Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech. End Semester

Branch: ECE | Semester: 7th

Title of the Course: Computer Networks | Course Code:EC405

Time: 3 Hours | Maximum Marks: 50

Section A (all parts are compulsory)

Q. 1. a) Which topology is used for large networks?
b) Which type of switching is used in ISDN?
c) How many pairs of stations can simultaneously communicate on Ethernet LAN?
d) Which transport layer protocol is used to support email and BOOTP?
e) Which of the transmission media among microwave, coaxial cable, radio waves, twisted pair and optical fibre is not readily suitable to CSMA operation?
f) How many zeros will be present in an odd-parity coded symbol?
g) Write down the output string if the bit string 0111101111101111110 is subjected to bit stuffing for the flag string 01111110.
h) Count to infinity problem is associated with which routing protocol?
i) How many characters per second (7bits + 1parity) can be transmitted over a 2400bps line if the transfer is synchronous (1start and 1 stop bit)?
j) What is network address translation? [1×10]

Section B (Attempt any four questions)

Q. 2. a) Explain the use of routers and gateways in networking.
b) Consider an error free 64 kbps satellite channel used to send 512 bytes of data frames in one direction, with very short acknowledgements coming back the other way. The round trip time is 540ms.
(i) What is the maximum window size to keep the channel busy?
(ii) what will be the maximum throughput for window size of 5?
c) Why Ethernet has a minimum and maximum packet length restriction? [1.5+2+1.5]

Q. 3 a) When a host on network A sends a message to a host on network B, which address does the router look at?
b) Consider a source computer (S) transmitting a file of size 10^6 bits to destination computer (D) over a network of two routers (R_1 & R_2) and three links (L_1, L_2 & L_3), L_1 connects S to R_1, L_2 connects R_1 to R_2 and L_3 connects R_2 to D. Let each link be of length 100KM. Assume signals travel over each link at a speed of 10^8m/s. Assume that the bandwidth on each link is 1mbps. Let the file be broken down into 1000 packets each of size 1000 bits. Find the total sum of transmission and propagation delays in transmitting file from S to D?
c) Explain vulnerable time and give its values for ALOHA, slotted ALOHA and CSMA. [1+2+2]

Q. 4. a) Discuss in brief the following terms

i) Telnet ii) http (hypertext transfer protocol) iii) Remote login

b) Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D. [3+2]

Q. 5. a) Briefly explain the purpose of ARP, RARP, BOOTP, DHCP protocols.

b) Station A needs to send a message consisting of 15 packets to station B using a sliding window (window size 5) and go-back-n error control strategy. All the packets are ready and immediately available for transmission. If every 5th packet that A transmits gets lost (but no acks from B ever get lost), then what is the number of packets that A will transmit for sending the message to B? [3+2]

Q. 6. a) The address of a class B host is to be split into subnets with a 5 bit subnet number. What is the maximum number of subnets and the maximum number of hosts in each subnet?

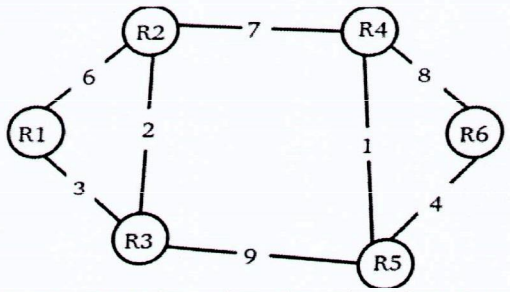
b) There are 10 stations in a slotted LAN. Each station attempts to transmit with a probability of 0.35 in each time slot. What is the probability that only one station transmits in a given time slot?

c) Explain the communication process between two hosts using TCP. [1+1.5+2.5]

Section C (Attempt any two questions)

Q. 7 a) Explain in detail the types of messages in ICMP.

b) Consider a network with 6 routers R1 to R6 connected with links having weights as shown in the following diagram:



All the routers use the distance vector based routing algorithm to update their routing tables. Each router starts with its routing table initialized to contain an entry for each neighbour with the weight of the respective connecting link.

(i) After all the routing tables stabilize, which links in the network will never be used for carrying any data?

(ii) Suppose the weights of all unused links are changed to 2 and the distance vector algorithm is used again until all routing tables stabilize. Which links will now remain unused? [4+6]

Q. 8 a) In an IPv4 datagram, the M bit is 0, the value of HLEN is 10, the value of total length is 400 and the fragment offset value is 300. Calculate the position of the datagram, the sequence numbers of the first and the last bytes of the payload.

b) Find the number of addresses, first address and last address in the block 17.34.16.0/23.

c) Explain split horizon strategy.

d) Explain silly window syndrome. [4+2+2+2]

Q. 9 a) A TCP session sends 10 packets per second over an Ethernet Local Area Network (LAN). Each packet has a total size of 1480 B (excluding the preamble and cyclic redundancy check (CRC)). Calculate the size of the headers, and hence the TCP payload data. What therefore is the TCP throughput of the session?

b) What is the difference between intranet and extranet?

c) Explain congestion control procedure in TCP. [3.5+1.5+5]