B. Tech.
(SEM. VIII) EXAMINATION. 2006-07
MULTIMEDIA SYSTEMS

Time : 3 Hours] [Total Marks : 100

Note : (1) Answer all questions.
(2) All questions carry equal marks.
(3) In case of numerical problems assume data wherever not provided.
(4) Be precise in your answer.

1. Attempt any four parts of the following :- \( 5 \times 4 = 20 \)
   (a) What are the hardware and software requirements for multimedia computer? Discuss the multimedia applications in business.
   (b) Distinguish between the following:-
      (i) Image and graphics
      (ii) Video and animation
      (iii) Multimedia production and Multimedia playback.
   (c) An analog audio signal has a dynamic range of 40 dB. Determine the magnitude of the quantization noise relative to the minimum signal amplitude if the quantizer uses :
      (i) 6 bits (ii) 10 bits.
(d) With a diagram, explain the working of a decoder for digital to analog conversion.

(e) Discuss the essential components of the video adapter card with their functions.

(f) How does the process of raster scanning create an image on monitor? How can interlacing be useful for displaying steady images on slower monitors?

2. Attempt any two parts of the following :- \( 10 \times 2 = 20 \)

(a) (i) A GIF image occupies a rectangular area of A inch by B inch on a monitor screen. The resolution of monitor is C dpi. What is the file size of the image in kB? The dimensions of the image is A inch \( \times \) B inch.

(ii) Calculate the data rate required for a 640 \( \times \) 480 resolution color monitor with 10-bit color depth and refresh rate of 30 Hz.

(b) With a diagram show how MIDI instruments can be interfaced with a PC. In relation to MIDI distinguish between channel messages and system messages giving examples.

(c) (i) What are the elements of hypertext? How hypertext is different from hypermedia?

(ii) What is authority tool? Describe the basic characteristics of requirements for selecting a multimedia authority tool.
3. Attempt any two parts of the following: \[ 10 \times 2 = 20 \]
   (a) Consider the text string “DI$DID$DIDI$DIDIA$DIDI”. Show all the steps of LZ78 compression and decompression including the dictionary formation.
   (b) Differentiate between:
       (i) Bitmap and vector drawing
       (ii) Lossless and lossy compression
       (iii) Statistical and dictionary based schemes.
   (c) (i) In a quadrophonic (4 channel) audio system, signals are sampled at 10kHz and stored as 6 bits values:
       (a) Calculate the required digital bandwidth
       (b) What is the highest frequency of the analog signal that can be reproduced from digitized signal.
       (ii) Explain how compression is achieved using the GIF standard. Is it lossy or lossless?

4. Attempt any two parts of the following: \[ 10 \times 2 = 20 \]
   (a) Discuss the following with suitable diagrams/examples in context to digital audio:
       (i) Sampling Rate
       (ii) Sampling Resolution
       (iii) Bit Rate
       (iv) Quantization Error
       (v) Signal-to-Noise Ratio.
(b) Discuss in detail the JPEG compression scheme.
(c) Explain the process of video capturing and digitization.

5. Attempt any two parts of the following: $10 \times 2 = 20$
   (a) What are the various types of frames in MPEG? How are these frames encoded?
   (b) Why is multimedia presentation standard needed? Explain different classes of MHEG model.
   (c) Describe various phases of multimedia application development.