

11. a. A Lan System has 8 Systems using a Main switch which connects two Sub Switches. Each Sub Switch Connects 2 hubs and each hub connects two systems. Show the complete connections. (4)

Explain how files will be transferred in the MAC layer for the following communication and the functionalities of Switches and Hubs at each stage.

- i. From one System to another System in the same hub. (4)
- ii. From a System in one hub to a System in another hub in the same Sub Switch. (4)
- iii. From a system to another System connected through different Sub Switches. (4)

(OR)

- 12.b. Give the timing diagram for the following frames:

- i. Station A sends F3 at $t=10$;
 - ii. Station A sends F4 at $t=20$;
 - iii. Station A receives F2 at $t=21$;
 - iv. Station A sends F5 at $t=40$;
 - v. Station B sends F6 at $t=46$ and at $t=48$, the frame is lost;
 - vi. At $t=45$, the receiving buffer of side B is full;
 - vii. At $t=60$, A receives cum ack up to F4 and F7 from A is sent;
 - viii. At $t=80$ A receives F8 and B receives cum ack up to F6;
- Assume that the propagation delay is 5 seconds and time out occurs after 12 seconds.

(8x1.5)

Show the window sliding on both sides for all the transitions.

(4)

- 13.a. i. Illustrate with an example, how members join in a multicast group and how does a node send information to a multicast group members. (8)
- ii. Give any four ICMP Query / Error Messages and explain their Operations. (4)
- iii. Give the format of UDP and the Significance of each field. (4)

(OR)

- 13.b.i. Fragments of a datagram of size 3000 bytes are sent through different routes to reach the destination M from I. The intermediate routers are J, K, L, P, R & S and the MTUs are 500, 600, 400, 500, 300, and 300 respectively. The MTU of I is 1000. Whenever there is a fragmentation, the fragments follow different routes. Each fragment can take a route with a minimum of 3 intermediate routers from I to M.

1. Provide path for each fragment and each sub fragment (if any). (4)
2. At each stage specify, ID, MF, OFFSET and LEN of the fragment. (4)
3. Show how these fragments are reassembled at M. (4)

- 13.b.ii Explain with an example, how RIP and BGP are used to communicate Inter Autonomous System and Intra Autonomous System. (4)

- 14.a. An organization is given a network address 140.40.40.0/24. This network has to be divided into 3 subnets with 50 hosts, 60 hosts and 70 hosts.
- (i) Show the connectivity. (4)
 - (ii) Assign the sub net address of each sub net, IP address and subnet mask of one host in each subnet. (4)
 - (iii) Construct the routing table of all the routers, which are used to connect each subnet and internet. (8)

(OR)

- 14.b. For the following problem. Find out the MINIMUM number of segments will be transmitted on both sides using TCP.
- Size of the data to be sent 7900 bytes.
 - Sender window size = Receiver windows size = 4000 bytes.
 - Maximum segment size = 1000 bytes.
 - Information will be retrieved from the Receiver window by the application program whenever it has data of 2000 bytes.

With the help of a diagram, specify the following at each stage:

- i. Show the timing diagram for all transmissions from connection establishment to termination. (4)
 - ii. Starting and ending index of sender window when you have data to send. (4)
 - iii. Starting and ending index of the empty space of Receiver Window. (4)
 - iv. Sending Seq.No., Ack.Seq.No. and Window Advertisement. (4)
- 15.a. Illustrate with an example for each of the following three protocols, give the sequence of events which will take place during communication.
- i. HTTP (2)
 - ii. FTP (2)
 - iii. SMTP (4)
 - iv. Find the IP address of a server it.annauniv.edu using DNS to access from abc.yahoo.com by iterative and recursive queries. (8)

(OR)

- 15.b.
- i. Discuss the techniques used to avoid congestion in TCP? (4)
 - ii. Using VCI, establish a path from a switch "A" to another switch "F" thru 2 intermediate switches. Show the Virtual Circuit tables at each stage. (4)
 - iii. Construct a network of 666 machines connected in an organization using CIDR. Show the network address, subnet mask and IP address of any five machines. (4)
 - iv. Discuss any two Queuing techniques to avoid congestion in the routers and provide service to all the users. (4)