COMPUTER NETWORKS
(CSEN 3201)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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) The total number of links required to connect n devices using Mesh topology is
   (a) 2^n (b) n^2
   (c) $n(n+1)/2$ (d) $n(n-1)/2$.

   (ii) In go back to N ARQ sliding window protocol, the receiver window size is
   (a) greater than one   (b) two
   (c) one   (d) none of these.

   (iii) Which detection method can detect a single bit error?
   (a) CRC   (b) Single parity check
   (c) Two dimensional parity check   (d) All of these.

   (iv) _____ is a collision free technique.
   (a) Token Passing   (b) ALOHA
   (c) CSMA/CD   (d) CSMA.

   (v) Which class of IP address is reserved for multicast communication?
   (a) Class A   (b) Class B
   (c) Class D   (d) Class E.

   (vi) In analog to digital conversion according to the Nyquist theorem, the sampling rate must be at least _____ times the highest frequency contained in the signal.
   (a) 1/2   (b) 3   (c) 3/4   (d) 2.

   (vii) ICMP resides at the same layer as which of the following protocol mentioned below?
   (a) TCP   (b) UDP
   (c) IP   (d) ARP.

   (viii) Process to Process delivery is the function of _____ layer
   (a) physical layer   (b) data link layer
   (c) transport layer   (d) network layer.

   (ix) Baud means
   (a) the number of bits transmitted per unit time
   (b) the number of bytes transmitted per unit time
   (c) the rate at which the signal changes
   (d) none of above.

   (x) In the slow-start algorithm, the size of the congestion window increases _____ until it reaches a threshold
   (a) exponentially   (b) additively
   (c) multiplicatively   (d) logarithmically.

Group – B

2. (a) A telephone line normally has a bandwidth of 3000Hz assigned for data communication. The signal to noise ratio is usually 3162. Find the channel capacity.

   (b) Bit rate can be increased as much as wanted by increasing the number of signal levels as per the calculations given by Nyquist theorem for noiseless channel. Comment.
   We want to digitize a human voice. What is the bit rate, assuming 8 bits per sample?

   (c) Compare and contrast a circuit switched network and a packet switched network.

   (d) Explain what is the purpose of multiplexing (FDM is for analog signals and TDM is for digital signal).

             2 + (2 + 2) + 3 + (1.5 + 1.5) = 12

3. (a) What are the antennas used for microwave communication? Name the antennas, draw them, write briefly how they work.

   (b) Name the steps of PCM and state very briefly (with diagram) the activity of each step.

   (c) Design a three stage, 15 × 15 switch (N = 15), with n = 5, k = 2. What will be the total no. of cross-points? Explain.

             4 + 4 + 4 = 12

(c) What is the use of the Age field in the link state packets?

4. (d) Construct the link state Packets for the following Networking code error detection and
receiver corrects an error which occ ight.
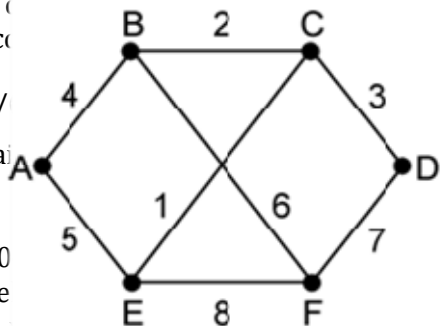
(b) Explain CSMA/

(c) Explain in detail of PPP.

6 + 3 + 3 = 12

5. (a) Consider a 50 00-msec round-trip propagation de following:
   (i) If stop and hannel, calculate for what percentage of time will the sender be idle. **2 + 3 + 3 + 4 = 12**

   (ii) If sliding window protocol is used, what should be the ideal window size of the sender.

Group – E

8. (a) "TCP is connection oriented protocol". Does this mean every packet (of a message) in TCP follows the same path and reaches the destination

(b) With diagram show the frame exchange in CSMA/CA and mention in brief the utility of RTS, CTS frames and NAV.

(c) What is the use of a supervisory frame in HDLC.

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

(b) What is a SYN flooding attack?

(c) Explain the use of Retransmission timer and Keep alive timer in TCP.

Group – D

6. (d) Write a short note on Bluetooth. the block 130.34.12.64/26. The organization needs to have four subnets. What are the subnet **3 + 3 + 3 + 3 = 12** addresses and the range of addresses for each subnet? Draw the

9. (a) diagram. What is TCP silly window syndrome? How does Clark's and Nagle's algorithm help in minimizing the syndrome?

(b) Explain with suitable example how address translation is done by

(b) With a Neat diagram explain slow start phase used by TCP to handle congestion.

(c) What is the purpose of subnetting? Find the net id and the host id of

(c) Differentiate between backpressure and choke packet congestion control method.
   (i) 19.34.21.5.

   (ii) 220.34.8.9

(4 + 2) + 4 + 2 = 12

(d) Differentiate between ARP and RARP protocol.

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

7. (a) What is the difference between static and dynamic routing?

(b) Name the steps of Link state routing protocol?