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B.Sc. (Engineering) in CSE
Semester Final Examination **2017**
Level **4**, Semester **II**, Course Code: **CSE 451**, Credit: **3.0**
Course Title: **Basic Multimedia System**

Time: **03** hours | Total Marks: **90**

[N.B. The figure in the right margin indicates the marks allocated for respective question. Split answer of any question is not allowed.]

Section-A

*(Answer any **03(three)** from the following questions)*

1. (a) What is multimedia? Why multimedia is important? Write some commanding application areas of multimedia system. 2+2+2

   (b) What key problems does a multimedia system have to deal with when handling multimedia data? Give a tentative solution of these problems. 3+2

   (c) What is dithering? Why it is necessary in multimedia activities? 2+2

2. (a) What is data compression? Differentiate between data compression and data deduplication. 1+3

   (b) Given the following portion from an 8x8 block from an image where numbers (0, 20, 50, 99) denote the gray-level intensities 2+4+2

99	99	99	99	99	99	99	99
20	20	20	20	20	20	20	20
0	0	0	0	0	0	0	0
0	0	50	50	50	50	0	0
0	0	50	50	50	50	0	0
0	0	50	50	50	50	0	0
0	0	50	50	50	50	0	0
0	0	0	0	0	0	0	0

   i) What is the entropy H of this image?
   ii) Show step by step how to construct the Huffman code to encode the above four intensity values in this image. Show the resulting code for each intensity value.
   iii) Which variant of RLE is suitable for this image and why?

   (c) Why lossy compression exists in data compression even though some information is lost? 3

3. (a) Briefly explain how the LZW transform operates. What common compression methods utilize this transform? 3+2

   (b) Show how the LZW transform would be used to encode the following sequence of text based tokens: 5

ABCBCABCAADAB

   (c) How does the human eye sense color? What characteristics of the human visual system can be exploited for the compression of color images and video? 2+2

4. (a) Briefly outline the JPEG compression pipeline and the constituent compression algorithms employed at each stage in the pipeline. 6

(b) What is the YIQ color model? Give an application in which this color model is mostly used and explain the reason. Given a color represented in RGB color space as R = 34, G = 78, B = 50, what is its representation in the YIQ color model? 1+

(c) Briefly describe the four basic types of data redundancy that data compression algorithms can apply to audio, image and video signals. 3

(d) Draw the block diagram of 2-level hierarchical mode of JPEG image compression procedure. 3

Section-B

*(Answer any **03(three)** from the following questions)*

1. (a) What is multimedia database? Describe how H.261 deals with temporal and spatial redundancies in video in details. 2+3

(b) Briefly outline the basic principles of intra frame coding in video compression, as used in MPEG-2. 4

(c) Briefly explain the MPEG-2 encoder and decoder for spatial scalability. 6

2. (a) What is the key difference between I-Frames, P-Frames and B-Frames? Why are I-frames inserted into the compressed output stream relatively frequently? 3+2

(b) Explain RTSP for multimedia communication. 5

(c) Briefly explain the basic principles of audio compression. 5

3. (a) Define macro block. Differentiate between interior and boundary macro block. 1+2

(b) Given the following coding order of a group of frames in MPEG-2: I P B B B P B B B I B B B I P B P. What is the display order of the frames? 3

(c) Differentiate between frame based coding and VOP based coding in video compression standard with necessary diagram(s). 5

(d) Explain 2D logarithmic search for searching motion vector. 4

4. (a) What is the Quality of Service (QoS)? Discuss the important parameters needed to ensure QoS in internet and multimedia communication. 1+4

(b) What is continuous media? Explain the characteristics that exploit in continuous multimedia data. 2+3

(c) Define padding. Why padding is necessary in MPEG-4 video compression. Apply padding for the following macroblock. 2+1+2

56	57	56			
49	45	50			
					65
			65		
				34	
45	33			35	55