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MCS-042

MASTER OF COMPUTER APPLICATIONS (MCA)

Term-End Examination

December, 2021

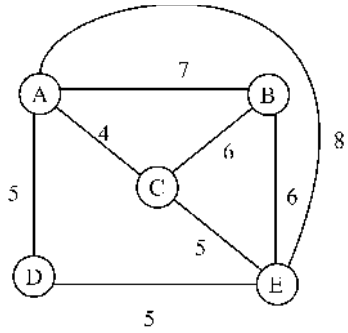
MCS-042 : DATA COMMUNICATION AND COMPUTER NETWORKS

Time : 3 Hours *Maximum Marks : 100*

Note : (*i*) *Question No.* ***1*** *is compulsory.*

(*ii*) *Attempt any* ***three*** *questions from the rest.*

1. (a) Consider the following network with the indicated link cost. Use Dijkstra's shortest path algorithm to find the shortest path from the source node A to all other nodes : 10



(b) Compare bit stuffing and byte stuffing. Bit stuff the following data frame : 6

00111100011111100011

(c) What are the important aspects that establish trust in digital signature ? Explain. 5

(d) What happens if one of the stations is unplugged in bus topology and ring topology ? 6

(e) How does token bucket traffic shaper work ? Explain with the help of a diagram. 8

(f) Explain the terms piggybacking and pipelining. 5

2. (a) What is Congestion ? What are the three phases in TCP's congestion control mechanism ? Explain with the help of a diagram. How does the size of a congestion window increase in the first phase ? 10

   (b) What is random access protocol ? Derive throughput expressions for pure ALOHA and slotted ALOHA. Also plot throughput *vs.* load graphs for both the protocols. 10

3. (a) Explain Diffie-Hellman algorithm with the help of an example. 10

   (b) How does BGP work ? How does it solve the count-to-infinity problem ? 10

4. (a) Explain the binary exponential back off algorithm. 5

   (b) Explain upward and downward multiplexing. 5

   (c) Describe Nyquist's theorem with the help of an example. 5

   (d) Explain the format of an Ethernet frame. 5

5. (a) Explain the purpose of the following IP and TCP header fields : 10

   (i) Fragment offset
   (ii) Time to live
   (iii) Service type
   (iv) Type of service
   (v) Window size

   (b) Show the constellation diagram of QPSK. 5

   (c) Show a TCP connection termination sequence. 5