3A. An ISP is granted a block of addresses starting with 160.80.0.0/17. The ISP wants to distribute these blocks to customers as follows:

i. The first group has 32 medium-size businesses; each need 512 addresses.
ii. The second group has 64 small businesses; each need 128 addresses.
iii. The third group has 1024 households; each need 4 addresses.

Design the sub-blocks and give the slash notation for each sub-block. 5

3B. What is silly window syndrome? Elucidate the solution given by Nagle's algorithm to avoid silly window syndrome created by the sender. 3

3C. What are the different types of links in OSPF? 2

4A. A sender has 100 KB of data to send to a receiver, using MSS= 5 KB. Assume that a time-out error occurs after every 4th transmission, possibly due to a congestion. With the aid of a timeline diagram. show how many transmissions are required to send the entire data. Show the calculations involved at each step. 5

4B. Explain warning bit and hop-by-hop choke packets method for congestion detection and recovery. 3

4C. An IP datagram has arrived with the following information in the header (in hexadecimal):

4500 00C8 0003 00C8 2006 0000 7C4E 0302 B40E 0F02

What is the first byte number and last byte number in this datagram? Justify if this is the last fragment, the first fragment, or a middle fragment? 2

5A. Consider the initial routing tables for the Autonomous System given in **Fig. Q.5A.** Assume router A sends the four records of its initial routing table to its neighbors, routers B, D, and C. Show the procedure involved in updating the routing tables if the Autonomous System uses Distance Vector Routing Algorithm. Find the final routing tables of all the routers.

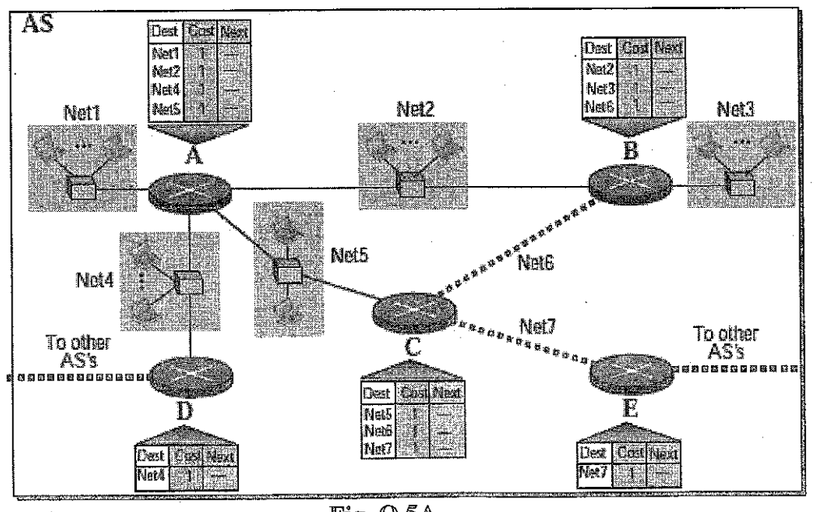

Fig. Q.5A. 5

5B. Five LANs are connected using source routing bridges as shown in **Fig. Q.5B.** Assume that the bridges 1,5 and 6 are not part of the initial spanning tree.

a) Show the single route broadcast frames when S1 wants to learn the route to S2.
b) Show the path to all routes broadcast frames returned by S2.

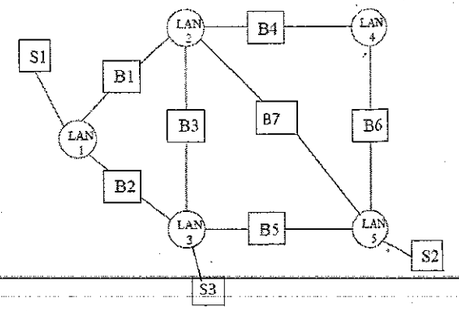

Fig. Q.5B. 3

5C. Consider the routing table of router, R1 given in Table Q.5C. Show the forwarding process if a packet arrives at R1 with the destination address 180.70.65.145.

Table Q.5C.

Mask	Network Address	Next Hop	Interface
/26	180.70.65.192	-	M2
/25	180.70.65.128	-	M0
/24	201.4.22.0	-	M3
/22	201.4.16.0	-	M1
Default	Default	180.70.65.200	M2

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MANIPAL INSTITUTE OF TECHNOLOGY

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IV SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: COMPUTER NETWORKS [ICT 2201]

REVISED CREDIT SYSTEM
(17 / 04 / 2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data, if any, may be suitably assumed.

1A. What is Link State Routing? Explain the steps taken by a router in Link State Routing. 5

1B. Briefly explain Random Early Discard method for congestion avoidance. 3

1C. Compare mesh and star topologies based on cost, setup, link robustness and network maintenance with proper justification. 2

2A. Suppose a Transport Layer data of 11980 Bytes is passed to the Network Layer for delivery across 2 networks of the internet, from source host, A to destination host, B. Assume that host A is connected to host B through router, R1. The first network (from host A to router R1) has a MTU of 2000 Bytes and the second network (from router R1 to host B) has a MTU of 1000 Bytes. If all the fragments reach safely at the destination, show the offset and flag values for each of the fragments. Assume all IP headers are 20 Bytes. 5

2B. A router running RIP has a routing table with 20 entries. How many periodic timers are needed to handle this table? How many expiration timers are needed to handle this table? How many garbage collection timers are needed to handle this table if five routes are invalid? 3

2C. A network transmits 500 bits frame on a shared media of 256 kbps.Assume that the systems in the network generate 500 frames per second. Calculate the throughput the network for:

i. Pure Aloha
ii. Slotted Aloha 2