Name - Md. Rakib Hasan.

ID - 2216080021.

Subject - Mobile & Telecommunication.

Course Code - CSE-448.

← Final → Assesment →

Answer to the Question No - 1

—x—

Ans: Draw the Basic Communication —

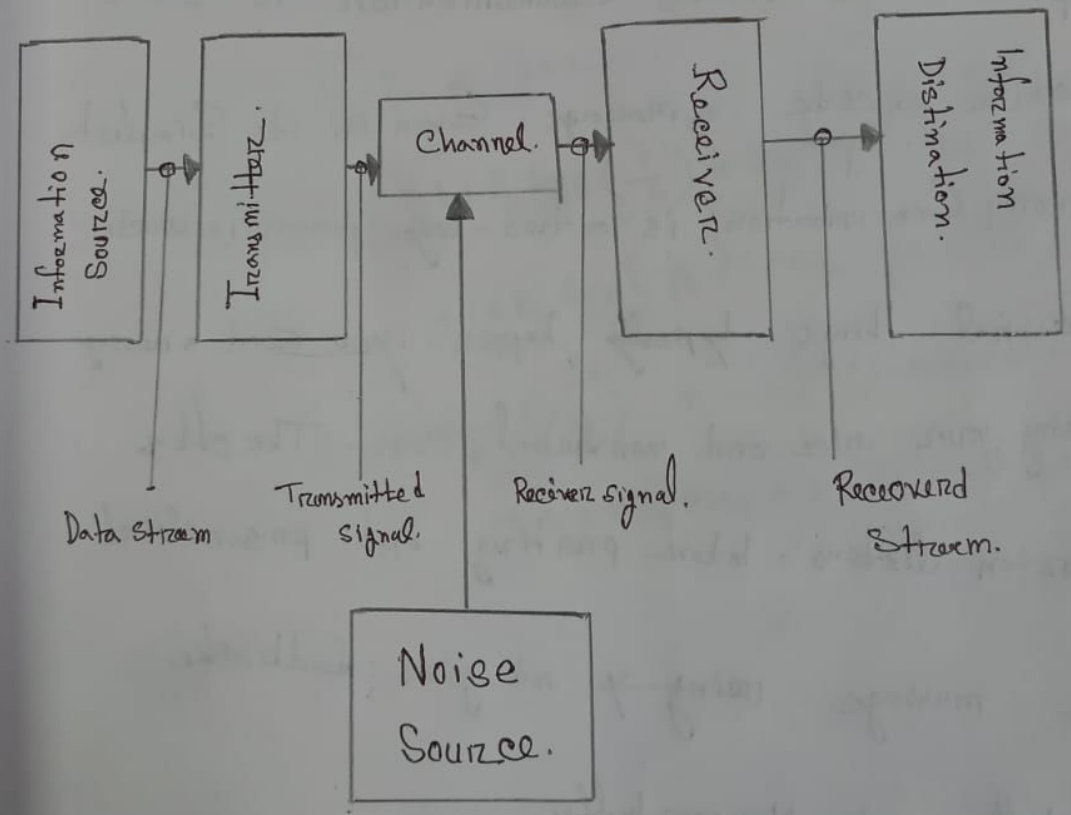


Fig: Basic Communication Diagram.

Communication Defined.

Communication is the sending and receiving information And can be One-on-one or btwen groups Of people Can be face-to-face or through Communication Devices. Communication requires a Sender the person who initiates Communication. to translate ~~or~~ Or encode a massage. Even in its Simplest from Communication is a two-way process in which Several things typically happen. you send a message Using your voice and nonverbal cues. The other person listens, interpreting and personalized the massage ~~using~~ y and gives feedbacke verbally and Nonverbally.

(1) (2)

(b) Answer:

Given Data, $H = \frac{I_T}{L}$

And also, $= \sum_{i=1}^{K} L_{Pi} \log_2 (1/P_i)$

$= \sum_{i=1}^{K} L_{Pi} \log_2 \left(\frac{1}{P_i}\right)$

given.

$H = \frac{I_T}{L}$

$\Rightarrow I_T = H \times L$

$\Rightarrow I_T = \left(L_i P_1 \log_2 \left(\frac{1}{P_1}\right) + L_2 P_2 \log_2 \left(\frac{1}{P_2}\right)\right.$

$+ L_3 P_3 \log_2 \left(\frac{1}{P_3}\right) + L_4 P_4 \log_2 \left(\frac{1}{P_4}\right) +$

$\left. L_5 P_5 \log_2 \left(\frac{1}{P_5}\right) + \cdots\right) \times \left(L_1 P_1 n_1 + L_2 P_2 n_2 + \right.$

$\left. + L_3 P_3 n_3 + L_4 P_4 n_4 + L_5 + \cdots\right)$

(4)

Answer to the Question No-2

(a) (i)

a| a a| b|b b| ab| ab ab| ab a|b bbbb aa|a b
1 2 3 4 5 6 7 8 9

ba b|a b|
10 11

Position 1 2 3 4 5 6 7 8 9 10 11.

Sequence

a, aa b bb ab aba, ba bbb baa abab ab

Numerical map: 0a1a 0b2b1b 5a 3a 4b 7a 6b 5

Code 000 10.001 101 11 1010 110 1001
1110.1101 101.

—— x ——

(ii) Answer: Decode the Lempel – Ziv encoded sequence

P q 1p 2q 3q 4p 5p 6p 4q 6p

Codeword	Information bit	Location
		1.
p	P	2.
q	q	3
1p	pp	4
2q	qq	5
3q	ppq	6
4p	qqp	7
5p	ppqp	8
4q	qqq	9
6p	qqpp	

⇒ Now Information pq pp qq ppq, qqp ppqp.
qqq qqpp

Answer to the Question - 3

(a) Answer given.

'e'	'i'	'o'	'p'	'b'	'c'
57	51	33	20	12	3

M = (57 + 51 + 33 + 20 + 12 + 3)

= 176.

e = 000

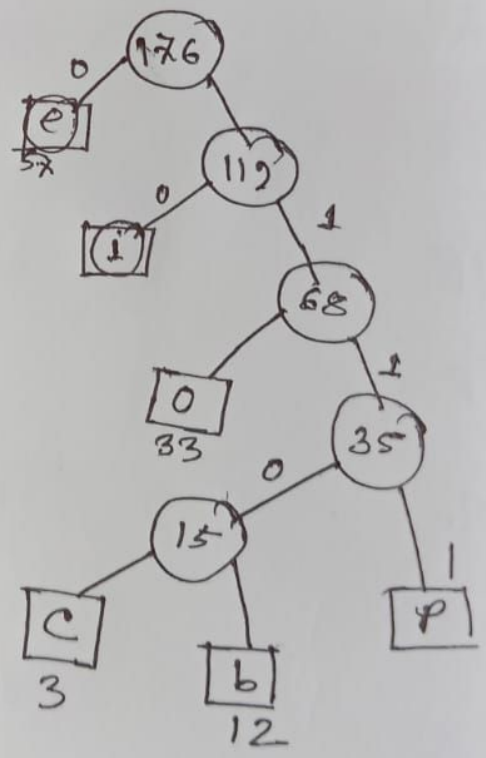
i = 001

o = 010

p = 011

b = 100

c = 101.



⇒ Agin

e = 0
i = 10
0 = 110
p = 1111
b = 11101
c = 11100

57 × 1 = 57
51 × 2 = 102
33 × 3 = 99
20 × 4 = 80
12 × 5 = 60
3 × 5 = 15

413

= 413 bits.

Now Average bits required to represent each characters = $\frac{413}{176}$

= 2.34 bit/character

efficiency:

e	i	0	p	b	c
↓	↓	↓	|	|	|
57	51	33	20	12	3

Solution

probability 1st Reduction

Message	probability	1st Reduction	2nd Reduction	3rd Reduction	4th Reduction
e	57	57	57	68	108
i	51	51	51	57	68.
o	33	33	39	51	
p	20	20	33.		
b	12	15			
c	3				

Now

e = 57	c_1 = 00	n_1 = 2
i = 51	c_2 = 01	n_2 = 2
o = 33	c_3 = 11	n_3 = 2
p = 20	c_4 = 100	n_4 = 3
b = 12	c_5 = 1010	n_5 = 4
c = 3	c_6 = 1011	n_6 = 4

P.T.O

Efficiency: $(\eta) = \dfrac{H(x)}{L}$

$\therefore H(x) = \sum_{k=1}^{6} P_k \log_2 P_k$.

$= P_1 \log_2 P_1 - P_2 \log_2 P_2 - P_3 \log_2 P_3 - P_4 \log_2 P_4$

$- P_5 \log_2 P_5 - P_6 \log_2 P_6$

$= -57 \log_2 57 - 51 \log_2 51 - 33 \log_2 33 - 20 \log_2 20$

$- 12 \log_2 12 - 3 \log_2 3$.

$= 332.47 - 289.29 - 166.46 - 86.43 - 43.01 - 4.75$

$= -922.41$.

$L = \sum_{k=1}^{6} = P(x_1)n_1 + P(x_2)n_2 + P(x_3)n_3$

$+ P(x_4)n_4 + P(x_5)n_5 + P(x_6)n_6$

$= (57\times2 + 51\times2 + 33\times2 + 20\times3 + 12\times4 + 3\times4)$

$= (114 + 102 + 66 + 60 + 48 + 12)$

$= 402$

$e = \dfrac{H(x)}{L} = \dfrac{-922.41}{402} = -2.294$

$\therefore$ Efficiency $= -2.294$.

Answer to Question – 4 (a)

Ans: Given.

$P(m_1) = 04$, $P(m_2) = 0.2$, $P(m_3) = 0.12$, $P(m_4) = 0.08$

$P(m_5) = 0.08$, $P(m_6) = 0.06$ $P(m_7) = 0.06$.

message sym	probability P(Pi)	step 1	step 2	step-3	step-4	code	no of bits
m_1	0.4	0	0			00	2
m_2	0.2	0	1			01	2
m_3	0.12	1	0			10	2
m_4	0.08	1	1	0	0	10	
m_5	0.08	1	1	0	1	1100	4
						1101	4
m_6	0.06	1	1	1	0	1110	4
				1	1	1111	4

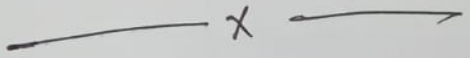
$\therefore$ Coding efficiency $= \frac{H(x) \rightarrow \text{Entropy}}{L \rightarrow \text{code length.}}$

$$H(x) = -\sum_{k=1}^{7} P_k \log_2 P_k$$

$$= -0.4 \log_2 0.4 - 0.2 \log_2 0.2 - 0.12 \log_2 0.12 - 0.08 \log_2 0.08$$
$$- 0.08 \log_2 0.08 - 0.06 \log_2 0.06 - 0.06 \log_2 0.06$$

$$= 0.528 + 0.464 + 0.367 + 0.291 + 0.291 + 0.243 + 0.24$$

$$= 2.427 \text{ bit/symbol.}$$



End.