

**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) What is the major factor that makes coaxial cable less susceptible to noise than twisted-pair cable?  
(a) Inner conductor (b) Diameter of cable  
(c) Outer conductor (d) Insulating material.
- (ii) A periodic signal completes 1 cycle in 0.001 seconds. What is the frequency?  
(a) 1 Hz (b) 100 Hz  
(c) 1 kHz (d) 1 MHz.
- (iii) If the baud-rate is 400 for a 4-PSK signal, the bit-rate is \_\_\_\_\_ bps.  
(a) 100 (b) 400  
(c) 800 (d) 1600
- (iv) In CRC, if the data unit is 111111 and the divisor 1010, what is the dividend at the receiver?  
(a) 111111011 (b) 111111110  
(c) 1010110 (d) 110111111.
- (v) In Go-Back-N ARQ, if frames 4, 5 and 6 are received successfully, the receiver may send an ACK \_\_\_\_\_ to the sender.  
(a) 5 (b) 7  
(c) 6 (d) any of the above
- (vi) For a sliding window of size n-1, there can be maximum of \_\_\_\_\_ frames sent but unacknowledged.  
(a) 0 (b) n - 1 (c) n (d) n + 1
- (vii) Forty stations are on an Ethernet LAN. A 10-port bridge segments the LAN. What is the effective average data rate of each station?  
(a) 1.0 Mbps (b) 2.0 Mbps  
(c) 2.5 Mbps (d) 5.0 Mbps.

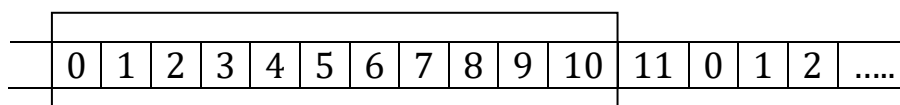
- (viii) In IPv4, what is the value of the total length field in bytes if the header is 28 bytes and the data field is 400 bytes?
  - (a) 428
  - (b) 107
  - (c) 407
  - (d) 427.
- (ix) What is the main function of the network layer?
  - (a) Node-to-node delivery
  - (b) Process-to-process delivery
  - (c) Synchronization
  - (d) Updating and maintaining routing tables.
- (x) 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.

**Group - B**

- 2. (a) Which two layers of the TCP/IP reference model perform error control? What is the difference between the two types of error control performed by these layers? Briefly discuss. [[CO1](Remember/LOCQ)]
  - (b) Recall the difference between circuit and packet switching. [[CO1](Remember/LOCQ)]
- (2 + 6) + 4 = 12**
- 3. (a) Four channels are multiplexed using TDM. If each channel sends 100 bytes/sec and we multiplex 1 byte per channel, find the frame size, the duration of a frame, the frame rate and the bit-rate of the link. [[CO2](Understand /LOCQ)]
  - (b) Find the maximum bit rates for an FSK signal if the bandwidth of the medium is 12,000 Hz and the difference between the two carriers must be at least 2000 Hz. Consider full duplex transmission. [[CO2](Understand/LOCQ)]
- 8 + 4 = 12**

**Group - C**

- 4. (a) In Go-Back\_N ARQ, if the sequence number is of n bits, then demonstrate that the maximum size of the window is  $2n - 1$ . [[CO3](Apply/IOCQ)]
- (b) Consider the following sender window of 11 frames at any given point of time.



Show the window again after the sender has sent frames 0 to 8 and has received ACK 5.

[[CO3](Apply/IOCQ)]

**6 + 6 = 12**

5. (a) Write the expression for throughput of ALOHA technique. Demonstrate that the maximum throughput that ALOHA can achieve is 18%. [[CO3](Apply/IOCQ)]  
 (b) Interpret the difference between CSMA/CA and CSMA/CD. [[CO3](Apply/IOCQ)]  
**(2 + 4) + 6 = 12**

**Group - D**

6. (a) Analyze the working of ARP with the help of a suitable diagram. [[CO4](Analyze/IOCQ)]  
 (b) Analyze which parts of the header format of IP packet are used for fragmentation and how they are used. [[CO4](Analyze/IOCQ)]  
**6 + 6 = 12**
7. (a) Compare and contrast between Distance Vector Routing and Link state Routing stating the names of two protocols in each type. [[CO4](Analyze/IOCQ)]  
 (b) Examine, why is there no need for the ICMPv4 message to travel outside its own network? [[CO4](Analyze/IOCQ)]  
**7 + 5 = 12**

**Group - E**

8. (a) Evaluate the role of frame relay in 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 msec, calculate the maximum burst time at the output. [[CO5](Evaluate/HOCQ)]  
**5 + 7 = 12**
9. (a) SMTP is used for emailing services. Then write, why is POP3 also necessary for emailing service? [[CO6](Create/HOCQ)]  
 (b) Write the utility of the HTTP and TELNET protocols. [[CO6](Create/HOCQ)]  
**4 + (4 + 4) = 12**

<i>Cognition Level</i>	<i>LOCQ</i>	<i>IOCQ</i>	<i>HOCQ</i>
<i>Percentage distribution</i>	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 channel access 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.*