

Con/3136-07.

(REVISED COURSE)
(3 Hours)

ND-1525
[Total Marks : 100

- N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.

1. (a) What is the significance of modeling and coding with respect to data compression ? 5
(b) Compare arithmetic with Huffman coding. 5
(c) What are the essential ingredients of symmetric cipher. 5
(d) What are the main features of digital signature standards. 5
2. A source and its letters form an alphabet –
 $A = \{ a_1, a_2, a_3, a_4, a_5 \}$ with probabilities
 $P = \{ 0.15, 0.06, 0.24, 0.05, 0.5 \}$.
Calculate –
 - (i) Standard Huffman code 5
 - (ii) Minimum variance Huffman code 5
 - (iii) Average length and redundancy of both the codes. 5
 - (iv) Draw the Binary Code Tree for both the codes and so prove that they are prefix codes. 5
3. (a) With $S = \{ h, i, j, k \}$ and $P\{ 0.6, 0.2, 0.15, 0.05 \}$, respectively, encode the message 'h, h, i, k, j'. Using arithmetic coding generate a tag for encoding and also decipher the tag for decoding the sequence. 10
(b) Explain the significance of 'prime numbers' in public key cryptography. Explain the RSA algorithm with a suitable example. 10
4. (a) A sequence is encoded using LZW and the initial dictionary is (a, \b, r, t) 10
 - (i) Output of the LZW encoder is 3, 1, 4, 6, 8, 4, 2, 1, 2, 5, 10, 6, 11, 13, 6 decode it.
 - (ii) Encode the decoded sequence using the same initial dictionary.
(b) Discuss security of HASH and MAC functions. 10
5. (a) Why is DCT more popular for image compression. Discuss its usage in JPEG.- 10
(b) What is the role played by the KDC in symmetric encryption. Explain. 10
6. (a) Discuss the various standard of MPEG audio and video standards. 10
(b) What are the different types of DES prevalent today. How is the security aspect maintained in DES. 10
7. Write note on any **two**: 20
 - (i) A-law and μ law companding
 - (ii) Run length encoding
 - (iii) Chinese Remainder theorem
 - (iv) 'Motion compensation' in video compressor.