CSE320 MIDTERM ASSIGNMENT

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Section: 01

Ans. to Q No - 1

For the 1st Hop:

Segment of Transport layer:

P_y	P_x	Data
D	S	

Packet of network layer:

95	5	P_y	P_x	Data
D	S	D	S	

Frame of data link layer:

B	A	95	5	P_y	P_x	Data	T2
D	S	D	S	D	S		

For the 2nd Hop:

Segment of Transport layer:

P_y	P_x	Data
D	S	

Packet:

95	5	P_y	P_x	Data
D	S	D	S	

Frame:

D	C	95	5	P_y	P_x	Data	T2
D	S	D	S	D	S		

For the 3rd Hop:

Segment:

P_y	P_x	Data
D	S	

Packet:

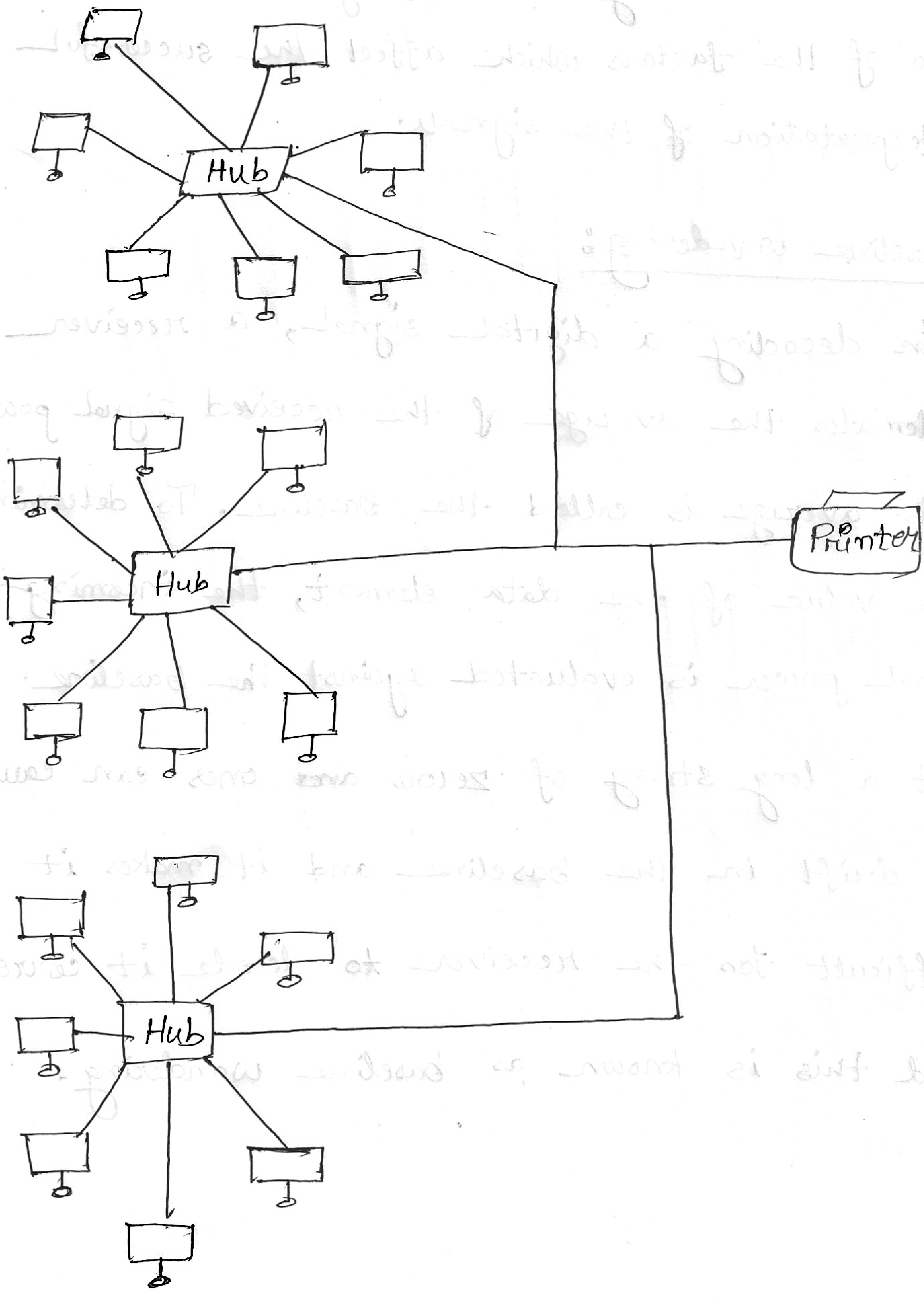
95	5	P_y	P_x	Data
D	S	D	S	

Frame:

F	E	95	5	P_y	P_x	Data	T2
D	S	D	S	D	S		

Ans. to Q. No - 2

a



b

Baseline wandering and self-synchronization are two of the factors which affect the successful interpretation of the signals.

Baseline wandering:

In decoding a digital signal, a receiver calculates the average of the received signal power. This average is called the baseline. To determine the value of the data element, the incoming signal power is evaluated against the baseline. But a long string of zeroes and ones can cause a drift in the baseline and it makes it difficult for the receiver to decode it correctly. And this is known as baseline wandering.

Effect of lack of self-synchronization:

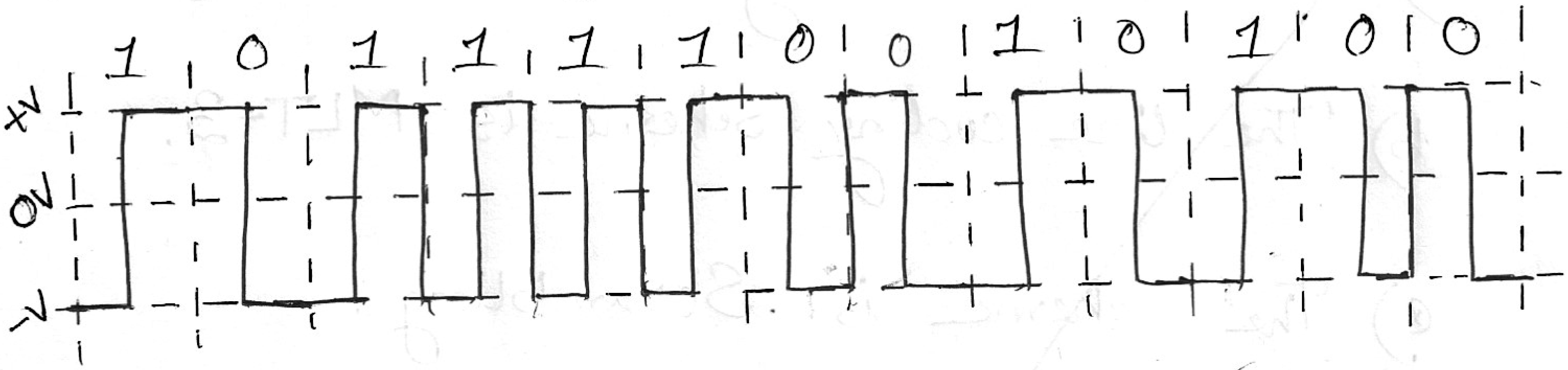
Self-synchonization includes timing information in the data being transmitted and this can be achieved by transitions in the signal. If the receiver's clock is out of synchronization, these points can receive the clock timing. Absence of it can result in a mismatch of the sender's bit interval and the receiver's bit interval. As a result, the receiver may misinterpret the data. So, the sender's clock and the receiver's clock must match.

~~Ans.~~ C

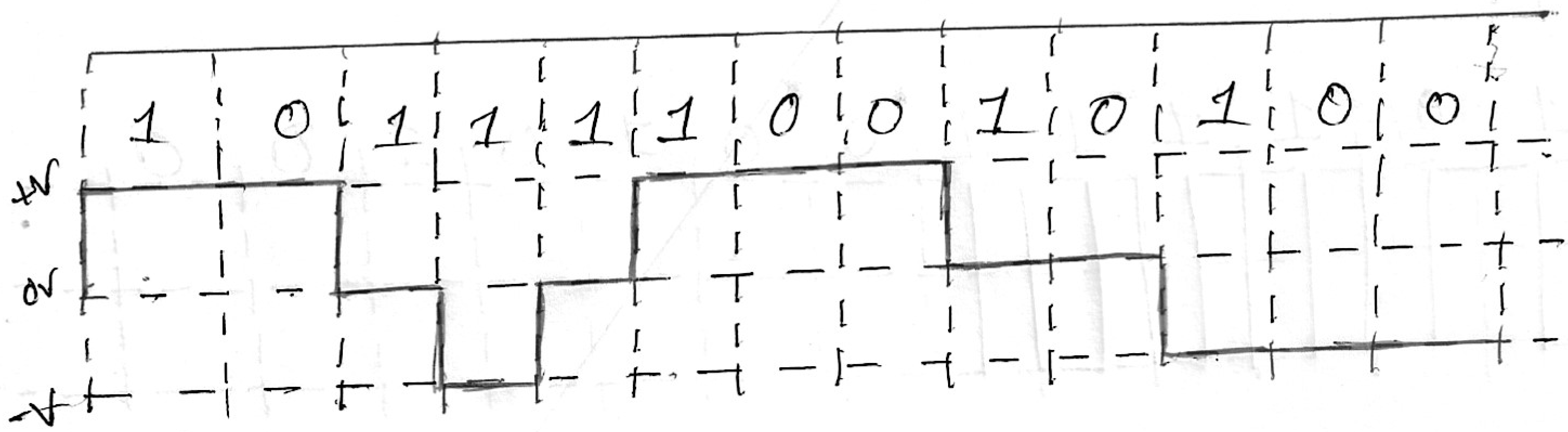
Many of the line coding schemes have a common problem which is the loss of synchronization due to a long sequence of 0. If we have a lot of zeroes in the data, then our encoded signal would look like a straight line according to those line coding schemes. This causes ambiguity in timing for each of the bits, which ultimately results in the lose of synchronization at the receiver's side. But this wouldn't happen if there was a transition in the signal. That is exactly why we need scrambling and block coding.

D

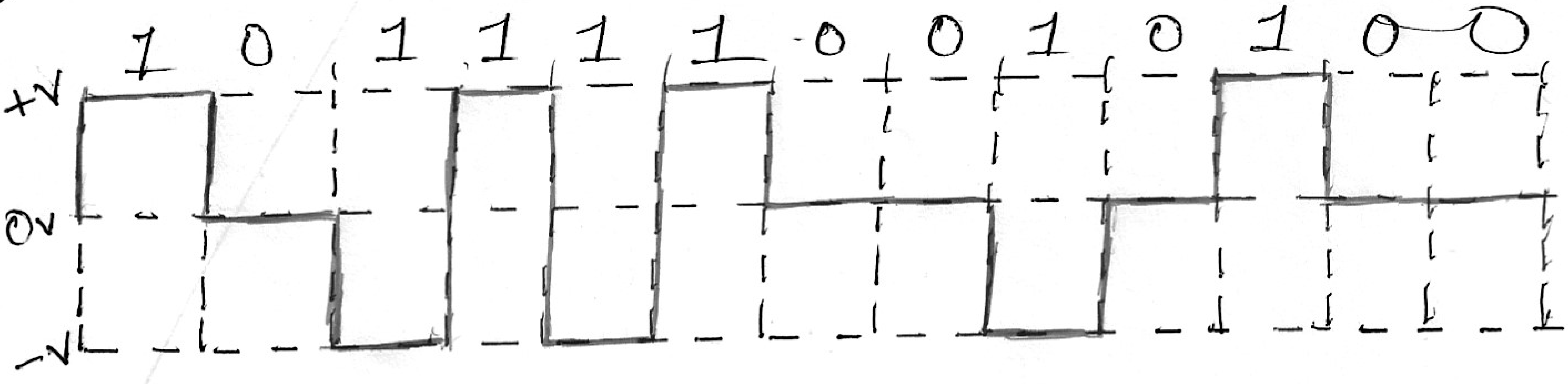
a) The line coding scheme is Manchester.



b) The line coding scheme is MLT-3.



c) The scheme is Scrambling (B8ZS):



Ans. to Q No - 3

Given,

Max sampling amplitudes = 40 v

Min sampling amplitude = − 40 v

Let us use L = 16 quantization levels.

$$\therefore \Delta = \frac{40 - (-40)}{16} = 5 \text{ v} \quad (\text{Zone width})$$

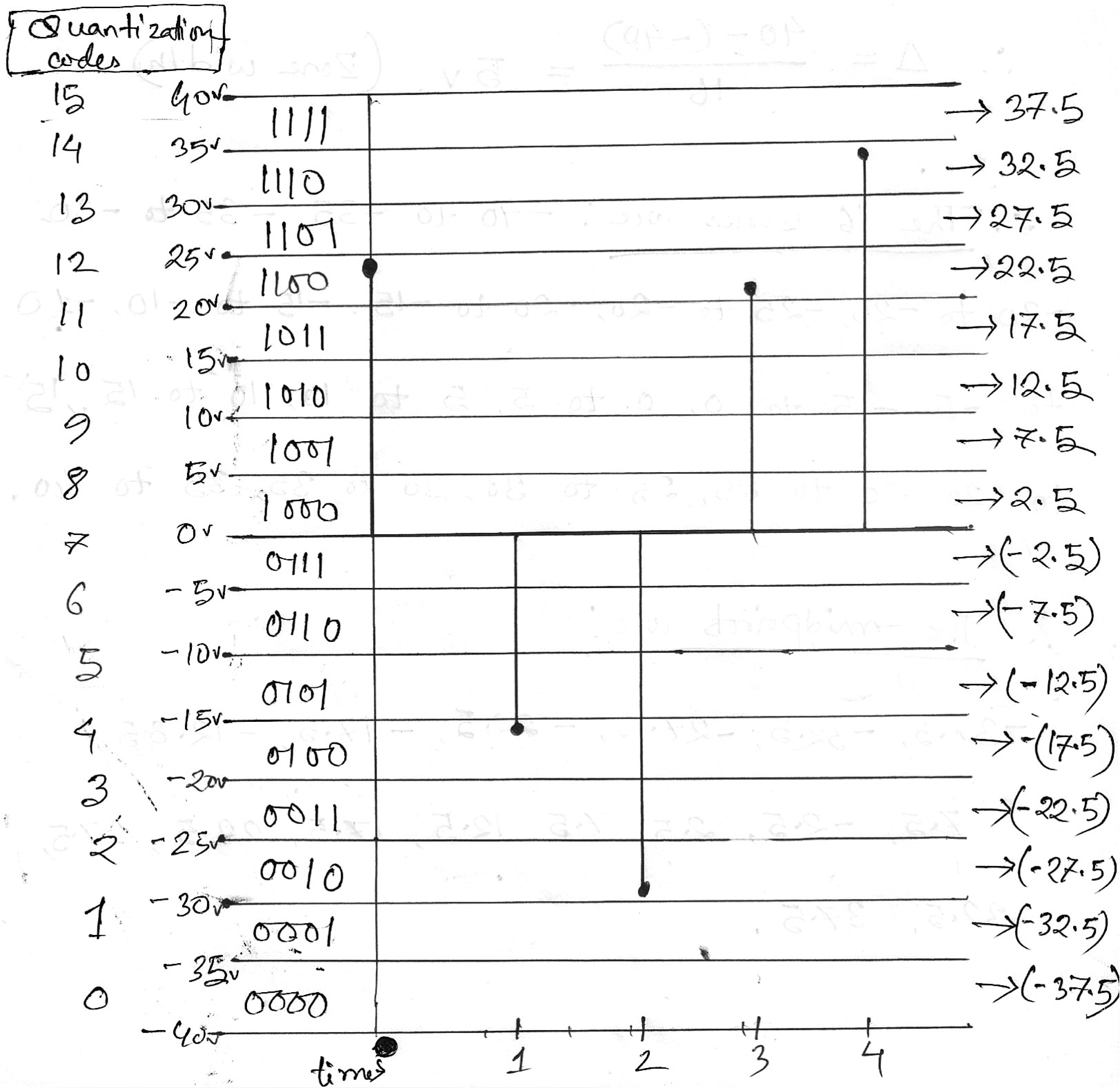
∴ The 16 zones are: −40 to −35, −35 to −30, −30 to −25, −25 to −20, −20 to −15, −15 to −10, −10 to −5, −5 to 0, 0 to 5, 5 to 10, 10 to 15, 15 to 20, 20 to 25, 25 to 30, 30 to 35, 35 to 40.

∴ The midpoints are:

−37.5, −32.5, −27.5, −22.5, −17.5, −12.85, −7.5, −2.5, 2.5, 7.5, 12.5, 17.5, 22.5, 27.5, 32.5, 37.5.

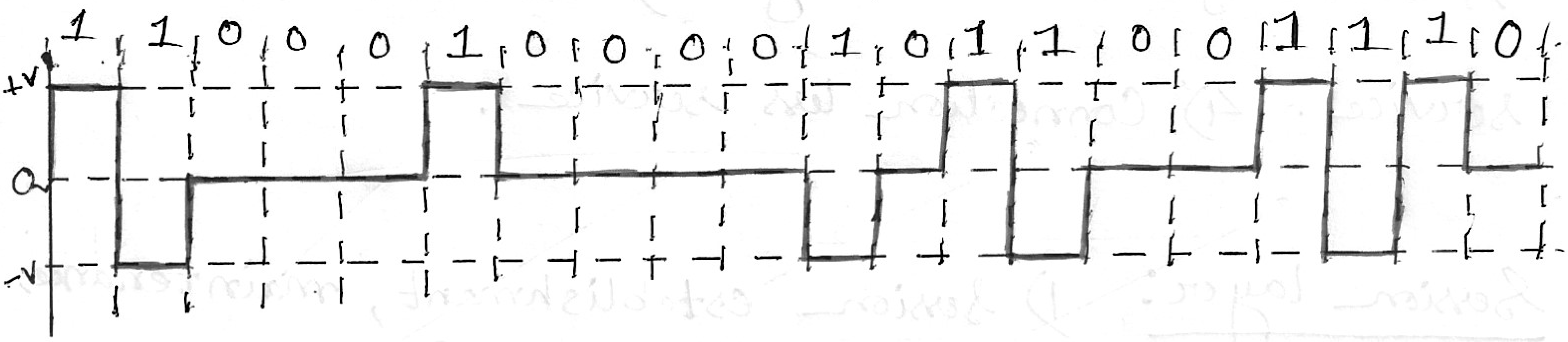
Now, the number of bits required to encode the zones, $n_b = \log_2 L = \log_2 16 = 4$

So the numbers which will represent the zones are: 0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111.



	23.7	−15.7	−29.6	20.5	33.5
Normalized PAM values	4.74	−3.14	−5.92	4.1	6.7
Normalized Quantized values	4.5	−3.5	−5.5	4.5	6.5
Normalized error	−0.24	−0.36	0.42	0.4	−0.2
Quantization Code	12	4	2	12	14
Encoded words	1100	0100	0010	1100	1110

Conversion using Bipolar AMI Scheme:



Ans. to Q No - 4

a

Physical layer: 1) Bit synchronization 2) Bit rate control 3) Physical topologies 4) Transmission mode

Data Link layer: 1) Framing 2) Physical addressing 3) Error Control 4) Flow Control 5) Access Control.

Network layer: 1) Routing 2) Logical Addressing.

Transport layer: 1) Segmentation and Reassembly 2) Service point addressing 3) Connection oriented service. 4) Connection less service.

Session layer: 1) Session establishment, maintenance termination. 2) Synchronization 3) Dialog Controller.

Presentation layer: 1) Translation 2) Encryption/ Decryption 3) Compression.

Application layer: 1) Network virtual terminal 2) File transfer access and management 3) Mail Services 4) Directory Services.

B

Here propagation time $= \dfrac{\text{distance}}{\text{propagation speed}}$

$$= \frac{22000 \times 10^3 \text{ m}}{2.4 \times 10^8 \text{ m/s}}$$

$$= 91.67 \text{ ms.}$$

and, Transmission time $= \dfrac{\text{message size}}{\text{bandwidth}}$

$$= \frac{3200 \times 8 \text{ bits}}{1.5 \times 10^9}$$

$$= 0.017 \text{ ms}$$

For Router 0:

Queuing delay $= 4 \times 2$ ms $= 8$ ms

Processing delay $= 2$ ms.

For Router 1:

Queuing delay $= 0 \times 3$ ms $= 0$ ms

Processing delay $= 3$ ms.

For Router 2:

Queuing delay $= 5 \times 1$ ms $= 5$ ms.

Processing delay $= 1$ ms.

$\therefore$ Latency = Propagation time + Transmission time + total queuing delay + total processing delay.

$= 91.67$ ms $+ 0.017$ ms $+ (8+0+5)$ ms $+ (2+3+1)$ ms

$= 110.687$ ms.

(Ans)

Ans. to Q No-5

a) Size in bytes

$$= \{(30 \times 10^6) \times 400 \times (7 \times 7) \times (250 \times 250)\} / 8$$

$$= 4.59375 \times 10^{15} \text{ bytes.}$$

b) $$\text{Data rate} = \frac{2000 \times 7 \times 7 \times 250 \times 250}{60}$$

$$= 102.08 \text{ Mbps.}$$

(Ans.)

Ans. to Q No- 6

a

The author was talking about high cost of software production and the requirement of the potential of a system to communicate with any other system and need for open systems standards. From the beginning, it is clear that a system is needed to be developed in parallel, and Reference model ensured that development efforts of a system closely corelated so that they work well together.

b

Elements of the OSI architecture:

(1) Systems, Layers, entities. (2) Services and Service access points (3) Functions and protocols (4) Naming (5) Connections

c

Three types of ~~connections~~ construction of N connections on top of N-1 connections:

1) One-to-one correspondence: Each (N) connection is built on one (N-1) connection.

2) Multiplexing: Several (N) connections are multiplexed on one single (N-1) connection.

3) Splitting: One single (N) connection is built on top of several (N-1) connections.

The two forms of error control recognized by the OSI model are in the layers — 1) Data link layer and 2) Transport layer

The data link layer's sublayer 'Logical Link Control' ensures that error-free and accurate data are transmitted ~~by~~ between the network nodes.

The transport layer checks for errors and duplication and resends the information that fails delivery.

d

In the first meeting of SC16, initial ~~meetings~~ discussions revealed that a basic layered architecture would satisfy most requirements of OSI which could be expanded later. SC16 decided to give Highest priority to the development of a standard model of architecture.

e

① Physical layer: This layer is the lowest layer of OSI model and is responsible for physical connection between devices.

② Data link layer: This layer is responsible for the device to device delivery of a message. and also handles the framing and physical addressing section.

(3) Network layer: This layer is responsible for the packet routing, selection of shortest path to transmit the packet. Routing and logical addressing ~~as~~ are some of the functions of this layer

(4) Transport layer: This layer is the heart of OSI model and is responsible for segmentation and error control and carrying from one port of a device to another port of another device.

(5) Session layer: This layer establishes connection, maintenance of sessions, authentication and security.

(6) Presentation layer: This layer is also known as translation layer because this layer translates the data to the required format. This layer is also responsible for encryption and compression of data.

(7) Application layer: This layer is at the top of OSI model and this layer enables us to perceive the data in human readable format.