

SASTRA DEEMED UNIVERSITY
(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

May 2025

Course Code: **CSE322**

**Course: COMPUTER NETWORKING PRINCIPLES &
COMPONENTS**

QP No. : **U037-6**

Duration: **3 hours**

Max. Marks: **100**

PART - A

Answer any FOUR questions

4 x 20 = 80 Marks

1. a) A multiplexer combines four 100-kbps channels using a time slot of 2 bits. (4)
 - i) What is the frame rate?
 - ii) What is the frame duration?
 - iii) What is the bit rate?
 - iv) What is the bit duration?
- b) Compare and contrast Synchronous, Asynchronous, and Isochronous data transmission methods. (6)
- c) Discuss in detail the responsibilities of each layer in ISO-OSI model with a neat diagram. (10)
2. a) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1 . What is the actual bit string transmitted? Suppose the third bit from the left is inverted during transmission. How will the receiver detect this error? (6)
- b) In GB-3, if every 4th packet that is being transmitted is lost and if we have to send 10 packets then how many total transmissions are required? (4)
- c) Describe the CSMA/CA algorithm with step-by-step working. (10)

3. a) Consider a network where a circuit-switched connection is established between two users. The link has a data rate of 1 Gbps and each circuit-switched connection requires a fixed bandwidth of 50 Mbps. (4)
 - i) How many simultaneous connections can be supported on this link?
 - ii) If each connection lasts 5 minutes, how many users can be served in 1 hour assuming 100% utilization?
- b) Consider an instance of TCP's AIMD algorithm where the window size at the start of the slow start phase is 4 MSS and the threshold at the start of first transmission is 32 MSS. Assume that time out occurs during the 6th transmission and starts with 1 MSS. Find the congestion window size at the end of 9th transmission. (6)
- c) In an IP packet, the value of HLEN is 6_{16} and the value of the total length field is 0038_{16} . How many bytes of data are being carried by this packet? (4)
- d) Explain DORA Process in DHCP with a neat client-server scenario. (6)
4. a) Discuss in detail the iterative and recursive query of DNS naming resolution with a neat diagram for each. (10)
- b) Write short notes on the following. (10)
 - i) IMAP
 - ii) POP3
 - iii) HTTP Request Methods.
5. a) In a CSMA/CD network running at 1 Gbps over 2 km cable with no repeaters, the signal speed in the cable is 400000 km/sec. What is the minimum frame size? (6)
- b) There are 5 stations in a slotted LAN. Each station attempts to transmit with a probability $P=0.2$ in each time slot. What is the probability that ONLY one station transmits in a given time slot? (4)
- c) Compare and contrast IPv4 with IPv6. (6)
- d) An IP packet of size 1600 bytes passes through network segment before it reaches its destination. The header-size of this packet is 30 bytes. The maximum size of an IP packet in intermediate

network (MTU) is 1400 bytes. How the IP packet would be fragmented in a router. Find all the information for each fragment. (4)

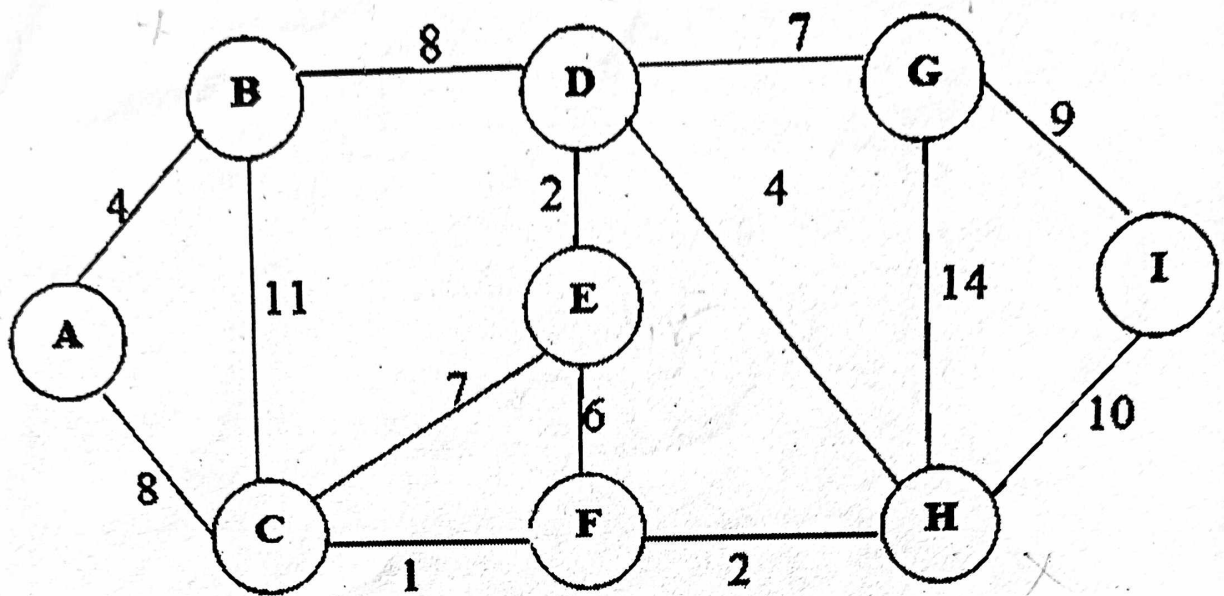
6. a) Write short notes on the following. (10)
- i) ARP
 - ii) RARP
 - iii) BOOTP.
- b) A 10 MB file needs to be sent over a packet-switched network. The network link has a transmission rate of 10 Mbps, and the packet size is 1 KB. The propagation delay is 10 ms, and each packet has a processing delay of 2 ms at the router. Assume no queuing delay. Find: (6)
- i) Number of packets required to transmit the file
 - ii) Time taken to transmit one packet
 - iii) Total transmission time for the entire file.
- c) Write short notes on the services offered by SCTP to the application-layer processes. (4)

PART - B

Answer the following

1 x 20 = 20 Marks

7. a) A 20 Kbps satellite link has a propagation delay of 400 ms. The transmitter employs the "Go Back N ARQ" scheme with N set to 10. Assuming that each frame is 100 bytes long, what is the maximum data rate possible? (5)
- b) Subnet the IP address 180.20.0.0 into 380 hosts in each subnet. Identify Class, Default Subnet Mask, Customized Subnet Mask. Also find out the No. of possible subnets, Usable IP Range, Network Address and Broadcast Address only for first 4 subnets. (5)
- c) Apply the Link State Routing Algorithm to find the shortest path. Assume node "A" as Root Node. Show the minimum spanning tree. (10)



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