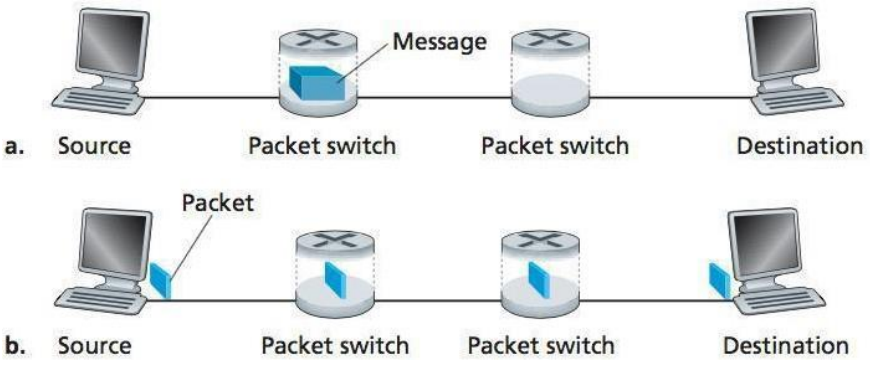
ASSIGNMENT – 1
DATA NETWORKING – TELE5330
Max Marks: 100

Q1: Differentiate between OSI and TCP/IP model. Briefly explain the functionalities of ALL layers of the TCP/IP model. [5+5=10 Marks]

Q2: For a scenario, where an application transmits N bytes of data at a steady state (every T time units). Furthermore, the application is expected to run for a longer period of time. Which network would be better – Packet Switched or Circuit Switched. Choose and Justify? [10 Marks]

Q3: For the scenario given below, consider the size of data to be sent as 150MB (B: Bytes). All the three links have a bandwidth of 5 Mbps (b: bits). Each switch uses STORE AND FORWARD packet switching. Ignore propagation, queueing and processing delays. [5+10+15+5+5 = 40 Marks]



a) What is the total time to send the data from Source to Destination assuming no segmentation?
b) If the message is split into 10 equal segments, how much time would it take for the first packet to travel from Source to the FIRST switch? While the first packet is moving from the FIRST switch to the SECOND switch, how much time would be elapsed when the second packet reaches the FIRST switch.
c) Assuming segmentation as in the case above, how much time would it take for the ENTIRE data (all the segmented packets) to reach the destination. Compare the overall time taken with no segmentation (a).

d) How would the overall Transmission delay be affected if the length of the link between each switch is doubled?
e) Give 2 pros and cons of using Message Segmentation.

Q4: What is an IP address and a MAC address? Interconnected computers require both IP address and MAC address. Why cannot we use only one of them, an IP address or a MAC address for all addressing associated with the computers? (Hint: Answer this question from a design perspective). [5+5= 10 Marks]

Q5: Write a python program to take an input from the user and check whether the number entered is a prime number or not. Paste the code along with a screenshot of the output. [5 Marks]

Q6:Write a python program to take String input from the user and check whether the number entered is a Palindrome or not. The String input can be a word or a sentence, therefore the check should determine whether the word or sentence is Palindrome. Paste the code along with a screenshot of the output.
[Hint: 'no melon, no lemon' is a Palindrome String] [10 Marks]

Q7. Suppose two hosts, A and B, are separated by 15,000 kilometers and are connected by a direct link of R = 1.5 Mbps. Suppose the propagation speed over the link is 2.2*108 meters/sec.

a. Calculate the bandwidth-delay product, R _ $d$prop
b. Consider sending a file of 700,000 bits from Host A to Host B. Suppose the file is sent continuously as one large message. What is the maximum number of bits that will be in the link at any given time?
c. Provide an interpretation of the bandwidth-delay product
d. What is the width (in meters) of a bit in the link? Is it longer than a football field?
e. Derive a general expression for the width of a bit in terms of the propagation speed s, the transmission rate R, and the length of the link m. [15 Marks]