

Roll No.:.....

# *National Institute of Technology, Delhi*

Name of the Examination: B. Tech. End Semester

Branch: ECE

Semester: 7<sup>th</sup>

Title of the Course: Computer Networks

Course Code: EC405

Time: 3 Hours

Maximum Marks: 50

## **Section A (all parts are compulsory)**

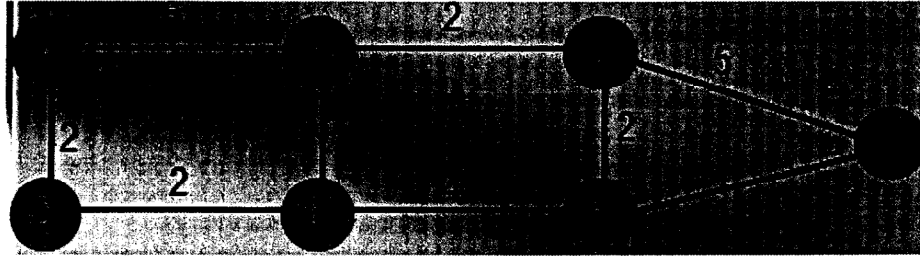
- Q. 1. a) What is the purpose of preamble and SFD in Ethernet frame header?  
b) What is unicasting, multicasting and broadcasting?  
c) What is the purpose of ARP and BOOTP?  
d) What is the difference between connectionless and connection-oriented network layer?  
e) Name the transition strategies for moving from IPv4 to IPv6?  
f) What is MTU?  
g) Which fields in IP header gets changed when a packet is fragmented by the router?  
h) What is vulnerable time?  
i) What is piggybacking?  
j) Count to infinity problem is associated with which routing protocol? [1×10]

## **Section B (Attempt any four questions)**

- Q. 2. a) Explain the use of repeaters and bridges in networking.  
b) A group of N stations share a 56 kbps pure (unslotted) aloha channel. Each station has one (NEW) packet arriving every 100 seconds and packets are 1000 bits long. What is the maximum value of N that the channel can accommodate?  
c) Why CSMA/CD is not suitable for wireless networks? [1.5+2+1.5]
- Q. 3 a) What do you understand by WWW? What is the use of hypertext links in Internet access? Name some popular Internet Browsers.  
b) Explain in detail about DNS? [2.5+2.5]
- Q. 4. a) Discuss in brief the following terms  
i) FTP      ii) SSL      iii) SMTP  
b) Determine the maximum length of the cable (in km) for transmitting data at a rate of 500 Mbps in an Ethernet LAN with frames of size 10,000 bits. Assume the signal speed in the cable to be 2,00,000 km/s. [3+2]
- Q. 5. Frames of 1000 bits are sent over a  $10^6$  bps duplex link between two hosts. The propagation time is 25ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link). Suppose that the sliding window protocol is used with the sender window size of  $2^i$  (i

is the number of bits that will be required to represent the sequence numbers distinctly) and acknowledgments are always piggybacked. After sending  $2^i$  frames, what is the minimum time the sender will have to wait before starting transmission of the next frame. [5]

- Q. 6. Use link state routing to calculate the routing table for C for the network topology given in figure below



[5]

### Section C (Attempt any two questions)

- Q. 7 a) Explain TCP header format in detail.  
 b) A client program sends one UDP packet with 100 B of data each second to a server and receives a corresponding reply also with 60 B of data. The client and server are connected by an Ethernet LAN. Calculate the total number of bits sent via the Ethernet network by this program in each second. From the number of bits per second calculate the utilization, given that Ethernet typically operates at 10 Mbps. [4+6]
- Q. 8 a) What are cookies? Explain creation, storage and usage of cookies.  
 b) Find the number of addresses, first address and last address in the block 123.56.77.32/29.  
 c) A system has a n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?  
 d) A channel has a bit rate of 4kbps and a propagation delay of 20 msec. For what range of frame sizes does stop-and-wait give an efficiency of at least 50 percent? [4+2+2+2]
- Q. 9 Derive the formula for utilization of Go-Back-N for following cases  
 (i) when the channel is fully busy and there is no error.  
 (ii) when the channel is fully busy and there is error  
 (iii) when the channel is not fully busy and there is no error  
 (iv) when the channel is not fully busy and there is error [10]