INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

NETWORKS AND PROTOCOLS								
V Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AECD26	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	-	-	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisite: Analog and Digital Communications								

I. COURSE OVERVIEW:
This course is intended to provide an overview of transmitting information from one point to another using any connection like wires, cables or any physical medium. It covers the fundamentals of networking; application areas; classification; reference models; transmission environment; technologies; routing algorithms; IP, UDP and TCP protocols; reliable data transferring methods; application protocols; network security; management systems; perspectives of communication networks. It focuses on performance analysis and design of a network system such as router, modem, etc to provide internet for communication purpose.

II. COURSES OBJECTIVES:
The students will try to learn

I. Develop an understanding of modern network architectures from a design and performance perspective
II. Understand the basics and challenges of network communication.
III. Provide an opportunity to do network programming using TCP/IP.
IV. Understand the operation of the protocols that are used inside the Internet and LAN.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO1 Describe the fundamental concepts of computer networks, including network components, topologies, protocols, and reference models such as OSI and TCP/IP.
CO2 Analyze the functions of the physical and data link layers, including switching techniques, transmission media, framing, error control methods, and multiple access protocols.
CO3 Explain the design and working of network layer components such as logical addressing, routing algorithms, ICMP, IGMP, and internetworking techniques.
CO4 Discuss the role of the transport and application layers, including protocols such as TCP, UDP, HTTP, FTP, DNS, SMTP, TELNET, and SNMP.
CO5 Understand the structure, standards, and performance of LAN technologies including Ethernet (IEEE 802.3), Fast Ethernet, Gigabit Ethernet, and WLAN (IEEE 802.11).
CO6 Evaluate the working and features of advanced LAN/WLAN protocols and standards such as IEEE 802.1X, 802.11i, WPAN (Bluetooth), FDDI, Token Ring, and network management protocols like SNAP, LLC, and STP.

IV. COURSE CONTENT:

MODULE-I: INTRODUCTION (10)
Components, Direction of Data flow, Networks, Components and Categories, Types of Connections, Topologies, Protocols and Standards, ISO / OSI model, TCP/IP Suite, Example Networks such as ATM, Frame Relay, ISDN.

MODULE-II: THE PHYSICAL, DATA LINK LAYER AND MEDIUM ACCESS SUBLAYER (10)
Transmission modes, Switching, Circuit Switched Networks, Transmission Media, Datagram Networks, Virtual Circuit Networks.
Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.
Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.

MODULE-III: THE NETWORK AND THE TRANSPORT LAYER (9)
Design Issues, Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols, Congestion control.

Introduction, client server programming, WWW (World Wide Web) and HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), E-MAIL, TELNET, SECURE SHELL, DNS (Domain Naming System), SNMP (Simple Network Management Protocol), IPv4, IPv6.

MODULE-IV: APPLICATION LAYER AND APPLICATION LAYER PROTOCOLS (9)
Introduction to Application Layer: HTTP (Hyper Text Transfer Protocol), DNS(Domain Naming System).

Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

MODULE-V: LAN PROTOCOLS (10)
Ethernet: IEEE 802.3 Local Area Network protocols – Fast Ethernet: 100Mbps Ethernet (IEEE 802.3u)- Gigabit (1000 Mbps) Ethernet:IEEE 802.3z (1000Base-X) and 802.3ab (1000Base-T)- 10-Gigabit Ethernet: IEEE 802.3ae and 802.3an – WLAN: Wireless LAN by IEEE 802.11 protocols – IEEE 802.11i: WLAN Security Standard – IEEE 802.1X: EAP over LAN(EAPOL) for LAN/WLAN Authentication and Key Management – WPAN: Wireless Personal Area Network Communication Protocols – IEEE 802.15.1 and the Bluetooth for WPAN Communications – FDDI: Fiber Distributed Data Interface – Token Ring: IEEE 802.5 LAN Protocol – LLC: Logic Link Control (IEEE 802.2)- SNAP: SubNetwork Access Protocol – STP: Spanning Tree Protocol (IEEE 802.1D).

V. TEXT BOOKS:

1. A. S. Tanenbaum (2003), Computer Networks, 4th edition, Pearson Education/ PHI, New Delhi, India.
2. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 5th Edition, 2012.
3. Jielin Dong, Network Protocols Handbook, 4th Edition, Javvin Press, 2007.

VI. REFERENCE BOOKS:

1. Douglas E. Comer "Internetworking with TCP/IP ", Prentice-Hall, 5th Edition, 2011.
2. Peterson, Davie, Elsevier "Computer Networks", 5th Edition, 2011
3. Comer, "Computer Networks and Internets with Internet Applications", 4th Edition, 2004.
4. Chawan- Hwa Wu, Irwin, "Introduction to Computer Networks and Cyber Security", CRC publications, 2014.
5. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.
6. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

VII. ELECTRONICS RESOURCES:

1. http://keshi.ubiwna.org/2017IoTCOMM/Wireless_Communications_&_Networking_Stallings_2nd.
2. http://www.google.com/wirelesscommunicationnetwork.
3. https: ://www3.nd.edu/~mhaenggi/ee598q/books/stallings_jagadish.pdf
4. https://www.oreilly.com/library/view/wireless-communications-principles/0130422320/
5. Networks and Protocols-IARE AKANSHA
6. https:// groups.google.com/forum/#!topic/kluecm2010-2014/7Q5gRhqh51g

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open end experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper - II
9. Lecture notes
10. E-learning readiness videos (ELRV)
11. Power point presentation