ROLL NO. _____

Code: AT65/AE132/AT116 **Subject: MULTIMEDIA SYSTEMS**

AMIETE – ET/IT (Current & New Scheme)

Time: 3 Hours **June 2019** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **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. _____aims to develop smart clothing that can communicate with other such enhanced clothing using wireless communication

(A) Digital Fashion **(B)** 3D motion capture
(C) Augmented interaction **(D)** Virtual Reality

b. _____is the best example of a hypermedia application?

(A) Interactive TV **(B)** Video-on-Demand
(C) Video Conferencing **(D)** The World Wide Web

c. The eye is most sensitive to light in the _____ of the visible spectrum.

(A) Left **(B)** Middle
(C) Right **(D)** Bottom

d. What is the aspect ratio for NTSC TV?

(A) 5:4 (B) 3:4
(C) 4:3 **(D)** 4:5

e. Which of the following is fixed length encoding technique?

(A) Run length encoding **(B)** Arithmetic coding
(C) Huffman coding **(D)** LZW coding

f. _____ is a series of musical tones whose frequencies are integral multiples of the frequency of a fundamental tone.

(A) Quantization **(B)** Sampling
(C) Harmonics **(D)** Decibel

g. Which of the following is a lossy compression technique?

(A) MPEG **(B)** Run Length encoding
(C) Arithmetic coding **(D)** Huffman coding

h. Difference between MPEG and H.261 is

(A) I-Frames **(B)** P-Frames
(C) B-Frames **(D)** O-Frames

i. RTSP stands for
(A) Real time Streaming Protocol **(B)** Real time Static Protocol
(C) Real time Signaling Protocol **(D)** Real time Sequence Protocol

j. ____is a reversible linear transform that exploits the statistical properties of the vector representation.
(A) DCT **(B)** KLT
(C) DFT **(D)** DWT

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

Q.2 a. Determine the space occupied in kB for **(8)**
i. 640 x 480 monochrome image
ii. 640 x 480 8-bit Gray scale image
iii. 640 x 480 24-bit colour image

b. Discuss about Lingo Specifics and Lingo Scripts in Macromedia Director. **(8)**

Q.3 a. What is the YIQ color model and why is this an appropriate color model used in conjunction with compression methods such as JPEG and MPEG? **(8)**

b. Given the following YIQ image values:

128 126 127 129	55 66 54 54	44 44 55 55
124 123 124 124	56 57 56 56	44 44 55 55
130 136 132 132	45 56 58 49	34 34 36 35
154 143 132 132	34 36 39 37	35 35 34 34
Y	I	Q

What are the corresponding chroma subsampled values for a 4:2:2 subsampling Scheme **(8)**

Q.4 a. An analog signal has bandwidth that ranges from 15 Hz to 10 kHz. What is the rate of sampler and the bandwidth of band limiting filter required? if **(8)**
(i) the signal is to be stored within computer memory.
(ii) the signal is to be transmitted over a network which has a bandwidth from 200 Hz to 3.4 kHz.
(iii) each signal is sampled at 8 bits per sample, what is the difference in the quantisation noise and signal to noise ratio expected for the transmission of the signals in (i) and (ii)?

b. Why is data compression necessary for Multimedia activities? Show, how you would encode the following token stream using run length encoding:
ABC000AAB00000000DEFAB00000?
What is the compression ratio for each method when applied to the above token stream? **(8)**

Q.5 a. Explain the basic compression process of JPEG in detail. **(8)**

b. Consider the four 3D input vectors $X_1 = (4,4,5)$, $X_2 = (3,2,5)$, $X_3 = (5,7,6)$, and $X_4 = (6,7,7)$. Find the KLT transform. **(8)**

Q.6 a. Given the following two frames of an input video, show, how MPEG would estimate the motion of the macroblock, highlighted in the first image, to the next frame. For ease of computation in your solution; you may assume that all macroblock calculations may be performed over 4x4 windows? You may also restrict your search to ± 2 pixels in horizontal and vertical direction around the original macroblock. **(8)**

1 1 1 1 1 1 1 1
1 1 2 3 3 2 1 1
1 1 2 2 2 2 1 1
1 1 2 **4 5** 2 1 1
1 1 2 **5 3** 2 1 1
1 1 2 3 3 2 1 1
1 1 1 3 3 2 1 1
1 1 1 3 3 1 1 1

Frame n

1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 2 1 2 2 2 2
1 1 2 1 4 3 3 2
1 1 2 1 4 3 4 3
1 1 2 1 4 4 5 4
1 1 2 1 4 5 4 5
1 1 2 1 2 4 4 4

Frame n+1

b. Discuss in detail about quantization in H.261. **(8)**

Q.7 a. Explain Binary Shape Coding in detail. **(8)**

b. MPEG has a variety of different standards, i.e. MPEG-1, MPEG-2, MPEG-4, MPEG-7 and MPEG-21. Why have such standards evolved? Give an example target application for each variant of the MPEG standard. **(8)**

Q.8 a. Explain the operation of G.726 ADPCM. **(8)**

b. Draw and explain the schematic diagram of the MPEG audio perceptual encoder. **(8)**

Q.9 a. Elaborate on Multimedia over ATM networks. **(8)**

b. Write a brief note on QoS multimedia data transmission, Multimedia service classes, Perceived QoS. **(8)**