

**Group - D**

6. (a) How does BGP handle the count-to-infinity problem faced in distance vector routing?
- (b) A block of addresses are assigned to an organization. One of the address is 205.16.37.40/28. What are the first and the last address of the block? Also find the total number of addresses in the block. Explain why network address translation is used.
- (c) 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?
- 3 + (3 + 3) + 3 = 12**

7. (a) A transport-layer message consisting of 1500 bits of data and 160 bits of header is sent to an internet layer, which appends another 160 bits of header. This is then transmitted through two networks, each of which uses a 24-bit packet header. The destination network has a maximum packet size of 800 bits. How many bits, including headers, are delivered to the network-layer protocol at the destination?
- (b) What is Silly Windows Syndrome? Explain the theorems associated with it.
- 6 + (2 + 4) = 12**

**Group - E**

8. (a) What is a pico-net? Explain the connection establishment procedure of Bluetooth Technology.
- (b) What do you understand by the term "polling" with respect to WLAN? Explain how collision is avoided using RTS/CTS mechanism with suitable diagrams.
- (2 + 4) + (2 + 4) = 12**
9. (a) Explain the principle of CSMA/CA. Write down some applications of bluetooth technology.
- (b) What is the main difference between Iridium and Globalstar? Which is better, a low reuse factor or a high reuse factor? Explain your answer. What are the functions of a mobile switching center?
- (4 + 2) + (2 + 2 + 2) = 12**

**ADVANCED COMPUTER NETWORKS  
(CSEN 5203)****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) The protocol that maps a physical address to the corresponding logical address is.  
(a) ARP (b) RARP (c) ICMP (d) IGMP.
- (ii) Segmentation is done in which layer?  
(a) Data link layer (b) Network layer  
(c) Transport layer (d) Physical layer.
- (iii) A small organization is given a block with the beginning address and the prefix length 205.16.37.24/29 (in slash notation). What is the range of the block?  
(a) 8 (b) 16 (c) 24 (d) 32.
- (iv) Given an IP address is 180.25.21.172 and subnet mask is 225.225.192.0. What is the subnet address?  
(a) 180.25.21.0 (b) 180.25.0.0  
(c) 180.25.8.0 (d) 180.0.0.0.
- (v) 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.
- (vi) Automatic repeat request error management mechanism is provided by  
(a) logical link control sub layer  
(b) media access control sublayer  
(c) network interface control sub layer  
(d) none of the mentioned.

- (vii) A subset of a network that includes all the routers but contains no loops is called  
 (a) spanning tree (b) spider structure  
 (c) spider tree (d) none of the mentioned.
- (viii) An endpoint of an inter-process communication flow across a computer network is called  
 (a) socket (b) pipe  
 (c) port (d) none of the mentioned.
- (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) WCDMA is an example of  
 (a) Ad-hoc Network (b) 3G Network  
 (c) Wireless Internet (d) None of these.

**Group - B**

2. (a) "For detecting 'd' bits error the minimum distance in a certain coding system should be  $(d + 1)$ . But for correcting 'd' bits error the minimum distance should be  $(2d + 1)$ " - explain.
- (b) Applying CRC algorithm, determine the checksum and the transmitted frame for the bit stream 1101011111 and for the generator polynomial  $x^4 + x + 1$ .
- (c) Prove that in a three-stage switch, the total number of crosspoints is  $2kN + k(N/n)^2$ , where k is the number of crossbars in the middle stage, N is the total number of input lines and n is the number of lines in each group. For a three stage switch,  $200 \times 200$  ( $N = 200, k = 4, n = 20$ ) using the Clos criteria find out the minimum number of crosspoints.  
 $3 + 4 + (3 + 2) = 12$
3. (a) What is differential encoding? Explain the difference between NRZ-L and NRZI.
- (b) What function does a modem perform?
- (c) An analog signal carries 4 bits in each signal unit. If 1000 signal units are sent per second, find the baud rate and the bit rate.

- (d) Differentiate between guided media and unguided media.
- (e) There are two methods of enforcing the rule that only one device can transmit. In the centralized method, one station is in control and can either transmit or allow a specified other station to transmit. In the decentralized method, the stations jointly cooperate in taking turns. What do you see as the advantages and disadvantages of the two methods?

$$(2 + 2) + 2 + 2 + 2 + 2 = 12$$

**Group - C**

4. (a) Describe sliding-window flow control protocol. What is the advantage of sliding-window flow control compared to stop-and-wait flow control?
- (b) Consider a half-duplex point-to-point link using a stop-and-wait scheme, in which a series of messages is sent, with each message segmented into a number of frames. Ignore errors and frame overhead.
- (i) What is the effect on line utilization of increasing the message size, so that fewer messages will be required? (Other factors remain constant)
- (ii) What is the effect on line utilization of increasing the number of frames for a constant message size?
- (iii) What is the effect on line utilization of increasing frame size?
- (c) What do you understand by the term 'bit stuffing'? Why is it necessary?

$$(5 + 2) + 3 + (1 + 1) = 12$$

5. (a) Explain the CSMA/CD algorithm? Explain binary exponential backoff.
- (b) A disadvantage of the contention approach for LANs, such as CSMA/CD, is the capacity wasted due to multiple stations attempting to access the channel at the same time. Suppose that time is divided into discrete slots, with each of N stations attempting to transmit with probability p during each slot. What fraction of slots is wasted due to multiple simultaneous transmission attempts?
- (c) Explain the working of the DES algorithm with suitable diagram? What modifications of DES lead to triple DES?

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