

Full Marks-70

Time-3 Hours

ANSWER ANY FIVE QUESTIONS (14x5=70)

1.a) How do you prepare data for representation and analysis? How do you develop a multimedia application? Write down the steps. 1+2+3

b) What are redundancies in images? How can you categories them? 2+2

c) State the basic principles of Huffman coding. State basic principles of Lampel-Ziv coding. 2+2

2.a) What are the elements of multimedia system? State Shannon's Coding theory for noiseless channel. How can you include animation as a building block of multimedia system? 2+2+2

b) How can you convert a gray-scale image into bit-plane image? Define the run length entropy of Huffman entropy. State the limitations of arithmetic coded bit stream. 2+2+2

c) Define Discrete Cosine Transform (DCT). 2

3.a) What is multimodality? What is postscript font? Differentiate between extended character set and Unicode. 2+2+2

b)) A long sequence of symbols generated from a source is seen to have the following occurrences

| Symbol | Occurrences |
|--------|-------------|
| A1 | 3003 |
| A2 | 996 |
| A3 | 2017 |
| A4 | 1487 |
| A5 | 2497 |

Assign Huffman codes to the above symbols , following a convention that the group/symbol with higher probability is assigned a "0" and that with lower probability is assigned a "1". Calculate the entropy of the source. 4

c) What are the principles of arithmetic coding? Express the predicted pixel as a linear combination of past neighbors'. 2+2

4.a) Define Quantization. Distinguish uniform and non-uniform quantization.

Let us consider a row of pixels, whose intensity values are given as follows:

- 33-35-34-36-35-34-35-35-38-44-50-59-73-81-82-82-81-81. Plot intensity vs. pixel. 2+2+3
- b) Define Q- tree . How does data can be stored in Q-trees? 2+3
- c) State basic requirements of low bit-rate in audio coders. 2
- 5.a) State the needs of multi-resolution image analysis. How do coders assign code-word? 2+2
- b) State the mathematical expression of Discrete Wavelet Transforms. 3
- c) Draw the block diagram for perceptual coding in audio. What are the basic objective of MPEG-1 standards? 4+3
- 6.a) Distinguish between produced video data and observed video data. What do you mean by virtual reality? 2+3
- b) Describe the measuring the quality of reconstructed image. What are the needs of transformer in image compression? 3+2
- c) How can you encode a string of symbols using Huffman codes? Draw the lossless predictive coding block diagram. 2+2
- 7.a) Describe transform coding by block diagram. Define optimal Predictor design. 3+2
- b) What is threshold coding? State the limitations of DCT. 2+3
- c) Draw the hierarchical data structure in MPEG-1. 4
- 8.a) Write down the significances of k-d trees. 3
- b) What do you know about I-picture, B-picture, P-picture? 2+2+2
- c) State the constrained parameter of MPEG-1 standard. 5
- 9.a) What are the bit rate requirements for stereo quality audio? 3
- b) How does error can be calculated in JPEG standard? What are the permissible modes of operation in JPEG? Describe hierarchical coding standard. 2+3+2
- c) Encode the sequence 32,32,34,32,34,32,32,33,32,32,32,34 by Lampel-Ziv coding. 4