

Bachelor of Engineering Subject Code: 3161007 Semester – VI Subject Name: Computer Networks

Type of course: Elective

**Prerequisite:** Basics of Computer hardware and software

**Rationale:** This course imparts a unified system view of the broad field of data and computer communications. The fundamentals of data communication are thoroughly explained to an extent of implementation in various networks.

### **Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks				Total
L	T	P	С	Theory Marks		Practical Marks		Marks
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

### **Content:**

Sr. No.	Introduction to Data Communication and Networking Data communication, use of Networks, Internet Protocols and standards, layering of Models, OSI model, TCP/IP Internet model.	
1		
2	Physical Layer Transmission media (Twisted pair, Coaxial cable, Fiber optic cable), Wireless Medium as Physical Layer (Electromagnetic Spectrum, ISM Band, Lighwave Transmission), Circuit switching, DSL technology, Cable modem.	4
3	Data Link Layer Services to N/W layer, Framing, Bit Stuffing, Character Stuffing, Error control, Flow control mechanism stop & wait, Go-back-, Selective repeat. Example data link protocol HDLC, PPP.	7
4	Medium Access Layer Channel allocation problem, Multiple Access, CSMA, CSMA/CD, CSMA/CA	5
5	Local Area Network Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN, Blue tooth, Zigbee, Connecting devices- Repeaters, Hub, Bridges, Switch, Router, Gateways, Broadband Wireless Networks	7
6	Network Layer Packet Switching, Virtual circuits and datagram, Static and Dynamic Routing Algorithms (Optimality principle, Static Routing Algorithms: Shortest Path, Flooding, Dynamic routing Algorithms: Distance Vector, Link state routing.), Congestion Control, IP	8



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Sunject State #10100.			
	Addressing, CIDR & NAT, IP layer protocols (ICMP, ARP, RARP, DHCP, BOOTP),		
	IPv4 and IPv6.		
7	Transport layer	4	
	Elements of Transport protocols - TCP & UDP		
8	Application Layer	5	
	DNS- Domain Name System, E-mail, FTP, HTTP, WWW, Firewall, Network Security		

### **Reference Books:**

- 1. Computer Networks by Andrew S. Tanenbaum, 4th Edition, Prentice Hall Publication
- 2. Data Communication and Networking by Behrouz Forouzan, 4th Edition, Tata McGraw-Hill Publication
- 3. Data and Computer Communication by William Stallings, Prentice Hall Publication
- 4. Computer Networks by Bhushan Trivedi, Oxford Publication
- 5. Computer networking: A top-down approach featuring the internet by Kurose, F James, 3rd Edition, Pearson Education India.

### **Course Outcomes:**

Sr.	CO statement	Marks % weightage
No.		
CO-1	Differentiate unique responsibilities and tasks performed by various layers in top-down and bottom-up approach of data flow	10%
CO-2	Design and troubleshoot customized small scale – short distance to large scale long distance networks to mitigate network hardware aspect	30%
CO-3	Simulate, modify, develop and implement algorithms and protocols at different layers to mitigate implementation aspects of the networks	45%
CO-4	Identify various network threats and implement standard security algorithms for safe and effective utilization of the Internet	15%

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### **Tentative / Proposed List of Experiments:**

- 1. Implementation of bit stuffing and de-stuffing
- 2. Implementation of character stuffing and de-stuffing
- 3. Implementation of parity checker
- 4. Implementation of CRC
- 5. Implementation of checksum
- 6. Implementation of pure and slotted ALOHA
- 7. Implementation of shortest path algorithm
- 10. Implementation of encryption and decryption algorithms

### Design based Problems (DP)/Open Ended Problems:

- 1. Identification of various networks components
- a. Connections, BNC, RJ-45, I/O box
- b. Cables, Co-axial, twisted pair, UTP
- c. NIC (network interface card)
- d. Switch. Hub
- 2. Sketch network diagram of any network
- 3. Interfacing with the network card (Ethernet)
- 4. Preparing of network cables
- 5. Establishment of a LAN
- 6. Troubleshooting of networks
- 7. Installation of Linux operating System and basic commands
- 8. Introduction to Network Simulation Tools like Cisco Packet Tracer (CPT)



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# **List of Open Source Software/Learning website:**

1. Virtual Lab: http://vlabs.iitkgp.ernet.in/ant/

2. Learning Website: http://nptel.ac.in