# Final-32D

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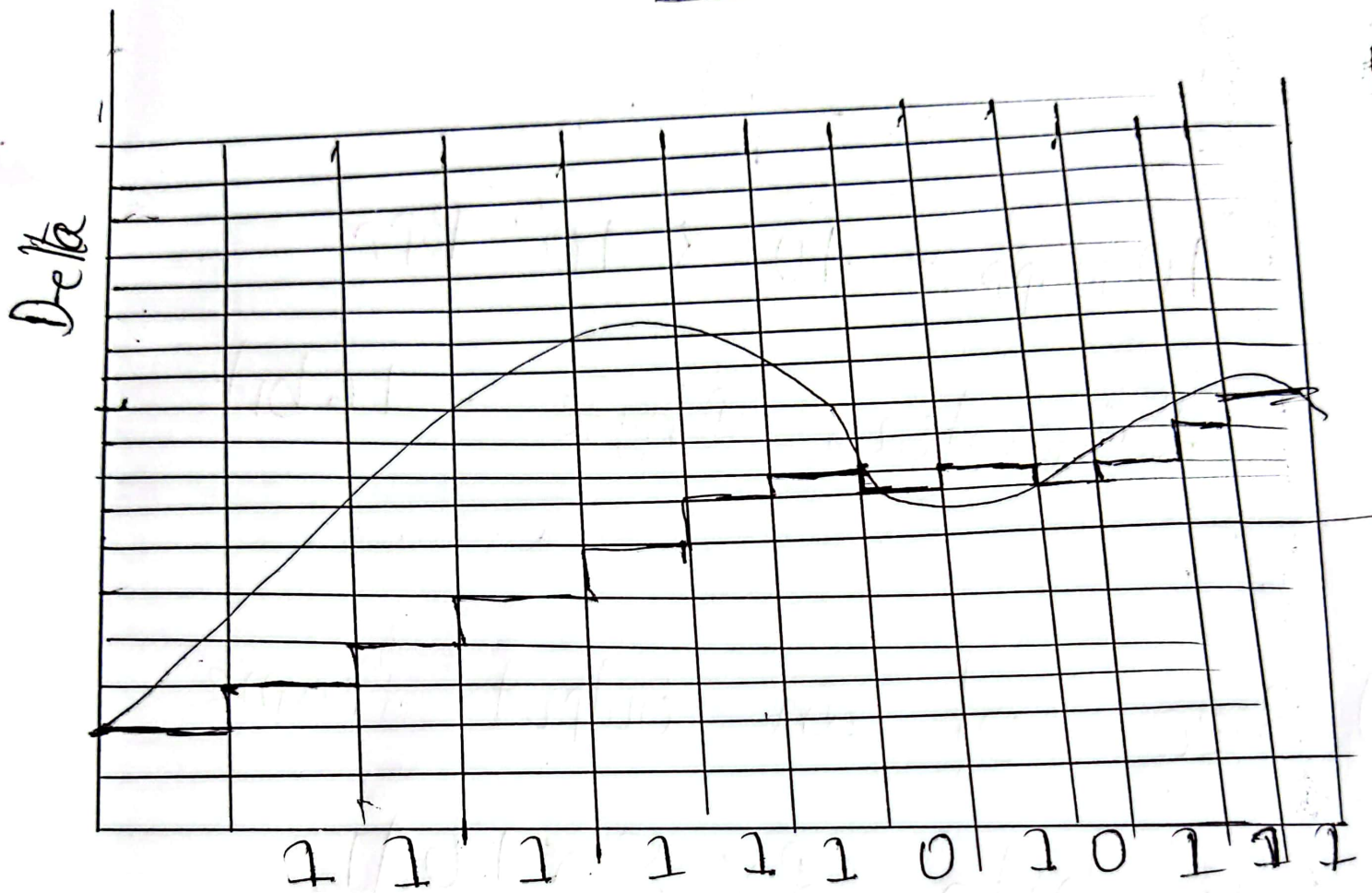
Section : 10

# Answer to *m. 2*

## (a)

(i) Long haul network — Optical fiber

(ii) 4G Mobile Networks → Radio wave

(iii) SONET Network → Optic fiber

(iv) Cordless Phones → Line of sight

# 1(b)



1 1 1 1 1 1 0 1 0 1 1 1

m 111 01011 0

# Answer to qn. 2

## (b)

$10 \text{ Mbps} = 10 \times 10^6 \text{ BPS}$

$2 \text{ Characters} = 2 \text{ byte} = 16 \text{ bit}$

① Size of an output frame

in bits, $2 \times 8 \times 10 + 1$

$= 161 \text{ bits}$

② Output frame rate,

$$\frac{1}{\text{frame duration}} = \frac{1}{T}$$

$$= \frac{1}{\frac{2}{10 \times 10^6}}$$

## 2 (iii) [b]

Duration of an output

frame, $T = \dfrac{2}{10 \times 10^6}$

### (iv)

Output data rate $= 161 \times$ framerate

$= 161 \times$ frame·rate

$= 161 \times \dfrac{10 \times 10^6}{2}$ bps

### (v)

Input bit duration $= \dfrac{1}{10 \times 10^6}$

## 2 (b) (v)

Input slot duration

$$T = \frac{2}{10 \times 10^6}$$

In Single bit error, a 0 is changed to a 1 or a 1 to a 0.

In burst error multiple bits are changed.

To detect "$\leq 2$" bit error, the minimum Hamming distance

$$d_{min} = S + 1$$
$$= 2 + 1$$
$$= 3$$

Divisor = 1001

dataword = 111011101

$$11\,110\,0\,001$$

$$1001\,)\,\overline{111\,011101\,000}$$

$$\oplus\ 1001$$
$$\overline{\quad 1111\,101\,000}$$
$$\oplus 1001$$
$$\overline{\quad 1\,001\,01\,000}$$
$$\oplus 1001$$
$$\overline{\quad 0000\,1000}$$
$$\oplus\ 0\,000$$
$$\overline{\quad 0001\,000}$$
$$\oplus 0000$$
$$\overline{\quad 001\,000}$$
$$\oplus\ 0000$$
$$\overline{\quad 01000}$$
$$\oplus\ 0000$$
$$\overline{\quad 1000}$$
$$\oplus\ 1001$$
$$\overline{\quad\quad\quad 1}$$

Binary form→ 111 0111 01 000

Quotient : 1111 00001

CRC bits : 001

Data 11101110101001 is sent from sender

For error detect 111 0111 01001

```
                    1011
            _____
    1011  | 100 1110
           ⊕1011
           _____
             010110
           ⊕ 0000
           _____
              10110
             ⊕1011
           _____
               0000
              ⊕ 00 00
           _____
                   0
```

Quotient is : 1010

CRC bits : 000

Remainder after division is zero
as the error is divisible by 1011

The Errors not detected

## 2(a)

Source 1 : MAXIMIZER

Source 2 : JACQUARDS

Source 3

Source 4 : KNOCKBACK

Source 5 : BLACK JACK

| Black | ___ | Jacq | MAX |
|-------|-----|------|-----|

| Jack | ___ | Quard S | Mizer R |
|------|-----|---------|--------|