

2) develop the shanon code for the following message

$$P_{xi} = \{ 0.36, 0.18, 0.18, 0.12, 0.09 \}$$

x_i	$P(x_i)$	L_i	F_i	code
S_1	0.36	2	0	00
S_2	0.18	3	0.36	010
S_3	0.18	3	0.45	100
S_4	0.12	4	0.72	1011
S_5	0.09	4	0.84	1101
S_6	0.07	4	0.93	1110

$$L_i = \text{int} \left[-\log_2(P_{xi}) \right] + 1$$

$$\therefore L_1 = \text{int} \left[-\log_2 0.36 \right] + 1 \quad \dots$$

$$L_1 = \text{int} \left[1.47 \right] + 1 = 2$$

$$L_2 = \text{int} \left[-\log_2 0.18 \right] + 1$$

$$= \text{int} \left[2.47 \right] + 1 = 3$$

$$L_3 = \text{int} \left[-\log_2 0.18 \right] + 1$$

$$= \text{int} \left[2.47 \right] + 1 = 3$$

$$L_4 = \text{int} \left[\log_2 0.12 \right] + 1$$

$$= \text{int} \left[3.05 \right] + 1 = 4$$

$$L_5 = \text{int} \left[\log_2 0.09 \right] + 1 = 4$$

$$L_6 = \text{int} \left[\log_2 0.07 \right] + 1 = 4$$

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$$L_i \rightarrow C_i = F_i * 2$$

code 1010

$$C_1 = 0 * 2 = 0 \\ 0 * 2 = 0 \Rightarrow 00$$

$$C_2 = 0,36 * 2 = 0,72 \\ 0,72 * 2 = 1,44 \Rightarrow 010 \\ 0,44 * 2 = 0,88$$

$$C_3 = 0,45 * 2 = 1,08 \\ 0,08 * 2 = 0,16 \Rightarrow 100 \\ 0,16 * 2 = 0,32$$

$$C_4 = 0,72 * 2 = 1,44 \\ 0,44 * 2 = 0,88 \Rightarrow 1011 \\ 0,88 * 2 = 1,76 \\ 0,76 * 2 = 1,52$$

$$C_5 = 0,84 * 2 = 1,68 \\ 0,68 * 2 = 1,36 \Rightarrow 1101 \\ 0,36 * 2 = 0,72 \\ 0,72 * 2 = 1,44$$

$$C_6 = 0,93 * 2 = 1,86 \\ 0,86 * 2 = 1,72 \Rightarrow 1110 \\ 0,72 * 2 = 1,44 \\ 0,44 * 2 = 0,88$$

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