**MCA/2ND SEM/MCAP 1202/2022**

# COMPUTER COMMUNICATION NETWORKS
## (MCAP 1202)

**Time Allotted : 3 hrs** **Full Marks : 70**

***Figures out of the right margin indicate full marks.***

***Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.***

***Candidates are required to give answer in their own words as far as practicable.***

## Group – A
### (Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Error Detection services are available to the network users through the _____ layer.
(a) Data link (b) Physical (c) Transport (d) Application

(ii) Which of the following CRC generators guarantee the detection of errors?
(a) x4 + x2 (b) x3 + x +1 (c) x2 +2 (d) All of the above.

(iii) In _____, each station is forced to send only at the beginning of the time slot.
(a) pure ALOHA (b) slotted ALOHA (c) CSMA/CD (d) polling

(iv) Each station on an Ethernet network has a unique _____ address imprinted on its network interface card (NIC).
(a) 5-byte (b) 32-bit (c) 48-bit (d) 12 bytes

(v) In a Go-Back-N ARQ, if the window size is 63, what is the range of sequence numbers?
(a) 0 – 63 (b) 0 – 64 (c) 1 – 63 (d) 1 – 64.

(vi) The 1-persistent CSMA approach can be considered a special case of the p-persistent approach with p equal to
(a) 0.1 (b) 0.5 (c) 1.0 (d) 2.0.

(vii) Which of the following routing algorithms can be used for network layer design?
(a) Shortest path algorithm (b) Distance vector routing
(c) Link state routing (d) All of the mentioned.

(viii) User datagram protocol is called connectionless because _____
(a) all UDP packets are treated independently by transport layer
(b) it sends data as a stream of related packets
(c) it is received in the same order as sent order
(d) it sends data very quickly.

(ix) To deliver a message to the correct application program running on a host, the _____ address must be consulted.
(a) IP (b) MAC
(c) port (d) none of the mentioned

(x) A client machine usually needs _____ to send email.
(a) only SMTP (b) both SMTP and POP
(c) only POP (d) either SMTP or POP.

## Group- B

2. (a) Which two layers of the TCP/IP Reference Model have the responsibility for logical addressing and port addressing? State the other responsibilities of these layers. [(CO1)(Remember/LOCQ)]
(b) Recall message and packet switching. [(CO1)(Remember/LOCQ)]
**(2 + 6) + 4 = 12**

3. (a) Explain is the relation between bit-rate and baud-rate? The bit-rate of a signal is 3000. If each signal carries 6 bits, what is the baud-rate? [(CO2)(Understand/LOCQ)]
(b) Identify the maximum bit-rate for an FSK signal if the bandwidth of the medium is 12,000 Hzand the difference between the two carriers is 2000 Hz. Transmission is in full-duplex mode. [(CO2)(Understand/LOCQ)]
**(2 + 4) + 6 = 12**

## Group - C

4. (a) Illustrate bit-stuffing and character-stuffing with appropriate examples? [(CO3)(Apply/IOCQ)]
(b) If a data frame contains 1101011 and the generator polynomial is x4 + x3 + 1, then calculate the CRC. [(CO3)(Apply/IOCQ)]
(c) Illustrate unicast, multicast and broadcast address with suitable examples. [(CO3)(Apply/IOCQ)]
(d) Write the frame format of HDLC. [(CO3)(Apply/IOCQ)]
**2 + 4 + 3 + 3 = 12**

5. (a) Suppose in a CSMA/CD LAN, the maximum end-to-end propagation delay is 25.6 μsec. If the LAN is operating in 100 Mbps, then what will be the minimum frame length (in bytes) of the LAN? [(CO3)(Apply/IOCQ)]
(b) Write the maximum throughputs of pure ALOHA, slotted ALOHA and CSMA/CD techniques? For what values of G (average number of frames generated during one frame transmission time) are these maximum values obtained? [(CO3)(Apply/IOCQ)]
**6 + (2 + 2 + 2) = 12**

## Group - D

6. (a) Examine the utility of routing tables in routing packets from source to destination? [(CO4)(Analyze/IOCQ)]
   (b) A network on the internet has a subnet mask of 255.255.240.0 and uses class B address. What is the number of subnets and number of hosts per subnet? [(CO4)(Analyze/IOCQ)]
   (c) Compare and contrast static and dynamic routing table? [(CO4)(Analyze/IOCQ)]

**4 + 4 + 4 = 12**

7. (a) Examine the routing table updation algorithm for distance vector routing. [(CO4)(Analyze/IOCQ)]
   (b) Draw the ARP packet format. [(CO4)(Analyze/IOCQ)]

**7 + 5 = 12**

## Group – E

8. (a) Evaluate open-loop congestion control and closed-loop congestion control. [(CO5)(Evaluate/HOCQ)]
   (b) Assume that the capacity of a token bucket is 250 KB and maximum size of input buffer is 1 MB. Token arrives at a rate allowing output at 2 MB/sec. Maximum speed of the network is 25 MB/sec. Now if 1 MB burst data arrives for 40 msecs, calculate the maximum bust time at the output. [(CO5)(Evaluate/HOCQ)]
   (c) Defend the connection establishment phase of TCP as a full proof mechanism. [(CO5)(Evaluate/HOCQ)]

**4 + 5 + 3 = 12**

9. (a) Write the function of user agent and mail server on the SMTP of e-mail service. [(CO6)(Create/HOCQ)]
   (b) Argue, why two port numbers are used by the FTP? [(CO5)(Evaluate/HOCQ)]
   (c) Write a brief note on the following: (i) WWW and (ii) HTTP. [(CO6)(Create/HOCQ)]

**2 + 2 + (4 + 4) = 12**

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| Cognition Level | LOCQ | IOCQ | HOCQ |
|---|---|---|---|
| Percentage distribution | 25 | 50 | 25 |

**Course Outcome (CO):**

CO1: Recall basic data communication and networking concepts like communication modes, topology, protocols, standards, layered tasks, reference models, connecting devices, switching.

CO2: Understand signals, digital and analog transmission, multiplexing, transmission media.
CO3: Interpret different framing, error correction, error detection, flow control and channelaccess protocols.
CO4: Examine the working principle of different routing and addressing schemes, different network layer protocols.
CO5: Evaluate different process to process delivery, congestion control and quality of service protocols.
CO6: Design network applications using different application layer protocols.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question