

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) AM, FM and PM are example of _____ conversion
(a) digital-to-analog (b) digital-to-digital
(c) analog-to-analog (d) analog-to-digital
- (ii) In Manchester and Differential Manchester the transition in the middle of the bit is used for
(a) bit transfer (b) baud transfer
(c) noise reduction (d) synchronization
- (iii) The best switching method to send a large message across a network is
(a) Circuit switching (b) Message switching
(c) Packet switching (d) Fragmentation
- (iv) A unit in the data link layer is called
(a) frame (b) packet (c) segment (d) parcel
- (v) What is the maximum number of errors that can be detected using two-dimensional parity check code?
(a) 4 (b) 5 (c) 3 (d) 2
- (vi) Identify the class of IP address 191.1.2.3
(a) Class A (b) Class B (c) Class C (d) Class D
- (vii) In distance vector routing each node periodically shares its routing table with
(a) every other node (b) immediate neighbour
(c) any one neighbour (d) none of the above
- (viii) The timer that helps to prevent a connection from staying open forever is
(a) Retransmission timer (b) Time-wait timer
(c) Keep alive timer (d) Persistence timer

- (ix) In the slow start phase of the TCP congestion control algorithm, the size of the congestion window
 (a) does not increase (b) increases linearly
 (c) increases quadratically (d) increases exponentially
- (x) ARP is used for the following task
 (a) Find out IP address of a given MAC address
 (b) Find out MAC address of a given IP address
 (c) Find IP address of a switch
 (d) Find TCP address of an application

Fill in the blanks with the correct word

- (xi) A digital signal has eight levels, number of bits needed per level is ____.
- (xii) In Go-Back_N ARQ sliding window protocol, the receiver window size is ____.
- (xiii) A one-to-many communication between one source and a specific group of hosts is classified as ____.
- (xiv) The bit rate of Manchester coding is ____ the baud rate.
- (xv) The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called ____.

Group - B

2. (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
3. (a) Consider a channel of 1MHz bandwidth. Let the SNR for the channel be 63. What will be the appropriate bit rate and signal level? [[CO3](Apply/IOCQ)]
 (b) State the significance of “Bandwidth-Delay product” in a network. [[CO2](Remember/LOCQ)]
 (c) What do you understand about the baseline wandering problem? [[CO2](Understand/IOCQ)]
 (d) Design a three stage, 15×15 switch ($N = 15, k = 2, n = 5$). What would be the number of crosspoints in the above mentioned switch? Redesign the previous three stage, 15×15 switch, using the Clos criteria with a minimum number of crosspoints. [[CO2](Apply/IOCQ)]
3 + 2 + 2 + (2 + 3) = 12

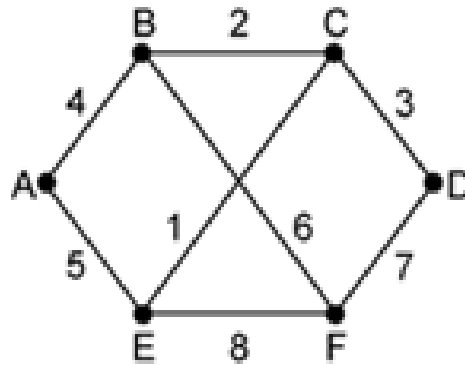
Group - C

4. (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
5. (a) Applying CRC algorithm, determine the transmitted frame for the bit stream 11010111 and for the generator polynomial $x^3 + x^2 + 1$. [[CO2](Apply/IOCQ)]
 (b) In Go-Back-N- ARQ, the size of sender window size $< 2^m$. Is it correct? Justify. [[CO2](Understand/LOCQ)]
 (c) Suppose a sender and a receiver are using sliding window protocol of window size 15. What will be the window status for the following occurrence? Sender has sent packets 0 to 11 and has received ACK 6. Explain for both Go-Back-N and Selective Repeat protocols. [[CO2](Apply/IOCQ)]
4 + 4 + 4 = 12

Group - D

6. (a) A block of addresses are assigned to an organization. One of the addresses is 205.16.39.40/28. What are the first and the last address of the block? Also find the total number of addresses in the block. [[CO4](Understand/LOCQ)]
 (b) An ISP is granted a block of addresses starting with 150.80.0.0/16. The ISP wants to distribute these blocks to 2600 customers as follows:
 (i) The first group has 200 customers; each needs 16 addresses.
 (ii) The second group has 400 customers; each needs 8 addresses.
 (iii) The third group has 2000 customers; each needs 4 addresses.
 Design the sub-blocks and give the slash notation for each sub-block. Find out how many addresses are still available after these allocations. [[CO4](Analyse/IOCQ)]
 (c) A router uses the following routing table:
- | Destination | Mask | Interface |
|--------------|-----------------|-----------|
| 144.16.0.0 | 255.255.0.0 | eth0 |
| 144.16.64.0 | 255.255.224.0 | eth1 |
| 144.16.68.0 | 255.255.255.0 | eth2 |
| 144.16.68.64 | 255.255.255.224 | eth3 |
- A packet bearing a destination address 144.16.68.117 arrives at the router. On which interface will it be forwarded? [[CO4](Apply/IOCQ)]
3 + 6 + 3 = 12
7. (a) What is the difference between OSPF and BGP protocol? [[CO4](Remember/LOCQ)]
 (b) What is flooding? What are its advantages? [[CO4](Remember/LOCQ)]

- (c) Construct the link state packets for the following network and explain the name and significance of the various fields in each packet. [[CO4](Apply/IOCQ)]



$$2 + 4 + 6 = 12$$

Group - E

8. (a) In a router implementing the Leaky Bucket algorithm, a burst of 10 Mbps traffic occurs over a time period of 0.1 sec. The constant output rate is 1 Mbps. Show the shaped traffic output. [[CO5](Understand/LOCQ)]
- (b) Describe briefly the process of TCP Connection establishment. Why is it 3-way handshaking process whereas connection teardown is a 2-way one? [[CO3](Remember/LOCQ)]
- (c) A TCP connection has Threshold set to 32 KB. The congestion window starts from the initial size of 1 KB. Describe the behaviour of the congestion window under the following conditions: (you may want to draw a suitable graph to explain your answer).
- (i) Time out occurs at the 8th transmission
- (ii) After that 4 more transmissions are performed. [[CO6](Apply/HOCQ)]
- $$3 + (3 + 2) + (2 + 2) = 12$$
9. (a) What do you mean by traffic shaping? Explain token bucket algorithm. [[CO5](Analyse/HOCQ)]
- (b) Port numbers are divided into broad categories. What are these categories and what is the underlying principle of these categories? [[CO2](Remember/LOCQ)]
- (c) Differentiate between stream sockets and datagram sockets? [[CO2](Understand/IOCQ)]
- $$(2 + 4) + 4 + 2 = 12$$

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	31.25	51.04	17.71