

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – WINTER • 2013****Subject code: 734103****Date: 28-11-2013****Subject Name: Multimedia Signal Processing and Communication****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Explain following terms with reference to signal encoder **04**
(i) Band limiting filter
(ii) ADC
(iii) Sample and Hold
(iv) Quantizer
- (b)** Determine the rate of the sampler and the bandwidth of the band limiting filter in an encoder which is to be used for the digitization of an analog signal which has a bandwidth from 15Hz through to 10kHz. Assuming that the digitized signal **03**
(i) is to be stored within the memory of a computer
(ii) is to be transmitted over a channel which has a bandwidth from 200Hz through to 3.4kHz
- (c)** Explain how a digital image produced by a scanner or digital camera is captured and stored within the memory of a computer. **07**
- Q.2 (a)** Write short note on various formats of digital video **07**
(b) Explain dynamic Huffman encoding algorithm with suitable example. **07**
- OR**
- (b)** Explain Lempel-Ziv-Welsh coding algorithm with suitable example. **07**
- Q.3 (a)** Write short note on MMR coding scheme for image compression. **07**
(b) Explain how the LZW coding algorithm can be applied to the compressed image data. Include in your explanation how compression is achieved and how receiver interprets the compressed information. **07**
- OR**
- Q.3 (a)** Explain working of JPEG encoder with suitable diagram. **07**
(b) A series of messages is to be transferred between two computers over PSTN lines. The message comprise just the characters from A through H, Analysis has shown that the probability of occurrence of each character is as follows **07**
A and B = 0.25, C and D = 0.14, E, F, G and H = 0.055
(a) Apply Huffman coding to derive a codeword
(b) Derive average number of bits per character for Huffman coding based code word set and compare it with fixed length binary code word and 7-bit ASCII code words
- Q.4 (a)** Explain the main difference between LPC codec and CELP codec. **04**

- Include in your explanation the meaning of the terms “Wave form template” and “template code book”.
- (b) Explain how ADPCM scheme obtains improved performance over a DPCM scheme. **03**
- (c) Write short note on MPEG audio coders **07**
- OR**
- Q-4** (a) Explain meaning of following terms with reference to speech coders **04**
- (i) Processing delay
 - (ii) Algorithmic delay
 - (iii) Lookahead
 - (iv) Coder delay
- (b) With suitable diagram, show how the sensitivity of the human ear varies with frequency. **03**
- (c) Write short note on Dolby audio coders **07**
- Q.5** (a) Explain the meaning of following terms with reference to video compression **03**
- (i) Moving pictures
 - (ii) MJPEG
 - (iii) Motion estimation and compensation
- (b) With suitable example ,explain the meaning of the following types of compressed frame **04**
- (i) I-frames
 - (ii) P-frames
 - (iii) B-frames
- (c) A digitized video is to be compressed using the MPEG-1 standard. Assuming a frame sequence of : **07**
- IBBPBBPBBPBBI.....
- and average compression ratio of 10:1(I) ,20:1(P), 50:1(B), derive the average bit rate that is generated by the encoder for both the NTSC and PAL digitization formats.
- OR**
- Q.5** (a) Write short note on MPEG -4 standard fro video compression and state main application of this standard. **07**
- (b) Write short note on various standards related to interpersonal Multimedia data communications. **07**
