Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-1:[15]

Suppose two packets arrive to two different input ports of a router at exactly the same time. Also suppose there are no other packets anywhere in the router.

a. Suppose the two packets are to be forwarded to two different output ports. Is it possible to forward the two packets through the switch fabric at the same time when the fabric uses a shared bus?
b. Suppose the two packets are to be forwarded to two different output ports. Is it possible to forward the two packets through the switch fabric at the same time when the fabric uses switching via memory?
c. Suppose the two packets are to be forwarded to the same output port. Is it possible to forward the two packets through the switch fabric at the same time when the fabric uses a crossbar?

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-2:[8]

Consider a subnet with prefix 192.168.56.128/26. Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network. Suppose an ISP owns the block of addresses of the form 192.168.56.32/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-3:[10]

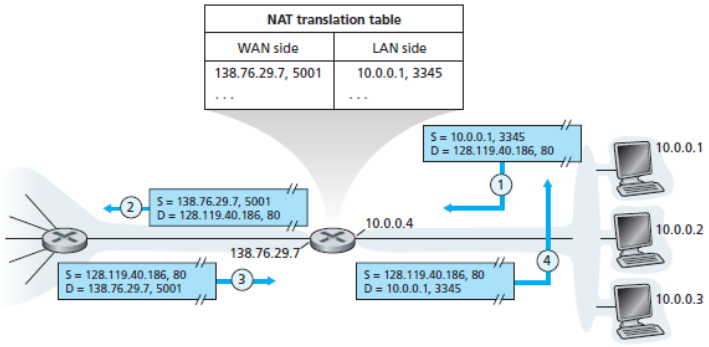
Consider sending a 1,600-byte datagram into a link that has an MTU of 500 bytes. Suppose the original datagram is stamped with the identification number 291.

a. How many fragments are generated?
b. What are the values in the various fields in the IP datagram(s) generated related to fragmentation?

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-4:[12]

Consider the network setup shown in the figure. Suppose that the ISP instead assigns the router the address 24.34.112.235 and that the network address of the home network is 192.168.1/24.



a. Assign addresses to all interfaces in the home network.
b. Suppose each host has two ongoing TCP connections, all to port 80 at host 128.119.40.86. Provide the six corresponding entries in the NAT translation table.

Note: Provide Detailed solutions and not just final answers. Final Answers only will get a mark of zero.

Problem-5:[15]

Suppose datagrams are limited to 1,500 bytes (including header) between source Host A and destination Host B. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 consisting of 5 million bytes? Explain how you computed your answer.