

**Instructions to candidates**

Answer **ALL** questions.

Missing data, if any, may be suitably assumed.

- 1A. TCP client opens a connection using an initial sequence number (ISN) of 14,534. The server opens the connection with an ISN of 21,732.
- Show the three TCP segments during the connection establishment.
  - Show the contents of TCP segment, if Client sends 100 bytes of data in each segment and server sends 200 bytes of data.
  - Show the contents of the segments during the connection termination. (Use three-way handshake).
- 1B. Answer the following, by considering 06 32 00 0D 00 1C E2 17 as dump of a UDP header in hexadecimal form.
- Source port number and Destination port number
  - Total length of the UDP and Length of the data
  - Efficiency of data transmission at UDP level and IP level (Assume header added at IP level is 20 bytes).
- 1C. Explain the count-to-infinity problem encountered in distance vector routing. [5+3+2]
- 2A. An IP datagram has arrived with the following information in the Header(in Hexadecimal)  
4A 00 00 5E 00 03 00 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02
- Are there any options?
  - Is the packet fragmented?
  - How many more routers can the packet travel to?
  - What is the identification number of the packet?
  - Compute the checksum.
- 2B. A host has no data to send. It receives the following segments at the times shown in terms of milliseconds after midnight. Show the acknowledgments sent by the host at transport layer. Also specify the criteria, based on which the acknowledgments has been generated.
- Segment 1 received at 000
  - Segment 2 received at 027
  - Segment 3 received at 300
  - Segment 5 received at 900
  - Segment 4 received at 980
- 2C. With an example, justify the need of longest mask matching in IP datagram forwarding. [5+3+2]
- 3A. Explain the working of the following protocols with a neat diagram
- Polling
  - CSMA/CD.
  - ALOHA
- 3B. Show the transition diagrams (FSMs) for simultaneous-close scenario.

3C. Suppose the length of a 10Base5 cable is 2500 m. If the speed of propagation in a thick coaxial cable is  $2 \times 10^8$  m/s, how long does it take for a bit to travel from the beginning to the end of the network? Assume there is 10µsec delay in the equipment. [5+3+2]

4A. Write the spanning tree algorithm. Apply the spanning tree algorithm for the given network in Figure Q.4A?

4B. The I&CT department of MIT, is granted a block 206.16.180.0/24. The network administrator wants to create 8 sub-nets.

- Find the sub-net mask.
- Find the first and last address of the last sub-net.
- How many sub-nets can be created with 32 addresses each?

4C. A computer receives a time-stamp request from another computer at 2:34:20 PM. The value of the original timestamp is 52,453,000ms. If the sender clock is 7ms slow, What is the one-way time? [5+3+2]

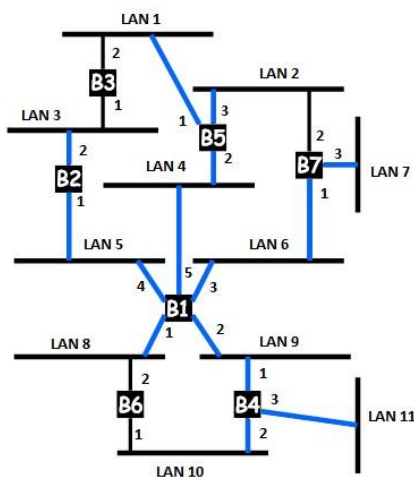


Figure Q.4A

Group	Timer	Group	Timer	Group	Timer
225.14.0.0	48	230.42.0.0	10	232.71.0.0	30
227.43.0.0	60	225.14.0.0	30	227.43.0.0	50
232.71.0.0	10	232.71.0.0	20		
230.42.0.0	15				

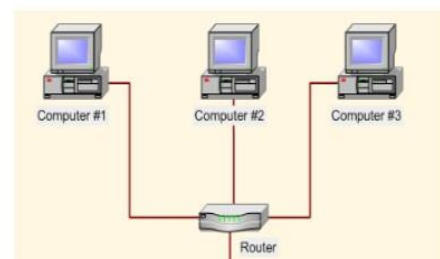


Figure Q.5A

5A. Briefly explain all types of message available in IGMP. Also show the sequence of message sent in the scenario as shown in Figure Q.5A.

5B. Briefly discuss about the fields related to fragmentation in IPv4 header.

- Find the number of fragments passed through each of the router in the given scenario. Assume that there exists only one router between any two networks. A 30000 byte message from a host belonging to network "Manipal" will reach the destination host belonging to the network "Delhi" after passing through networks "Mangalore" and "Bangalore" respectively. The source and the destination have decided for Path MTU during connection setup. The MTUs (in bytes) of the networks are as follows:

Manipal 1000, Mangalore 300, Bangalore 600, Delhi 500.

- How many fragments are reassembled at the destination host?

5C. What are the different types of basic network topologies? Explain in brief. [5+3+2]

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