Sym

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(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination Synoptic

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Max. Marks: 30 | Duration: 3Hr
Class: F.Y.M.C.A. | Semester: II
Course Code: MCA22 | Branch: M.C.A.
Name of the Course: Computer Networks

Instruction:
(1) All questions are compulsory.

Q.1 Outline the term "Computer Networks"? Discuss various types of network topologies in computer networks along with its advantage & disadvantage.[8 M] CO2

Answer:

Definition/About of Computer Networks [1M]

Listing of all 6 bellow topologies [1M]

1m each for topology, its advantage & disadvantage-

Bus Topology

Ring Topology

Star Topology

Tree Topology

Mesh Topology

Hybrid Topology

Q.2 An analog signal has a bit rate of 8000 bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need? [5m] CO1

Answer:

In this example, S = 1000, N = 8000, and r and L are unknown. We find first the value of r and then the value of L.

$$S = N \times \frac{1}{r} \quad \Rightarrow \quad r = \frac{N}{S} = \frac{8000}{1000} = 8 \text{ bits/baud}$$

$$r = \log_2 L \quad \Rightarrow \quad L = 2^r = 2^8 = 256$$

OR

Q.2 We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level? [5m] CO1

Answer:

First, we use the Shannon formula to find the upper limit.

$$C = B \log_2 (1 + SNR) = 10^6 \log_2 (1 + 63) = 10^6 \log_2 64 = 6 \text{ Mbps}$$

The Shannon formula gives us 6 Mbps, the upper limit. For better performance we choose something lower, 4 Mbps, for example. Then we use the Nyquist formula to find the number of signal levels.

$$4 \text{ Mbps} = 2 \times 1 \text{ MHz} \times \log_2 L \longrightarrow L = 4$$

Q.3 Compare OSI and TCP/IP model [7M] CO3

Answer- 1M for each correct difference.

Following are some major differences between OSI Reference Model and TCP/IP Reference Model, with diagrammatic comparison below.

OSI(Open System Interconnection)	TCP/IP(Transmission Control Protocol / Internet Protocol)
1. OSI is a generic, protocol independent standard, acting as a communication gateway between the network and end user.	1. TCP/IP model is based on standard protocols around which the Internet has developed. It is a communication protocol, which allows connection of hosts over a network.
2. In OSI model the transport layer guarantees the delivery of packets.	2. In TCP/IP model the transport layer does not guarantees delivery of packets. Still the TCP/IP model is more reliable.
3. Follows vertical approach.	3. Follows horizontal approach.
4. OSI model has a separate Presentation layer and Session layer.	4. TCP/IP does not have a separate Presentation layer or Session layer.
5. Transport Layer is Connection Oriented.	5. Transport Layer is both Connection Oriented and Connection less.
6. Network Layer is both Connection Oriented and Connection less.	6. Network Layer is Connection less.
7. OSI is a reference model around which the networks are built. Generally it is used as a guidance tool.	7. TCP/IP model is, in a way implementation of the OSI model.
8. Network layer of OSI model provides both connection oriented and connectionless service.	8. The Network layer in TCP/IP model provides connectionless service.
9. OSI model has a problem of fitting the protocols into the model.	9. TCP/IP model does not fit any protocol
10. Protocols are hidden in OSI model and are easily replaced as the technology changes.	10. In TCP/IP replacing protocol is not easy.
11. OSI model defines services, interfaces and protocols very clearly and makes clear distinction between them. It is protocol independent.	11. In TCP/IP, services, interfaces and protocols are not clearly separated. It is also protocol dependent.
12. It has 7 layers	12. It has 4 layers

Q.4 A bit stream 10011101 is transmitted using the standard CRC method described in the text. The generator polynomial is x3 + 1. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end . [5M] CO4

Answer:-

The frame is 10011101.

The generator is 1001.

The message after appending three zeros is 10011101000. [1M]

The remainder on dividing 10011101000 by 1001 is 100. [1M]

So, the actual bit string transmitted is 10011101100 (Frame +Reminder)

The received bit stream with an error in the third bit from the left is 10111101100.[1M]

Dividing this by 1001 produces a remainder 100, which is different from zero. [1M]

Thus, the receiver detects the error and can ask for a retransmission. [1M]

OR

Q.4 Calculate LRC and VRC for following bit pattern using even parity: [5M] CO4

1001011 0001100 1000000 1110111

Answer-

VRC :

Using Even Parity:

1001011 0001100 1000000 1110111

VRC : 0010 [3M]

LRC : 1001011

0001100

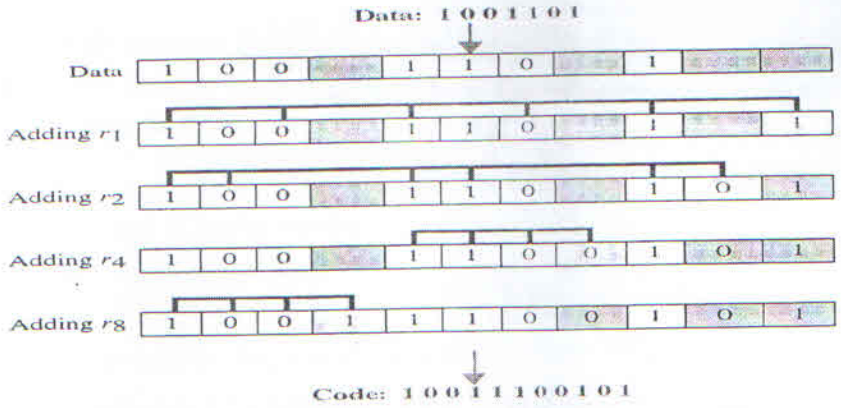
1000000

1110111

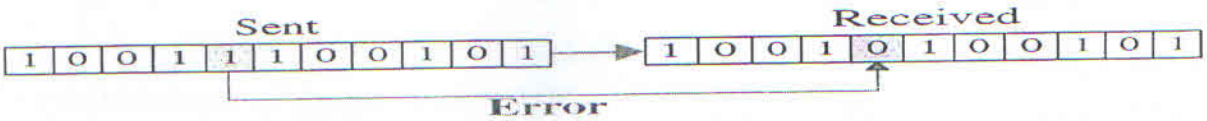
1110000 [2M]

Q.5 Construct the Hamming code for the bit sequence 1001101 & check error bit position for bit sequence 10001100101 at receiver side [5M] CO4

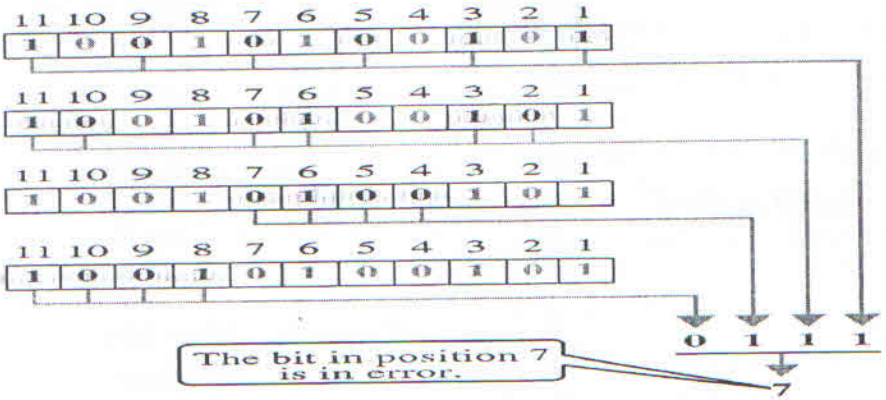
Answer- 2M for each correct redundancy bit



1M for correct received bit sequence.



2M for correct bit position i.e 7th position



OR

Q.5 Compare time domain & frequency domain [5M] CO1

Answer-

1M for each correct difference.