COMPUTER NETWORKS
(CSEN 3202)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) For a _____ channel Shannon capacity is used to find the maximum bit rate
(a) Noisy (b) Noiseless
(c) Bandpass (d) Lowpass

(ii) A one-to-many communication between one source and a specific group of hosts is classified as
(a) Unicast (b) Broadcast
(c) Multicast (d) None of these.

(iii) Designed a three stage switch (N=200) with n=20,k=4. What is the total number of cross points are?
(a) 1909 (b) 2000
(c) 1900 (d) 2010.

(iv) Which of the following is NOT a valid type of acknowledgement?
(a) Selective acknowledgement (b) Cumulative acknowledgement
(c) Positive acknowledgement (d) Negative acknowledgement.

(v) The timer that helps to deal with window size of zero is?
(a) Retransmission timer (b) Time-wait timer
(c) Keep alive timer (d) Persistence timer

(vi) Evaluate the number of links that you require in Mesh Topology with 15 nodes?
(a) 10 (b) 105 (c) 68 (d) 87

(vii) What is the Hamming distance between Message A and Message B, Where Message A =11010111, Message B = 11101111?
(a) 5 (b) 2 (c) 3 (d) 4.

(viii) Alternate and adaptive routing algorithm belongs to
(a) Static routing (b) Permanent routing
(c) Dynamic routing (d) None of the above

(ix) Link state routing protocol is
(a) BGP (b) OSPF (c) SPF (d) RIP.

(x) The 3rd and 9th bits get corrupted in the transmission of a 12 bit frame. What is the size of the burst?
(a) 6 (b) 7 (c) 8 (d) 9

Fill in the blanks with the correct word

(xi) If a signal changes instantaneously its frequency is _____.

(xii) _____ was originally developed to provide a loop free method of exchanging routing information between autonomous systems.

(xiii) The class is ____ for a Network Address 132.21.0.0.

(xiv) In Go-Back_N ARQ sliding window protocol, the receiver window size is _____.

(xv) Process to process delivery is the responsibility of the _____ layer.

Group - B

2. (a) Encode the Message 11101111 using the following encoding scheme
(i) NRZ-I (ii) Differential Manchester. *[(CO2)(Apply/LOCQ)]*
(b) Consider a Noisy Channel with Bandwidth 4 MHz, SNR=69. What is the Capacity of the Channel? *[(CO3)(Analyse/HOCQ)]*
(c) What is the type of cord required to connect two computer devices? What are the different reasons of signal distortion? *[(CO3)(Understanding/IOCQ)]*

4 + 4 + (2 + 2) = 12

3. (a) Explain PCM with suitable diagram. *[(CO2)(Remember/IOCQ)]*
(b) Draw and explain the constellation diagram for Amplitude shift keying, assume any suitable voltage for your diagram. *[(CO2)(Analyse/IOCQ)]*
(c) With a diagram explain the delay in a packet switched network. *[(CO2)(Remember/LOCQ)]*
(d) What is the role of a TSI (time-slot-interchange) in a Time division multiplexer? *[(CO3)(Understand/HOCQ)]*

4 + 2 + 3 + 3 = 12

Group - C

4. (a) What does the equation $2^r >= m+r+1$ signify?
000, 011, 101,110 are the valid code words of a coding system. How many bit errors is this coding system guaranteed to detect and why? *[(CO2)(Understand/IOCQ)]*
(b) Explain the Selective Repeat ARQ Algorithm with suitable diagram. *[(CO2)(Remember/LOCQ)]*
(c) Explain the Polling method of medium access. *[(CO6)(Remember/LOCQ)]*

(2 + 2) + 4 + 4 = 12

5. (a) How is vulnerable time calculated for ALOHA protocol? How does the vulnerability time differ in Slotted ALOHA? *[(CO6)(Remember/HOCQ)]*

(b) There are four stations sharing a channel and using CDMA for access control. How many orthogonal sequences will be needed? Generate the required orthogonal sequences using Walsh table. *[(CO2)(Understand/IOCQ)]*

(c) What are the strategies used to avoid collisions in CSMA/ CA protocol. *[(CO2)(Analyze/IOCQ)]*

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

Group - D

6. (a) What is the problem associated with classfull addressing and how does classless addressing solve the same? *[(CO4)(Understand/LOCQ)]*

(b) Given the CIDR representation 20.10.30.35 / 27. Find the range of IP Addresses in the CIDR block. *[(CO4)(Understand/LOCQ)]*

(c) What is address aggregation? Explain with an example. *[(CO4)(Analyze/IOCQ)]*

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

7. (a) With reference to NAT, what is address translation? What information is usually present in the translation table and how does that help in the process of address translation? *[(CO4)(Understand/LOCQ)]*

(b) What is the longest mask matching principle? *[(CO4)(Analyze/HOCQ)]*

(c) What is flooding and why is it considered useful? *[(CO4)(Analyze/IOCQ)]*

(2 + 3) + 3 + 4 = 12

Group - E

8. (a) Illustrate the TCP connection establishment using 3-way handshaking protocol with suitable diagram stating the significance of the sequence nos. and ACK nos. *[(CO3)(Remember/LOCQ)]*

(b) What was the purpose behind designing the Leaky bucket Algorithm? Draw and explain the working of the algorithm. *[(CO6)(Understand/LOCQ)]*

(c) "TCP is connection oriented protocol" -

(i) Does this mean every packet (of a message) in TCP follows the same path and reaches the destination in order? Explain.

(ii) With respect to TCP what is meant by "connection oriented"? *[(CO5)(Analyse/IOCQ)]*

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

9. (a) What is the silly window syndrome? How does Nagle's algorithm address the issue? *[(CO2)(Remember/LOCQ)]*

(b) Explain TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm with a diagram *[(CO2)(Understand/LOCQ)]*

(c) Explain with a diagram the meaning and significance of cumulative acknowledgement in context of TCP *[(CO6)(Analyse/IOCQ)]*

(2 + 2) + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	43	39	14

Course Outcome (CO):

After the completion of the course students will be able to

CO 1. Learn the terminology and concepts of the OSI reference model, TCP-IP reference model and the need for the layered architecture.

CO 2. Understand the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks

CO 3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies

CO 4. Demonstrate various types of routing techniques

CO 5. Defend and argue the various quality of service measures to improve network throughput.

CO 6. Synthesize the strength and shortcomings of the underlying protocols, and then go on to hypothesize new and better application layer protocols.

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