

COMPUTER NETWORKS
(CSE3202)

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) Digital signal transmitted to digital media is known as:
(a) Modulation (b) Line Coding
(c) Shift keying (d) Multiplexing
- (ii) A device is sending out data at the rate of 1000 bps. How long does it take to send a file of 100,000 characters?
(a) 200s (b) 400s
(c) 600s (d) 800s
- (iii) For a 4-bit sliding window protocol the sequence numbers can range from
(a) 1 to 16 (b) 0 to 7
(c) 0 to 15 (d) 8 to 15
- (iv) The length of an Ethernet address is
(a) 16 bits (b) 32 bits
(c) 48 bits (d) 64 bits
- (v) A local telephone network is an example of which network?
(a) Packet switched (b) Circuit switched
(c) Bit switched (d) Line switched
- (vi) RIP routing protocol uses the following algorithm
(a) Dijkstra's Shortest Path (b) Bellman Ford
(c) Floyd Warshall (d) None of the above
- (vii) Which of the following is the broadcast address for a Class B network ID using the default subnetmask?
(a) 172.16.10.255 (b) 255.255.255.255
(c) 172.16.255.255 (d) 172.255.255.255

- (viii) 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
- (ix) Process to Process delivery is the function of layer
 - (a) Transport
 - (b) Network
 - (c) Physical
 - (d) Application
- (x) In open-loop control, policies are applied to
 - (a) Remove after congestion occurs
 - (b) Remove after sometime
 - (c) Prevent before congestion occurs
 - (d) Prevent before sending packets

Fill in the blanks with the correct word

- (xi) If a signal changes instantaneously its frequency is _____.
- (xii) Circuit switching takes place at the _____ layer.
- (xiii) The full form of CIDR is _____.
- (xiv) A subset of a network that includes all the routers but contains no loops is called _____.
- (xv) _____ algorithm solves the speed mismatch problem of a fast server sending data too fast to a slow receiver.

Group - B

- 2. (a) A channel has Bandwidth = 4 KHz and a signal-to-noise ratio of 30 dB. Determine maximum information rate for (i) 4-level encoding, (ii) 128-level encoding. [[CO2](Understand/LOCQ)]
 - (b) Explain how PCM works. [[CO2](Remember/LOCQ)]
 - (c) Explain CDMA technology and how it combines TDMA and FDMA technologies? [[CO2](Analyse/IOCQ)]
- (2 + 2) + 4 + 4 = 12**
- 3. (a) What is the difference between Line Coding and Modulation? What do you mean by Baseband and Broadband transmissions? [[CO2](Understand/LOCQ)]
 - (b) Differentiate between bit rate and baud rate with suitable examples. [[CO4](Remember/LOCQ)]
 - (c) How is the total delay calculated in a Datagram Network and a Circuit Switched Network? Explain with a suitable diagram. [[CO2](Remember/IOCQ)]
 - (d) Explain any one wireless transmission strategy? [[CO2](Understand/LOCQ)]
- (2 + 2) + 2 + (2 + 2) + 2 = 12**

Group - C

- 4. (a) In Pure ALOHA, when any station can transmit at any time – the throughput is only 18%. Whereas in Slotted ALOHA, when stations are allowed to transmit at defined time slots – the performance is boosted to 36%. How is this possible? [[CO6](Analyse/IOCQ)]

- (b) How do you calculate the minimum time a station should wait to detect collision in an Ethernet LAN? [[CO2](Understand/LOCQ)]
- (c) A number of 10 Mbps Ethernet stations are attached in a bus configuration network. The maximum distance between any two stations in the network is 3 km. Assume signal propagation speed is 3×10^8 m/sec. What is the minimum time after which a station can be sure of no collision in this network? [[CO2](Apply/IOCQ)]
 $4 + 3 + 5 = 12$
5. (a) A 10 bit data block 0111010111 is to be sent using hamming code for error detection and correction. Show how the receiver corrects an error that occurs in the 6 bit position. [[CO2](Apply/IOCQ)]
- (b) Explain the Reservation or Bit map protocol method of medium access. [[CO6](Remember/LOCQ)]
- (c) Assume that, in a Stop-and-Wait ARQ system, the bandwidth of the line is 1 Mbps, and 1 bit takes 20 ms to make a round trip. What is the bandwidth-delay product? If the system data frames are 1000 bits in length, what is the utilization percentage of the link? [[CO2](Apply/IOCQ)]
 $6 + 4 + 2 = 12$

Group - D

6. (a) What is the difference between non-adaptive and adaptive routing protocols. [[CO4](Remember/LOCQ)]
- (b) An organization is granted the block 130.34.12.64/26. The organization needs to have four subnets. What are the subnet addresses and the range of addresses for each subnet? [[CO4](Analyze/IOCQ)]
- (c) What is the purpose of subnetting? Find the netid and the hostid of the following IP addresses :
 (i) 19.34.21.5
 (ii) 220.34.8.9. [[CO4](Analyze/LOCQ)]
 $2 + 4 + (2 + 2 + 2) = 12$
7. (a) An IP packet is sent from a machine A with IP address 192.168.11.12 in Network 1 to a machine B with IP address 192.168.7.15 in Network 2. Both the networks are LANs attached to the same organizational network. Show the header fields of the IP packet delivered to B from A as well as the response generated from B back to A. You may assume any packet content. [[CO4](Analyse/IOCQ)]
- (b) Describe the steps of Link State routing protocol. Mention one key difference of this protocol with the Distance Vector protocol. [[CO4](Apply/HOCQ)]
- (c) What is the purpose of "Time to live (TTL)" field in the IP header? [[CO4](Remember/LOCQ)]
 $(3 \times 1 + 2) + (3 + 1) + 3 = 12$

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) A computer on a 10Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 2Mbps. It is initially filled to capacity with 16 Mega bits. What is the maximum duration for which the computer can transmit at the full 10Mbps? *[[CO5](Analyse/HOCQ)]*
- (b) Define congestion. What is the difference between flow control and congestion control? *[[CO5](Remember/LOCQ)]*
- (c) Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a timeout occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission. *[[CO6](Apply/IOCQ)]*
- $4 + (2 + 2) + 4 = 12$**
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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	47.92	43.75	8.33