

(3 Hours)

[Total Marks : 100]

- N.B. :** (1) Attempt any **five** questions.
 (2) Assumptions made should be **clearly** stated.
 (3) Assume any **suitable** data wherever **required** but **justify** the same.

1. Explain systematic block code, consider a systematic block code whose parity check equation are :-

$$c_4 = d_1 + d_2 + d_3$$

$$c_5 = d_1 + d_2$$

$$c_6 = d_1 + d_3$$

Where d_i - message digits

c_i - parity check digit

- (a) Find generator matrix and parity check matrix for this code.
 (b) Construct code generated by this matrix
 (c) Determine error correcting capability
 (d) Prepare a suitable Decoding Table.
 (e) Decode the received words 101100 and 000110.
2. (a) Explain RSA Algorithm. 10
 (b) Explain the following term with example :- 10
 (i) Hamming distance
 (ii) Hamming bound
 (iii) Code rate
 (iv) Code efficiency
 (v) Weight of Code.
3. (a) Define the term "Information" and explain its significance. 10
 (b) State and explain different classes of complexity. 10
4. (a) Explain DES and its security against protocols. 10
 (b) State Chinese Remainder Theorem. 10
 Solve for x.
 $x = 1 \text{ mode } 2$
 $x = 2 \text{ mode } 3$
 $x = 2 \text{ mode } 5$
5. (a) What is data Compression ? What are its limitations ? What are its Application ? 10
 (b) What is lossy Compression Technique ? What are its different types ? Explain any one with example. 10
6. Explain terms :- 20
 (a) Rabin Miller Primality Test
 (b) Symmetric and asymmetric key algorithms
 (c) One way hash function
 (d) Digital Signature
 (e) Adaptive Huffman coding.
7. (a) Compare and contrast stream cipher and block cipher cryptography Algorithm. 5
 (b) Find the Entropy, Redundancy and Information rate of a four symbol source (A,B,C,D) with a band rate of 1024 symbol/sec. and symbol selection probabilities of 0.5, 0.2, 0.2 and 0.1 when the source is memoryless. 5
 (c) Write the importance of prime number in information theory and coding. 5
 (d) Explain Fermat's Little Theorem with suitable example. 5