DATA COMMUNICATION & COMPUTER NETWORKS
(MCAP 2102)

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) Which layer functions as a liaison between user support layers and network support layers?
(a) Network (b) Physical
(c) Transport (d) Application.

(ii) FDDI is an example of which topology?
(a) Bus Topology (b) Ring Topology
(c) Star Topology (d) None of these.

(iii) Which of the following encoding methods does not provide for synchronization?
(a) RZ (b) NRZ-L
(c) NRZ-I (d) Manchester

(iv) Which of the following CRC generators guarantee the detection of errors?
(a) $x^4 + x^2$ (b) $x^3 + x + 1$
(c) $x^2 + 2$ (d) all

(v) The subnet mask 255.255.255.192
(a) extends the network portion to 16 bits
(b) extends the network portion to 26 bits
(c) extends the network portion to 36 bits
(d) has no effect on the network portion of an IP address.

(vi) The process-to-process delivery of the entire message is the responsibility of the _____ layer.
(a) network (b) transport
(c) application (d) physical.

(vii) A periodic signal completes 1 cycle in 0.001 secs. What is the frequency?
(a) 1 Hz (b) 100 Hz
(c) 1kHz (d) 1MHz

(viii) In virtual circuit network each packet contains
(a) full source and destination address
(b) a short VC number
(c) both (a) and (b)
(d) none of these.

(ix) In a noiseless channel with a bandwidth of 4500 Hz transmitting a signal with 4 signal levels. Find the maximum bit rate in kbps :
(a) 9 (b) 15
(c) 18 (d) 36.

(x) High-performance switching and multiplexing technology that utilizes fixed-length packets to carry different types of traffic is
(a) ATM (b) ADSL
(c) SONET (d) none of these.

Group - B

2. (a) What is multiplexing? Explain different type of multiplexing with suitable diagrams of each type.

(b) What do you mean by Shannon Capacity?

(c) Define three types of transmission impairment.

8 + 2 + 2 = 12

3. (a) Using Manchester and Differential Manchester line encoding techniques to encode the following binary strings: (i) 11010100010 (ii) 01011011011

(b) Describe the method of PSK signal generation.

(c) What is Nyquist Bit rate of noiseless channel?

6 + 4 + 2 = 12

Group - C

4. (a) Explain the mechanism of Stop-and-Wait ARQ.

   (b) A receiver receives a code 11001100111. Using Hamming encoding algorithm, find which bit is in error and what is the original code sent.

   (c) What is the difference between even parity and odd parity?

5 + 5 + 2 = 12

5. (a) Draw and explain the concept of I frame and U frame in HDLC.

   (b) Discuss the size of the Go-Back-N ARQ sliding window at both sender site and the receiver site.

   (c) What is Byte stuffing?

4 + 5 + 3 = 12

Group - D

6. (a) A block of addresses is granted to a small organization. One of the addresses is 205.16.37.39/28.
   (i) What is the first address in the block?
   (ii) What is the last address in the block?
   (iii) Find the total number of addresses in the block.

   (b) What is the role of ARP and RARP protocol in data communication?

   (c) What is network byte order in computer networking? Explain with example.

6 + 4 + 2 = 12

7. (a) Explain the differences between static and dynamic routing.

   (b) Name two major classes of dynamic routing protocol. Briefly describe one dynamic routing protocol.

   (c) What is Wireshark?

4 + 6 + 2 = 12

Group - E

8. (a) Distinguish between closed–loop and open-loop congestion control.

   (b) "TCP provides reliable connection-oriented delivery service, IP provides unreliable connection-less delivery service" – explain.

   (c) Draw header format of an IP packet. Explain which parts of it are used for fragmentation and how.

4 + 4 + 4 = 12

9. (a) What are causes of congestion in a network?

   (b) Define the parameters used for describing flow characteristics?

   (c) Discuss different scheduling techniques to improve the QoS in a network.

2 + 4 + 6 = 12