Code: AT65   Subject: MULTIMEDIA SYSTEMS

AMIETE – IT (NEW SCHEME)

Time: 3 Hours   **DECEMBER 2011**   **Max. Marks: 100**

NOTE: There are 9 Questions in all.

- **Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.**
- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1   **Choose the correct or the best alternative in the following:**   **(2×10)**

a. This language is a tool to create 3D environments on the web.

   (A) VRML   **(B)** Dreamweaver
   (C) Adobe Premiere   **(D)** Macromedia Flash

b. _____ is an analog process that uses smaller or larger filled circles of black ink to represent shading.

   (A) Spatial resolution   **(B)** Halftoning
   (C) Intensity resolution   **(D)** Bitmap

c. _____ is an image format for digital cameras.

   (A) GIF   **(B)** TIFF
   (C) EXIF   **(D)** PDF

d. The_____ come into play when light levels are low and produce an image in shades of gray.

   (A) cones   **(B)** luminance receptor
   (C) blue receptor   **(D)** rods

e. Subtractive color primaries are _____

   (A) CMY   **(B)** RGB
   (C) YIQ   **(D)** YUV

f. HDTV has an aspect ratio of _____

   (A) 9:16   **(B)** 16:9
   (C) 3:4   **(D)** 4:3

g. If the true frequency is 5.5 kHz, sampling frequency is 8 kHz, what is the alias frequency?

(A) 11 kHz	**(B)** 16 kHz
(C) 2.5 kHz	**(D)** 13.5 kHz

h. _____ JPEG delivers low quality versions of the image quickly followed by higher quality passes.

(A) Hierarchical	**(B)** Sequential
(C) Lossless	**(D)** Progressive

i. This can be generated using image stitching and warping techniques.

(A) Sprite Panaroma	**(B)** Texture
(C) Synthetic object	**(D)** Mesh

j. A CD-ROM contains 333000 blocks to be played back in 74 minutes. Calculate the capacity of the CD-ROM when operating in Mode 1.

(A) 150 KB	**(B)** 650.39 MB
(C) 150 MB	**(D)** 650.39 GB

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Describe different categories of multimedia software tools.   **(8)**

b. Explain the following popular image file formats:
(i) PNG
(ii) EXIF
(iii) TIFF   **(8)**

Q.3 a. Describe CIELAB color model for images with necessary figures and equations.   **(8)**

b. NTSC video has 525 lines per frame and 63.6 μsec per line with 20 lines per field of vertical retrace and 10.9 μsec horizontal retrace. Where does the 63.6 μsec come from? Which takes more time, horizontal retrace or vertical retrace and how much more time?   **(8)**

Q.4 a. Derive the SQNR in dB for quantization accuracy of N bits/sample using a uniform quantizer with M levels. For AM radio with a mono channel and frequency band of 5500 Hz, calculate the uncompressed data rate if it is coded using 8 bits/sample.   **(8)**

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b. Explain adaptive Huffman coding algorithm. **(8)**

Q.5 a. Describe the various steps of JPEG image compression algorithm with a block diagram. **(10)**

b. Consider the four 3D vectors $x_1 = (4, 4, 5)$, $x_2 = (3, 2, 5)$, $x_3 = (5, 7, 6)$, $x_4 = (6, 7, 7)$. Derive the KLT transform matrix and the transformed vectors using KLT. **(6)**

Q.6 a. A video sequence is given to be encoded using H.263 in PB-mode, having a frame size of 4CIF, frame rate of 30fps, and video length of 90 minutes. On average, two I frames are encoded per second. The video at the required quality has an I-frame average compression ratio of 10:1, an average P-frame compression ratio twice as good as I-frame, and an average B-frame compression ratio twice as good as P-frame. Assuming the compression parameters include all necessary headers, calculate the encoded video size. **(8)**

b. Describe the different scalabilities in MPEG 2. **(8)**

Q.7 a. Explain the following in reference to MPEG 7 video compression standard:

(i) Descriptor   (ii) Description Scheme. **(8)**

b. What is a hybrid excitation vocoder? Describe MELP technique for audio compression. **(8)**

Q.8 a. Describe the basic MPEG audio encoder and decoder with a block diagram. **(8)**

b. Explain the following protocols used for communicating multimedia over IP
(i) RTP   (ii) RTCP
(iii) RSVP   (iv) RTSP **(8)**

Q.9 a. Explain the different rendering algorithms for animation. **(8)**

b. Explain the working principle of a DVD. Describe the various DVD formats. **(8)**