Date: 17th April 2023

Indian Institute of Information Technology, Sri City, Chittoor

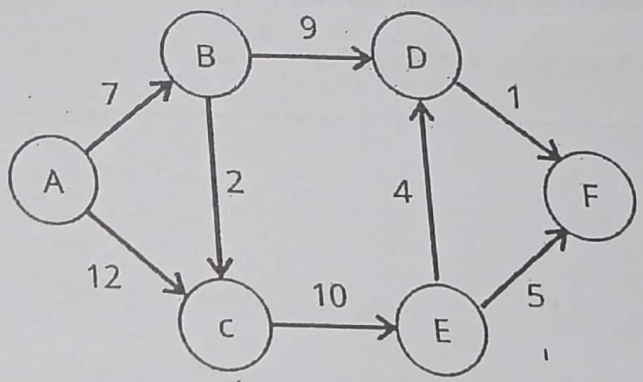
Name of the Exam: Computer and Communication Networks (CCN)

Duration: 90 mins

Max. Marks: 25 Marks

Instructions:

1. Closed book exam
2. Assumptions made should be clearly stated
3. All sub-parts of the question should be written together
4. Calculators are allowed. Sharing in the exam hall is not allowed.
5. Attach Question paper with Answer booklet

1	(a) Assume that X and Y are the only two nodes on an ethernet. Each has a steady queue of frames to send. Both X and Y attempt to transmit a frame, collide and Y wins the first backoff race. At the end of this successful transmission by Y, both X and Y attempt to transmit and collide. (i) What is the probability that X wins the second backoff race? (ii) What is the collision probability in the second backoff race? (b) Why does the data link layer check errors although errors are checked at the transport layer? Which error detection mechanism is used by Ethernet protocol?	4M+2M
2	a. Write Algorithm for the Dijkstra Algorithm for finding a route in a given topology ? b. Consider the above network. With the link cost indicated, use Dijkstra' shortest path algorithm to compute the shortest path from 'A' to all other nodes. (Note: No Partial Marks)  	3M 3M
3	a. Suppose you connect your computer to IIIT Sri City's wired network and want to upload a file from your computer to a server on port 20/21. Name **(do not describe)** ***all*** the protocols at different layers (except physical layer) of TCP/IP stack that your computer will use to upload the file. Assume that IIIT Sri City's ISP is Airtel and it is using Bellman Ford's approach for intra routing algorithm. **[Note: Marks for a layer will be awarded only if all the protocols to be used on that layer are mentioned]**	5M +2M

b. Given the example table for the fragmentation, choose the set of values for the last fragment for a 2400-byte datagram into a link that has an MTU of 500 bytes including 20 bytes header. Suppose the original datagram is stamped with the identification number 422. [2M]. Identify the correct answer from the below options

Fragment	Bytes	Identification	Offset	More Fragment(MF Flag)
1st Fragment	1480 bytes in the data field of IP Datagram	777	Offset =0	MF=1

A) Fragment-4, Bytes- 360, identification-422, offset = 240, MF=1

B) Fragment-5, Bytes- 560, identification-423, offset = 200, MF=0

C) Fragment-5, Bytes- 460, identification-422, offset = 240, MF=0

D) Fragment-5, Bytes- 260, identification-422, offset = 340, MF=0

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a) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end. **[4M]**

b) Suppose four active nodes—nodes A, B, C and D—are competing for access to a channel using slotted ALOHA. Assume each node has an infinite number of packets to send. Each node attempts to transmit in each slot with probability p. The first slot is numbered slot 1, the second slot is numbered slot 2, and so on.

i) What is the probability that node A succeeds in slot 4? [1M]

ii) What is the probability that the first success occurs in slot 3? [1M] **[2M]**

All the Best