B. Tech.

(SEM. VIII) EXAMINATION, 2006-07
MULTIMEDIA SYSTEMS

Time : 3 Hours] [Total Marks : 100

Notes : (1) Answer all questions.
(2) All questions carry equal marks.

1 Attempt any two parts of the following : 10×2=20
   (a) Explain the various multimedia applications like document imaging, Image processing and image recognizing full-motion digital video application and electronic messaging etc.
   (b) Explain in details the multimedia system architecture.
   (c) Explain some of the multimedia data interface standards for images sound and video.

2 Attempt any two parts of the following : 10×2=20
   (a) Can a single MIDI message produce more than one note sounding ? Is it possible for more than one note to sound at once on a particular instrument if so. How is it done in MIDI ? How many different instruments are there in General MIDI ? Why ?
(b) What is the advantage of interlaced video? What are some of its problems? Why can we not just overlay the two fields to obtain a de-interlaced image? Suggest some simple de-interlacing algorithms that retain information from both fields?

(c) With reference to digital video describe chroma subsampling, CCIR standard for digital video and HDTV.

Describe any two of the following:

(a) What is the entropy (n) of the image below, where numbers (0, 2, 5, 9) denote the gray-level intensities?

```
9 9 9 9 9 9 9 9
2 2 2 2 2 2 2 2
0 0 0 0 0 0 0 0
0 0 5 5 5 5 0 0
0 0 5 5 5 5 0 0
0 0 0 0 0 0 0 0
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Show step by step how to construct the Huffman tree to encode the above four intensity values in this image. Show the resulting code for each intensity value. What is the average number of bits needed for each pixel?

(b) Compare the rate of adoption of adaptive Huffman coding and adaptive arithmetic coding. What prevents each method from adapting to quick changes in source statistics? Take an example.

(c) What is LZW compression? Encode and decode the string ABABABABCABABBA using LZW encoder and decoder.

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4 Attempt any **two** of the following: \[10 \times 2 = 20\]
(a) How many principal modes does JPEG have? In the hierarchical model, explain why we must include an encode/decode cycle on the coder side before transmitting difference images to the decoder side.
(b) Describe the Adaptive DPCM encoder and decoder with diagram.
(c) Explain the differential coding of Audio. Describe lossless predictive coding in details.

5 Attempt any **two** of the following: \[10 \times 2 = 20\]
(a) With the help of a block diagram, explain MPEG-1 format and B-frame coding based on bidirectional motion compensation.
(b) Digital video uses chroma subsampling what is the purpose of this? Why is it feasible?
(c) Color inkjet printers use the CMY model. When the cyan ink color is sprayed on to a sheet of white paper, why does it look cyan under day light? What color would it appear under a blue light? Why?