(c)   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 burst time at the output.

(d)   What is the purpose of FTP?

$$3 + 3 + 4 + 2 = 12$$

9. (a)   SMTP is used for emailing services. Then why is POP3 also necessary for emailing service?

(b)   What is congestion? Explain the leaky bucket algorithm for congestion control.

(c)   TCP provides reliable data delivery but UDP does not provide reliability. Then why do some applications use UDP protocol?

(d)   Why does the Internet use a connection-less service?

$$3 + (1 + 3) + 3 + 2 = 12$$

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)   What is the main function of the transport layer?
(a) Node-to-node delivery   (b) Synchronization
(c) Process-to-process delivery   (d) Routing.

(ii) In which of the following networks, reassembly buffers are required?
(a) Packet-switched networks   (b) Circuit-switched networks
(c) Message-switched networks   (d) None of these.

(iii) The TTL field has value 10. How many routers (max) can process this datagram?
(a) 11   (b) 5
(c) 10   (d) None of the above.

(iv) Which one of the following is not a function of network layer?
(a) routing   (b) inter-networking
(c) congestion control   (d) none of the mentioned.

(v)   ICMP is primarily used for
(a) error and diagnostic functions (b) addressing
(c) forwarding   (d) none of the mentioned.

(vi) The hamming code is a method of -------------
(a) error detection   (b) error control
(c) error correction   (d) error encapsulation.

(vii) In the _____ method, all data exchanges must be made through the primary device even when the ultimate destination is a secondary device.
(a) reservation   (b) polling
(c) token passing   (d) none of the above.

(viii) The number of addresses in a class C block is _____.
(a) 65,534   (b) 16,777,216
(c) 256   (d) none of these.

(ix) Which one of the following routing algorithm can be used for network layer design?
(a) shortest path algorithm   (b) distance vector routing
(c) link state routing   (d) all of the mentioned

(x) In pure ALOHA, the vulnerable time is _____ the frame transmission time.
(a) the same as   (b) two times
(c) three times   (d) none of the above.

Group - B

2. (a) Which layer of OSI Reference Model has the responsibility for service point addressing (SPA)? State the other responsibilities of this layer.

(b) Compare the ISO-OSI and the TCP/IP reference models.

(c) Establish the relationship between baud rate and bit rate.

(d) Find the maximum bit-rate for an FSK signal if the bandwidth of the medium is 12,000 Hz and the difference between the two carriers is 2000 Hz. Transmission is in full-duplex mode.

(1 + 2) + 3 + 2 + 4 = 12

3. (a) What are the advantages of FM over AM? Compute the bit rate for a 1000 baud 16-QAM signal.

(b) How does PSK differ from QPSK?

(c) What are synchronous and asynchronous transmissions? Explain with an example.

(d) How does NRZ-L differ from NRZ-I?

(2 + 2) + 3 + 3 + 2 =12

Group - C

4. (a) Explain ALOHA and slotted ALOHA. Compare their throughtput.

(b) What is CSMA/CD? Discuss different channelization methods.

(c) Is it possible to detect the error bit, if any, using Hamming code, if the received bit sequence is 10010100101? Justify.

4 + 5 + 3 = 12

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5. (a) If a data frame contains 1101011 and the generator polynomial is $x^4 + x^3 + 1$, then calculate the CRC.

(b) 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?

(c) In Go-Back-N ARQ, if the sequence number is of n bits, then show that the maximum size of the sender window is $2n – 1$.

(d) With the help of a diagram explain HDLC frame format.

3 + 3 + 3 + 3 = 12

Group - D

6. (a) What is the difference between Distance Vector Routing and Link State Routing? Give name of two protocols of the above mentioned routing algorithm.

(b) What is IP addressing? What are the different classes of IP addressing? What is the difference between static and dynamic IP's?

(c) What is the maximum number of subnets in class C using the mask 255.255.255.224?

4 + (2 + 2 + 1) + 3 = 12

7. (a) A network on the internet has a subnet mask of 255.255.240.0 and uses class B address. What are the number of subnets and number of hosts per subnet?

(b) What is the default mask and broadcast address for class B? Specify the private IP range for class A address.

(c) What is the function of ICMP? What is the purpose of the ICMP redirection message?

(d) Differentiate between Non-adaptive and adaptive Routing.

4 + 2 + (2 + 1) + 3 = 12

Group - E

8. (a) State the differences between TCP and UDP.

(b) Distinguish between open-loop congestion control and closed-loop congestion control.