

BACHELOR OF COMPUTER SCIENCE. & ENGINEERING EXAMINATION, 2014

(3rd year, 2nd Semester)

COMPUTER NETWORKS

Time: 3 hours

Full Marks: 100

Answer any FIVE questions.

(Parts of a question must be answered together)

1. a) Explain with actual routing table examples:
 - (i) Datagram subnet.
 - (ii) Virtual Circuit subnet.
- b) Compare UDP and TCP protocols.
- c) Consider building a CSMA/ CD network running at 1 Gbps over a 1 Km cable with no repeaters. Signal speed in the cable is 200,000 Kms/ sec. What should be the minimum frame size? Explain your answer briefly. ((5+5)+5+5)
2. a) Give the algorithm for 'Selective Repeat' sliding window protocol and explain its working in details.
- b) If 0 to MAX-SEQ is the range of sequence numbers used to identify frames, then
 - i) What is the sender's window size in case of Go-Back-N sliding window protocol?
 - ii) What is the sender's window size in case of Selective-Repeat sliding window protocol?
 - iii) Explain in details the similarity or difference (as the case may be) of your answers to (i) & (ii) above
- c) What is a 'NAK'? Why and where is it used?
- d) ((6 + 4) + (2 + 2 + 4) + 2),

$$80 + 50 + 70 + 10$$
3. a) An earth station is sending a stream of 1000 bytes frames to another earth station through a 100 Kbps satellite channel. Earth to satellite propagation delay is 270 milliseconds. Delay from satellite to earth is also the same. The receiving station takes 10 milliseconds to process each incoming frame and then sends back a 500 bytes 'Ack' frame. Assume that the satellite has zero retransmission delay. What should be the sender's window size (for optimum channel utilization) if 'Go -Back-N' protocol is being used? Explain your answer briefly.
- b) Stations 2, 4, 5 & 6 are competing for a multi-access channel using the Binary-Countdown method. Enumerate the different steps and find the minimum number of bidding rounds necessary for all the stations to gain access to the channel.

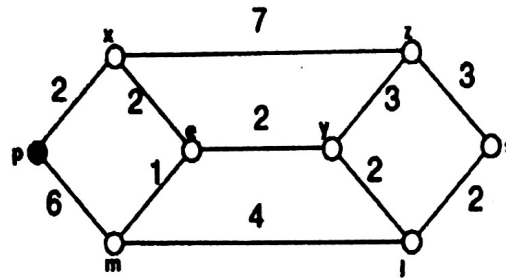
c) How long does a station 's' have to wait, in the worst case, before it can start transmitting its frame over an Ethernet LAN that uses

i) The basic Bit-Map protocol?

ii) The Mok and Ward's protocol with permuting virtual station numbers?

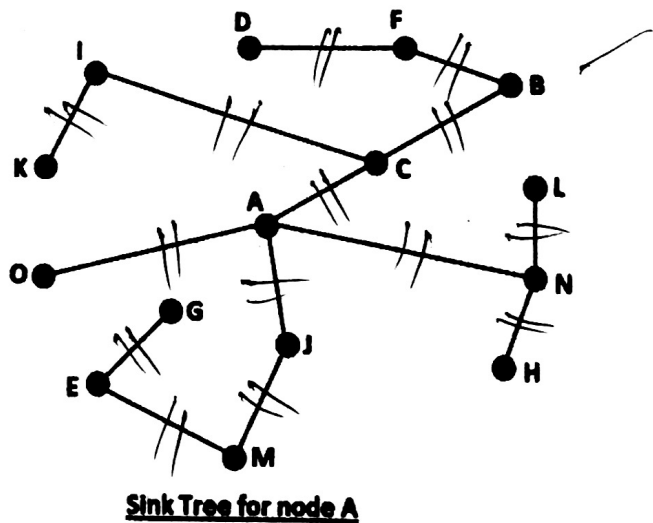
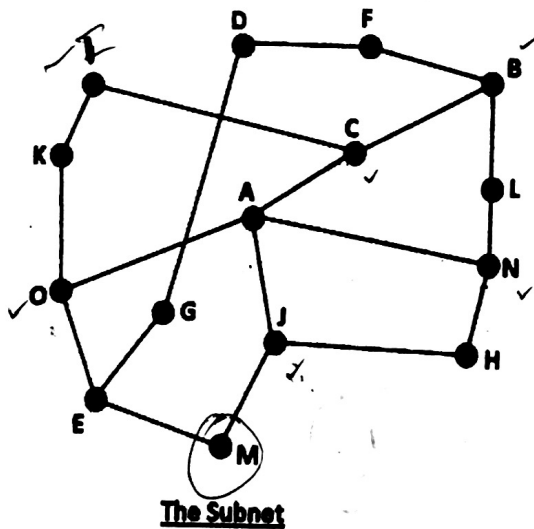
$$(7 + 7 + (2 + 4))$$

4. a) Consider the subnet given below:



Give details of all steps necessary to compute the shortest path(s) from node 'p' to node 's' using Dijkstra's Shortest Path algorithm. Explain your steps (with diagrams, if necessary) in details.

b) Consider the following subnet and the corresponding 'sink-tree' for router A:



- Illustrate the 'Reverse Path Forwarding' technique for broadcasting from router A. How many packets are generated? Explain your answer properly.
- If all routers are assumed to be aware of the 'Sink-Tree' for A, how many packets will be generated to complete the broadcast? Explain briefly.
- If all links have uniform bandwidth of 50 Kbps, and packet to be broadcast is 1000 bits long, how long will it take for the broadcast to be completed in (i) & in (ii) above?

$$(7 + (6 + 3 + (2 + 2)))$$

50 ~~10~~ 10³ bit

480
280

5. a) Give the IEEE 802.3 frame format and explain in details.
- b) List two ways in which the OSI reference model and the TCP/IP reference model are the same. Now list two ways in which they differ.
- c) Six wireless stations A through F communicate using MACA protocol. Is it possible that two transmissions take place simultaneously? If so, when? If not, why? Under what conditions, if any, would it be possible to use CSMA/CD instead of MACA? Explain your answer properly. 8+4+(4+4)
6. a) Write down the 802.11 frame format and explain in details with special emphasis on the portion that deals with 'Frame Control'.
- b) List and briefly explain the different services that must be provided by a wireless LAN operating under the 802.11 protocol.
- c) 802.3 protocol does not allow frames to be fragmented but 802.11 does; why? How are frame fragments managed by the later protocol? ((4 + 4) + 7 + (2 + 3))
7. a) Give the different 'Classfull' address formats as used under IPv4 and explain each briefly.
- b) A large number of consecutive IP addresses are available starting at 198.16.0.0. Four organisations A, B, C and D request for 4000, 2000, 4000 and 8000 addresses respectively, and in that order. For each of the organisation give the first IP address assigned and the last IP address assigned as well as the mask in w.x.y.z/s notation.
- c) How does IPv4
- i) Deal with fragmented packets?
 - ii) Ensure that certain packets are never fragmented?
 - iii) Route certain packets through pre-specified routers? (7 + 7 + (2 × 3))
8. Write short notes on any four:
- | | |
|---|---|
| i) DCF & PCF in wireless network | ii) WDMA |
| iii) 802.16 wireless broadband | iv) Congestion control |
| v) Protocol modeling using 'Finite State Machine' | vi) IPv6 packet header |
| vii) Routing techniques for Bridges | viii) CIDR (4 × 5) |

Mk

mf xhy p m w o