VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Class ID	:	CH2021228000244	Semester	:	Summer 1 2021-2022
Course	:	Network and Communication	Code	:	CSE1004
Faculty	:	Prof.B.SahayaBeniPrathiba	Slot	:	A1+A2+TA1+TA2

ANSWER ANY 6 QUESTIONS (6X10=60 MARKS)

1. Answer both a and b.(10 marks)

   a. Consider VIT Network academic block has 3 labs, each located in 3 different floors. Each lab has 4 computers. The institute is in need of establishing an isolated LAN connecting the computers to a single hub. Choose the appropriate network category, topology/ies and networking devices. Justify this scenario diagrammatically and theoretically by providing appropriate topologies. (5 marks)

   b. Sketch and explain the functionalities and responsibilities of the layers in the OSI model (5 marks)

2. Consider the below figure 1, which has two devices A and B connected with two intermediate nodes, where device A and intermediate node 1 is located in the first floor of a shopping mall and device B and the intermediate node 2 is located in the ground floor of the same shopping mall. The intermediate nodes are connected with coaxial cable. Imagine billing detail from first floor has to be sent to the second floor. Explain both diagrammatically and theoretically about the various layers of these devices and justify how the communication happens in this scenario. Also justify whether direct communication is possible rather than layer-by-layer communication(10 marks).
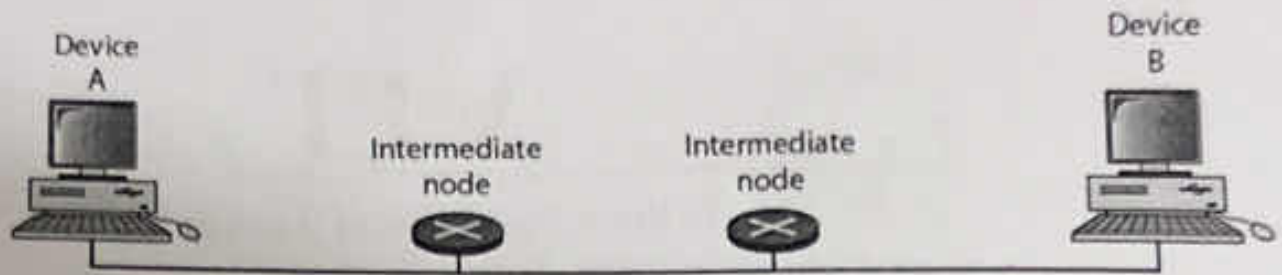
Figure 1

3. Let us assume Raja needs to transmit the data 1011000 to Nila. However, the transmission medium is a noisy channel. Consider the parity generator x^3+x+1 and detect whether the data transmission undergoes any kind of errors. Validate your answer for both Raja (sender) and Nila (receiver).(**10 marks**).

4. Consider IBM and Qualcomm are dealing with new project discussion. As a part of their discussion, IBM wanted to send the data 11001 without any error (i.e. even though the network detects the error, it should correct it before transmitting). Imagine the network provider uses even parity hamming code generator. If so, justify how redundancy bits for the data 11001 will be generated? IBM is quite worrying about the data to be error-free. Help IBM to understand the entire process with step by step procedure involved.(**10 marks**).

5. In VIT AB2, four telephones were available and connected with 4x4 switch. Same way, VIT AB1 has two telephones and VIT sigma block has two telephones with 2x2 switches for each block. Can you suggest which switching network will be appropriate for this if the communication is made through 4kHz voice channels? Sketch the architecture and data flow as well. (**10 marks**).

6. Consider yourself as a Network Engineer at VIT, Chennai. As a first duty, you are asked to design Ethernet IEEE 802.3 network connectivity for the Network and Communication Laboratory. Which random access protocol/MAC protocol you choose for the Ethernet connectivity. What are the constraints available in the chosen MAC protocol? Provide the flow chart of the protocol schematically mentioning the maximum time of retransmissions. (**10 marks**).

7. Consider sender A transmit a message to receiver B. Assume that the window at both sender and receiver side is 1. Further, this transmission consumes more bandwidth and time wastage as it requires the frame to be transmitted and the acknowledgment to be received before the timer expires. Explain both diagrammatically and briefly for the following scenarios.(**10 marks**).

   a. *Normal operation*

b. *The frame is lost*

c. *The Acknowledgment (ACK) is lost*

d. *The Ack is delayed*

8. Answer both a and b **(10 marks).**

a. Consider a point-to-point link 50 km in length. At what bandwidth would propagation delay (at a speed of 2 × 108 m/sec) that provides equal transmit delay for 100-byte packets?

   i. Consider the same scenario for 512-byte packets?

b. Suppose a 128-Kbps point-to-point link is set up between Earth and a rover on Mars. The distance from Earth to Mars (when they are closest together) is approximately 55 Gm, and data travels over the link at the speed of light 3×108 m/sec.

   i. Calculate the minimum RTT for the link.

   ii. Calculate the delay × bandwidth product for the link.