

S.E. I to IV

I. + Coding

11/6/66

[REVISED COURSE]

CON/2121-06.

TV-8139

(3 Hours)

[Total Marks : 100

Instructions to Students:

- Answer any **Five** questions.
- Assumptions made should be clearly stated.
- Assume any suitable data wherever required but justify the same.
- Figures to the right indicate marks.
- Illustrate answers with sketches wherever required.
- Answers to questions should be grouped and written together i.e. all answers to sub-questions of individual questions like Q1, Q2, Q3 etc. should be answered one below the other.
- Write answers legibly with Blue/Black ink pen . Use of pencil should be done only to draw diagrams and graphs.

1. (a)
- (i) How is Entropy measured? Explain the physical significance of Entropy in Information Theory. 5
 - (ii) What do you mean by Coding Efficiency and Redundancy? 5
- (b) State Source Coding Theorem and Channel Coding Theorems. Explain in brief. 10

- 2.(a) State the broad-level steps in DES. 10
- (b) Explain RSA Algorithm. 10

3. (a) Explain Diffie-Hellman Algorithm. Which attack is it vulnerable to? 10
- (b) Compare Symmetric versus Asymmetric Key Cryptography. 10

4. Assume an M=8 symbol source(A,B,C,D,E,F,G,H)having probabilities of symbol occurrence:

m_k :	A	B	C	D	E	F	G	H
p_k :	0.1	0.18	0.4	0.05	0.06	0.1	0.07	0.04

- (a) Calculate the Entropy. 5
- (b) Calculate the average number of bits per message for 3x5
- (i) Code words with Constant length.
 - (ii) C=0 B=10 A=110 F=1110 G=11110 E=111110 D=1111110 H=1111111
 - (iii) C=1 B=001 A=011 F=0000 G=0100 E=0101 D=00010 H=00011

5. (a) (i) For a (6,3) code, the generator matrix G is
- For all eight possible data words 000 to 111 find the corresponding code words and verify that this code is a single - error correcting code. 5
- (a)(ii) Compare Source Coding with Channel Coding. 5
- (b) Define :

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

- (i) Hamming Weight, (ii) Hamming Distance, (iii) Code Rate, (iv) Syndrome, (v) Linear Code Properties 5x2 = 10

- 6.
- (a) Name the Source Coding Techniques used in the following types of Files and classify them as Lossy or Lossless (i) .zip (ii) .jpg (iii) .mpg (iv) .bmp (v) .gif 5x3=15
- (b) Differentiate Compression Rate from Compression Ratio. 5