VIT
Vellore Institute of Technology

Final Assessment Test – Jan/Feb 2023

Course: ITA5003 - Data Communication and Networking

Class NBR(s): 5117 / 5122 / 6227 Slot: E2+TE2

Time: Three Hours Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Elaborate in detail about the TCP/IP Architecture with an explanation of each layer in it.

2. a) What are the propagation time and the transmission time for a 100-Mbyte message if the bandwidth of the network is 2 Mbps? Assume that the distance between the sender and the receiver is 10,000 km and that light travels at 2.4×10^8 m/s. [5]

   b) Elaborate on how data signals are transmitted using the frequency division multiplexing technique with a suitable diagram [5]

3. a) Compare and Contrast Packet Switching Networks and Circuit Switching Networks [5]

   b) Assume the data received from the network layer at the sender side is DDDEFEFDDEDF. Perform Byte stuffing to send to the receiver. (Note: E & F – Escape and Flag Characters respectively) [3]

   c) Assume the data received from the network layer at the sender side is 11000111111100111111101100011. Perform Bit stuffing to send to the receiver. [2]

4. A path in a digital circuit-switched network has a data rate of 5 Mbps. The exchange of 500 bits is required for the setup and teardown phases. The distance between the two parties is 2500 km. Calculate the total delay incurred for this process and assume that there is no transmission initiated during the data transfer phase.

5. Define the following parameters for a switching network:

   N= number of hops between two given end systems

   L= message length in bits

   B= data rate in bits per second (bps), on all links

   P= packet size

   H= overhead (header) bits per packet

   S= call setup time (circuit switching or virtual circuit) in seconds

   D= propagation delay per hop in seconds

   For N=4, L=3200, B=9600, p=1024, H=16, S=0.2, D=0.001, compute the end-to-end delay for circuit and packet switching. Assume there are no acknowledgements, and no queuing delay.

6. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$.

   a) What is the actual bit string transmitted?

   b) Suppose the third bit from the left is inverted during transmission. How will the receiver detect this error?

7. Assume an organization is allotted with a block of IPV4 addresses. One of the IP among the block is 162.18.19.34/24. Identify the following from the given input.

   i) Start address of the block
   ii) End address of the block
   iii) Total Number of IP addresses in the block
   iv) Perform 4 subnets in the given block of IP addresses
   v) Identify the subnet mask

8. a) Compare and contrast IPV4 and IPV6 (any 7 Points) **[5]**

   b) Summarize the various techniques used for preventing congestion in a TCP network **[5]**

9. a) Draw the IP datagram packet and the necessary fields of IP datagram header. **[5]**

   b) Assume that, video conferencing is taking place between host A and host B. What type of services is required for this communication in the transport layer? Justify with your answer. **[5]**

10. Elaborate in detail about the role and working process of Domain Name System in Internet.