CT Assignment - 2

Name: Md. Shariful islam
ID - (IT-17013)

Answer to the question no-01

a) List three techniques of digital-to-digital conversion.

Sol^{n}: The three different techniques describes in this digital-to-digital conversion are line coding, block coding and sesanbling.

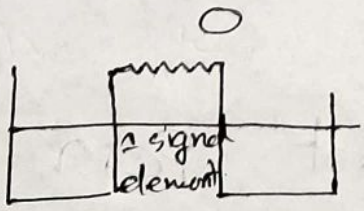
b) Compose and contrast PCM and DM?

Soln: Both PCM and DM use sampling to convest an analog signal to a digital signal.

PCM finds the m value of the signal amplitude for each sample; DM finds the change between two consecuit sample.

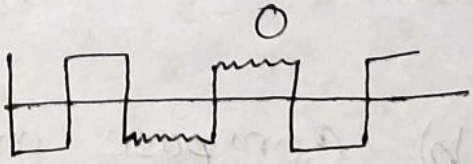
c) calculate the value of the signal rate for each case in figure-A, if the data rate is 1 mbps and c = 1/2

1 data element



a. one data element per one signal element (r=1)

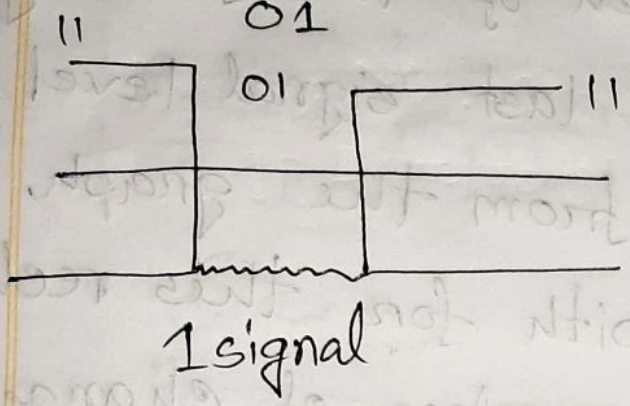
1 data element



2 signal element

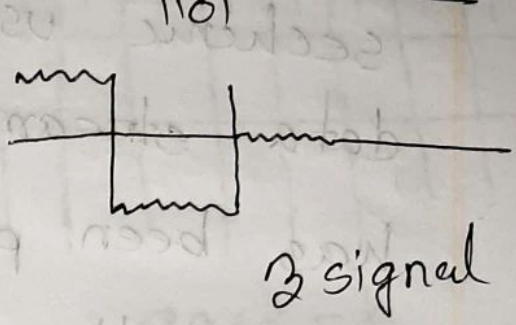
b. One data element per two signal element (r = 1/2)

2 data element



1 signal

4 data element



3 signal

c. two data element per signal element ($r = 2$)

d. four data element per three signal element ($r = 4/3$)

Solution: we use formula $S = c \times N \times (1/r)$

for each case,

let $c = 1/2$

a) $r = 1 \rightarrow S = 1/2 \times (1\text{ mbps}) \times 1/2 = 500\text{ kbaud}$

b) $r = 1/2 \rightarrow S = (1/2) \times (1\text{ mbps}) \times 1/1/2 = 1\text{ Mbaud}$

c) $r = 2 \rightarrow S = (1/2) \times (1\text{ mbps}) \times 1/2 = 250\text{ kbaud}$

d) $r = 4/3 \rightarrow S = (1/2) \times (1\text{ mbps}) \times 1/4/3 = 200\text{ bits}$

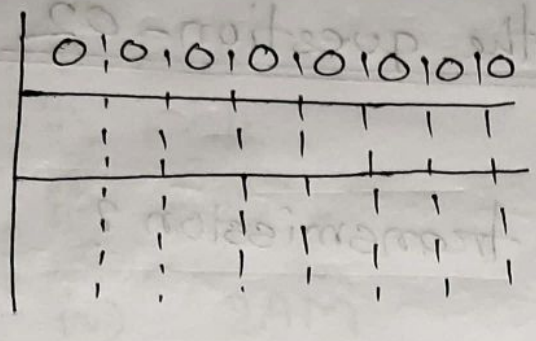
d) Draw the graph of the NR2-L seeheme using each of the following data streams. the last signal level has been positive. from the graph, Guess the bandwith for this reeheme using the avenage number of changes in the signal level. Compare your guess with the concept.

a. 00000000 c. 01010101
b. 11111111 d. 00110011

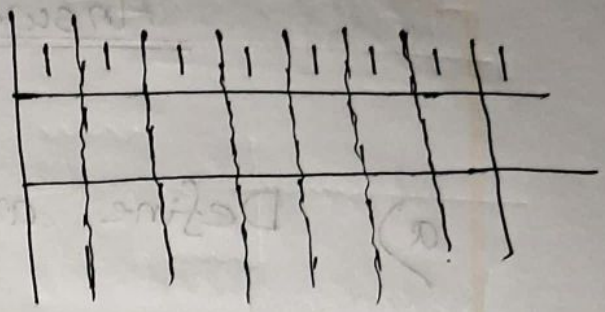
Solution: Bandwith is propontional to (3/8 N) which is within the range in (B=0 to N) for the NR2-L seeheme.

Avenage number of change = (0+0+8+4)/4
= 3
N = 8

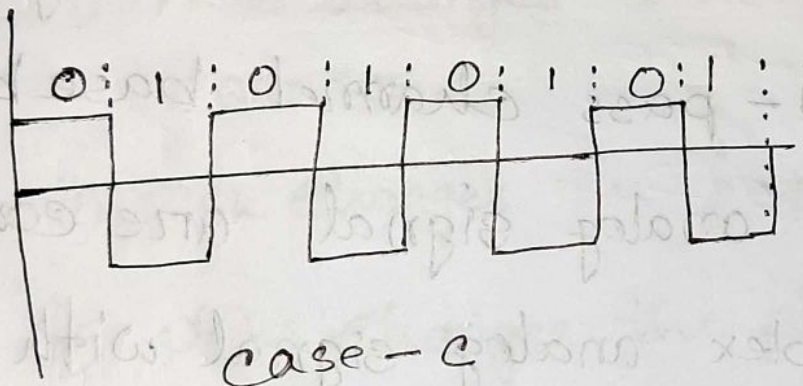
B-D (3/8) N



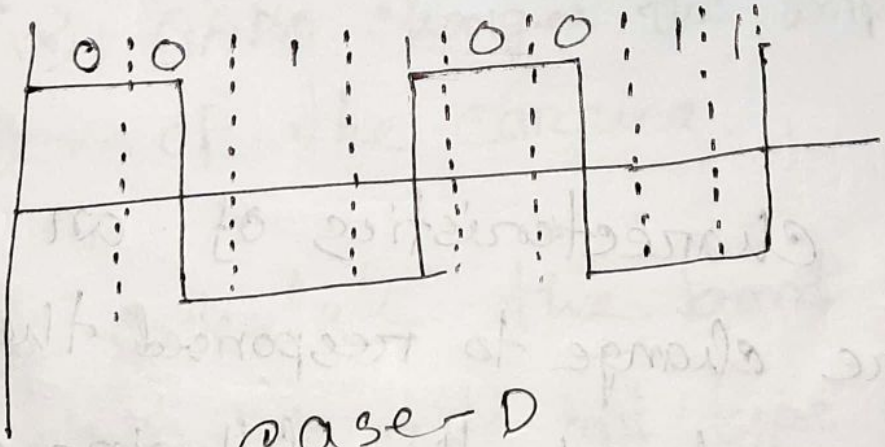
case-a



case-b



case-c



case-D

Answer to the question-02

a) Define analog transmission?

Solution: Normally analog transmission refers the transmission of analog using a 6 band-pass channel baseband digital or analog signal are conversed to a complex analog signal with a range of frequencies suitable the channel.

b) which characteristics of an analog signal are change to responsed the digital signal in each of the following digital-to-analog conversion?

i) Ask
ii) FSK
iii) PSK
iv) QAM

Solution:

i) Ask changes the amplitude of the carrier.
ii) FSK changes the frequency of the carrier
iii) PSK changes the phase of the phase the carrier
iv) QAM changes the amplitude and phase of the carrier.

c) calculate the band rate for the given bit rate and type of modulation.

1. 2000 bps, FSK
2. 40000 bps, Ask
3. 6000 bps, 8psk
4. 36000 bps, 64-QAM

Solution:

the formula $S = (\frac{1}{r}) \times N$, but first we need to calculate the value of r for each case

1) $r = \log_2^L = 1 \rightarrow S = (1/1) \times (2000) = 2000$ baud

2) $r = \log_2^L = 1 \rightarrow S = (1/1) \times (4000) = 4000$ baud

3) $r = \log_2^L = 2 \rightarrow S = (1/2) \times 6000 = 3000$ baud

4) $r = \log_2^L = 6 \rightarrow S = (1/2) \times 36000 = 6000$

4.) Draw the following diagram

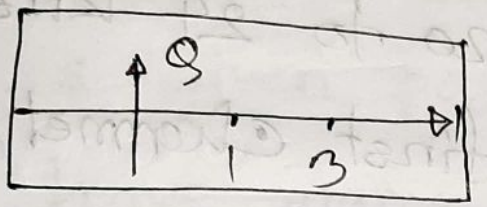
1) Ask with peak amplitude value of 1 and 3

2) Bpsk with a peak amplitude of ~~1 and~~ 2

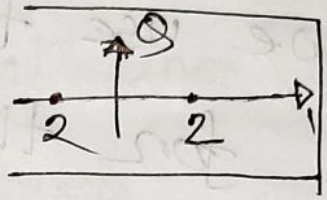
3) Qpsk with a peak amplitude value of 3

Solution:

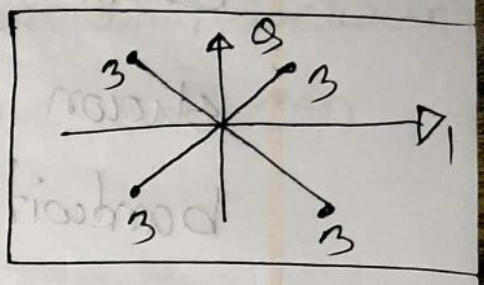
a) Ask



b) Bpsk



c) Qpsk



Answer to the question no-03

a) Assume that a voice channel occupies a bandwith of 4kHz. we need to combine three voice channel ~~up~~ into a link with a bandwith of 12kHz, from 20 to 32 kHz. Shows the configuration using the frequency domain. Assume there are no guard bands?

Solution:

we shift each of the three voice channels to a different bandwith, as shown we use the 20 to 24 kHz bandwith for the first channel, the 24 to 28 kHz for the second channel and 28 to 32 kHz bandwith for the 3rd one each a channel receive the entire signal, using a filter to separate out its own signal. Each channel then shifts the frequency to start from zero

c) Distinguish between a link and a channel in mulplessing?

Solution: In multiplessing the word link refers to the physical path. The word channel refers to the protion of the link that carries a transmission between a given pairs of lines. One link can have many channels

d) which of the three multiplesing technique are used to combines analog signals? which of the three multiplessing techniques are used to combine digital signal?

Solution: FDM and WDM are used to combine analog signal, the bandwith is shared. TDM is used to combined digital signals. The time is shared.

Answer to the question no-04

a) What is the position of the transmission media in the OSI or the internal model.

Solution: The transmission media is located beneath the physical layer and controlled by the physical layer.

b) Name the two major catagories of transmission media?

Solution:

The two major catagories are Guided and unguided.

c) Calculate the bandwidth of ~~two~~ the light for the following wavelength range. Assume a propagation speed of 2×10^8 m):

a. 1000 to 1200 nm

b. 1000 to 1400 nm

Solution: we can use the following formula $f = c/\lambda$ to find the corresponding frequency for each wave length as shown below:

a) $B = [(2 \times 10^8)/(1000 \times 10^{-9})] - [(2 \times 10^8)/(1200 \times 10^{-9})]$

$= 33$ THz

b) $B = [(2 \times 10^8)/(1000 \times 10^{-9})] - [(2 \times 10^8)/(1400 \times 10^{-9})]$

$= 57$ THz

Answer no- 05

a) Describe the need for switching and define a switch?

Solution: switching provides solution to the problem of connecting multiple devices in a network. It is more practical than using a bus topology. it is more efficient than using star topology and central hub. switching device capable of enabling transfer connection between two or more devices linked to the switch.

b) List the three traditional switching method. what are the most common today?

Solution: The three traditional switching methods are circuit switching, packet switching and message switching. The most common today are circuit switching and packet switching.

c) consider an m x k crossbar switch with m input and output

a) can we say that switch acts as a multiples if n > k?

b) can we say that switch acts as demultiplier if n < k?

Solution:

a) if mxk and mxk crossbar as like as a multipliers that combines m inputs into k output However, we need to know that a regular multiplier as mx1

b) if m<k and mxk crossbar is like demultiplixer that devides m inputs into output. However we need to know that regular demultiplexer is 1xn.

d Transmission of the information in any methods involves end to end addressing and somethings local addressing.

Network	setup	Data transfer	Teardown
Circuit-switched	end-to-end		end-to-end
Data grame		end-to-end	
virtual circuit	end-to-end	local	end-to-end

Solution:

Network	setup	Data transfer	Teardown
Circuit switched	end-to-end	is needed during the setup and teardown phase to create a connection.	end-to-end
Data grame	independent	end-to-end	end-to-end
virtual circuit	end-to-end	local	end-to-end

Answer no - 06

a) change the following IPV4 address from binary notation to dotted-decimal notation.

i) 10000001 00001011 00001011 11101111

ii) 11000001 10000011 00011011 11111111

Solution:

i) 129.11.11.239

ii) 193.131.27.255

b// change the following IPV4 address from dotted-decimal notation to binary notation.

i) 111.56.45.78

ii) 221.341.7.82

Solution:

i) 01101111 00111000 00101101 01001110

ii) 11011101 00100010 00000111 01010010

c. find the error, if any of the following IPV4 address?

i) 111.56.045.78

ii) 221.341.7.8.20

iii) 75.45.301.14

iv) 111.00010.23.14.67.

Solution:

i) There must be no loading zero (045)

ii) There can be no more than four number in an IPV4 address.

iii) Each number needs to be less than or equal to 255 (301 is out of the range).

iv) A maximum of binary notation and dotted-decimal notation is not allowed.

d// find the class of each address.

i) 00000001 00001011 00001011 1101111

ii) 11000001 10000011 00011011 11111111

iii) 14.23.120.8

iv) 252.5.15.1111

Solution:

i) The 1st bit is 0. This is a class of A address.

ii) The 1st 2 bits are 1. the third bits 0. This is class of C address.

iii) The first bytes is 14, the class is A

iv) The first byte is 252; this is class of E address.

Answer no-07

An organization is granted the block 130.56.0.0/16. The administrator wants to create 1024 numbers.

a) Find the subnet mask ?

b) Find the number of address in each subnet?

c) Find the first and last address in subnet 1 ?

d) Find the first and last address in subnet 1024 ?

Solution:

(a) $\log_2^{1024} = 10$ extra is = 10 possible : 1024

mask : 126

(b) $2^{32-26} = 64$ address per subnet

(c) subnet 1: 130.56.0.0

first address in subnet 1: 130.56.0.6

number of address : 0. 0. 0. 63

last address is : 130. 56. 0. 63

subnet 1

(d) subnet 1024 :

130.56.0.0+0.0.22.192 = 130.56.255.192

first address : 130.16.255.192

number of : 0 . 0 . 0 . 63

last address : 130. 56. 255. 255.

Answer to the question no-08

a// The network layer is concerned with ——— of data ?

Solution: packets.

b// Which one of the following is not function of network layer?

Solution: Error control. In the OSI model network layer is the third layer and it provides data routing

paths for networks communications. Error controls is a function of the data link layer and the transport layer.

c) Which of the following routing algorithm can be used for network layer design?

Solution: The routing algorithm is what decimal where a packet should go need. There are several routing techniques like shortest path algorithm, static and dynamic routing, decentralized routing distance

vector routing, link state routing. Hierarchical routing etc. The routing algorithm go hand in hand with the operating of the routing in the network. The routers and the main participants in this algorithms.

d// What is spanning tree?

Solution: A subnet of network that includes all the routers but contains no loops is called spanning tree.