

First Semester M. E. (Electronics and Tele.) Examination

DATA COMPRESSION

Elective - I

Paper - 1 ENTC 05

P. Pages : 3

Time : Three Hours]

[Max. Marks : 80

- Note :** (1) All question carry equal marks.
 (2) Due credit will be given to neatness and adequate dimensions.
 (3) Assume suitable data wherever necessary.
 (4) Retain the construction lines.
 (5) Illustrate your answer wherever necessary with the help of neat sketches.
 (6) Use pen of Blue/Black ink/refill only for writing the answer book.

1. (a) Prove Kraft-McMillan inequality theorem. 7
- (b) Design a Huffman code for a source that puts out letters from an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with $P(a_1) = P(a_3) = 0.2$, $P(a_2) = 0.4$ and $P(a_4) = P(a_5) = 0.1$. The entropy for this source is 2.122 bits / symbol. Find average length for this code. 7

OR

2. (a) Explain how Markov model is useful in text compression. 7
- (b) What are necessary conditions for an optimal variable length binary code ? 7
3. (a) With the help of diagram, explain the steps involved in adaptive, context dependent arithmetic coding of binary source symbols. 6
- (b) What are the various mainstream imaging file formats that uses LZW coding? Explain any one of them. 7

OR

4. (a) Explain the Graphics interchange format (GIF) used for image compression. 6

(b) Explain compression over modems using V.42 bis standard. 7

5. (a) Obtain the derivation for Walsh Hadamard function coding and draw the basis function for $n = 4$. 7

(b) Explain three different coding systems defined by JPEG standard. 6

OR

6. (a) Explain the use of Run length coding in the BMP file format in detail. 7

(b) Explain with example the properties of Burrows-Wheeler transform that make it useful for higher order text compression. 6

7. (a) For eight reconstruction values explain the encoder mapping for a quantizer. 7

(b) Explain the following terms :—

(1) Decision Boundaries

(2) Reconstruction level

(3) Quantizer distortion. 6

OR

8. (a) Design an M-level uniform quantizer for an input that is uniformly distributed in the interval $[-X_{\max}, X_{\max}]$. 7

(b) Explain with the help of diagram terms related to uniform quantizer

(1) Mid-rise quantizer

(2) Midtread quantizer 6

9. (a) Explain two band subband coding and decoding system and its spectrum splitting properties with the help of diagram. 7

(b) Explain Haar transform ? 6

OR

10. (a) With the help of appropriate figure, explain a two dimensional four band filter bank for subband image coding. 7

(b) Explain discrete Wavelet transform. 6

11. (a) Explain in brief :—

(1) Spectral masking.

(2) Temporal masking.

(3) Psychoacoustic model. 7

(b) Explain block diagram of an MPEG-2 Advanced Audio coding encoder. 7

OR

12. (a) With the help of block diagram, explain Dolby AC3 Algorithm. 7

(b) Explain DPCM with Backward Adaptive prediction. 7



