KUMARAGURU college of technology
character is life

Register Number:……..…

M.E DEGREE EXAMINATIONS: JUNE 2017

(Regulation 2015)

Second Semester

COMMUNICATION SYSTEM

P15COT202: Data Compression Techniques

COURSE OUTCOMES

CO1: Discuss various text compression algorithms and compare their efficiency in terms of speed and compression ratio.

CO2: Apply various audio compression techniques.

CO3: Analyze different compression techniques and standards for image and video

CO4: Compare various video compression standards

CO5: Apply knowledge for identifying a suitable strategy for compression of text, image, audio and video.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): Quantization results in scaling down of the dynamic range of the input. CO5 [K_5]
   Reason (R): The perceptual effect of contouring can be reduced by a procedure called dithering.
   a) Both A and R are Individually true and R is the correct explanation of A
   b) Both A and R are Individually true but R is not the correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

2. In PCM, the samples are dependent on CO2 [K_1]
   a) Frequency
   b) Time
   c) Quantization level
   d) Interval between quantization level

3. Huffman's coding is an encoding algorithm used for CO1 [K_3]
   a) lossy data compression
   b) broadband systems
   c) files greater than 1M bit
   d) lossless data compression

4. Matching type item with multiple choice code CO1 [K_2]

List I	List II
A. JBIG	i. substitution coder
B. Dictionary	ii. compression of Binary images
C. GIF	iii. no initial knowledge of source distribution.
D. Adaptive Huffman coding	iv. LZW data compression

	A	B	C	D
a)	ii	i	iv	iii
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

5. Assertion (A): In H.261 standard, each macro block is preceded by a header. CO4 [K_5]
Reason (R): H.261 algorithm switches between 64 different quantizers

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

6. The idea with wavelets is to represent a complicated function by CO3 [K_4]

a) sinus functions
b) Lines
c) simple basic functions
d) square functions

7. The examples for reversible coding are CO1 [K_3]

1. Run length encoding
2. Huffman's encoding
3. PCM encoding
4. JPEG encoding

a) 1,3
b) 1,4
c) 1,2
d) 2,3

8. Without losing quality, JPEG-2000 can achieve compression ratios of _____ CO4 [K_1]

a) 20:1
b) 200:1
c) 2000:1
d) 2:1

9. MPEG-2 Compression belongs to _____ CO4 [K_2]

a) Entropy coding scheme
b) Hybrid coding scheme
c) Source coding scheme
d) None of these

10. The sequence of steps in JPEG image compression are : CO3 [K_2]

1. Quantization
2. DCT
3. Entropy coding
4. Zig zag ordering and run length encoding

a) 2-1-4-3
b) 1-3-2-4
c) 3-4-2-1
d) 4-1-3-2

PART B (10 x 2 = 20 Marks)

11.	State the need for quantization in the field of data compression.	CO5	[K_1]
12.	Differentiate between lossless compression and lossy compression.	CO5	[K_4]
13.	Mention the advantages of adaptive Huffmann coding over Huffmann coding.	CO1	[K_4]
14.	List out the applications of Arithmetic coding.	CO1	[K_1]
15.	What are formants? List out its properties.	CO2	[K_1]
16.	How CELP provides better quality than LPC in speech coding?	CO2	[K_4]
17.	Mention the main goals of JPEG compression.	CO3	[K_2]
18.	Specify the role of QMF filters in sub-band coding.	CO3	[K_3]
19.	Define motion compensation.	CO4	[K_1]
20.	Compare MPEG2 and MPEG4.	CO4	[K_5]

PART C (6 x 5 = 30 Marks)

21.	Elaborate briefly on various metrics employed to evaluate the performance of compression.	CO5	[K_2]
22.	Encode and decode the following stream of characters: *BACA* with probabilities $P(A) = 0.5;\ P(B) = P(C) = 0.25$ using Arithmetic coding.	CO1	[K_4]
23.	Illustrate LZW dictionary encoding with a suitable example.	CO1	[K_3]
24.	Discuss the functions of the various blocks in a LPC encoder and decoder with a neat sketch.	CO2	[K_2]
25.	Elaborate briefly on the GIF and TIFF image file formats.	CO3	[K_2]
26.	Show how the compression algorithm used with MPEG-1 differs from that used in the H.26X standard.	CO4	[K_4]

Answer any FOUR Questions

PART D (4 x 10 = 40 Marks)

27.	Given the eight symbols $A, B, C, D, E, F, G \text{ and } H$ with probabilities $\frac{1}{30}, \frac{1}{30}, \frac{1}{30}, \frac{2}{30}, \frac{3}{30}, \frac{5}{30}, \frac{5}{30}$ and $\frac{12}{30}$ respectively. Draw the Huffman tree for these symbols and also compute the average code size and efficiency.	CO1	[K_4]
28.	Explain in detail about the principle of Vector Quantization. Elaborate briefly on the various classifications of Vector Quantization.	CO5	[K_2]

29. Explain the principle of operation of a DPCM signal encoder and decoder with a neat sketch. CO2 [K_2]

30. For a seven level decomposition shown below: CO3 [K_5]

21	6	15	12
-6	3	6	3
3	-3	0	-3
3	0	0	0

a) Find the bit streams generated by EZW coder and SPIHT coder.
b) Decode the bit streams generated by the EZW and SPIHT appropriately.

31. Elaborate briefly about the various MPEG standards. CO4 [K_1]

****