP.  **[9 Hours]**

**Course Outcomes:**

Upon completion of this course a student will be able to

* Design logical address allocation for different sized networks from an allocated address block based on classful and classless addressing schemes.
* Describe the key technological components involved in routing of data across a network.
* Illustrate the proper usage of various protocols used in the different layers of TCP/IP protocol suite.
* Interpolate the basic protocols of computer networks in network design and implementation.
* Apply various protocols to solve challenges in a given scenario.

**References:**

1. Forouzan B. A., *TCP/IP Protocol Suite (4e),* Tata McGraw Hill 2017.
2. Tanenbaum A. S., *Computer Network (5e),* Prentice Hall of India Pvt Ltd 2013.
3. Forouzan B. A., *Data Communications and Networking (5e),* Tata McGraw Hill 2013.
4. Garcia L., Widjala, *Communication Networks (2e),* Tata McGraw Hill 2004.