

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJASTHAN)
Pilani Campus
Second Semester, 2021-2022
Comprehensive Examination

Course Number : CS F401
Date & Time : May 21, 2022 (08 AM - 11 AM)
Course Title : Multimedia Computing
Weightage & Nature : 40% [Closed Book]

Note:

There are six questions in all. Please answer parts of a question in sequence and in the order of appearance in the question paper.

Q1. Answer the following in continuation and in sequence. Write short and precise answers.

- 1.1 Write three differences between a Multimedia Operating System and a Real-time system?
- 1.2 State three artifacts that may be introduced after fractal compression?
- 1.3 State the purpose of B-frames in video compression?
- 1.4 What is the principle of writing data in the Magneto-Optical CD/RW?
- 1.5 Why it is essential to consider spatial synchronization and content synchronization in Multimedia Systems?

Marks Q1 [2 x 5 = 10]

Q2. Find the resulting binary-stream and compression ratio after compressing the following fax message, containing four scan-lines, using the modified Huffman coding. Use separate lines (one for each scan-line) to write Huffman codes (separated by space) in the resulting binary-stream after compression.

- Line 1:** 0 white, 5 black, 5 white, 1014 black
Line 2: 3 black, 18 white, 805 black, 198 white
Line 3: 15 white, 2 black, 1007 white
Line 4: 8 black, 3 white, 13 black, 1000 white

-8	0	0	0	7	0	0	0
-6	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	3	2	0	0

Marks Q2 [3 + 1 = 4]

Q3. Compress the quantized 8 x 8 block (Table 1) using Huffman codes as a part of JPEG compression? Find the compression ratio. Assume original data is represented by 8-bit.

Table 1 (8 x 8 Block)

Marks Q3 [3 + 1 = 4]

Q4. Assuming 8-bit representation, find the quantized block (as part of JPEG DCT based base-line mode of compression) of the 3 x 3 block given in Table 2 using the quantization table given in Table 3. Use rounding instead of truncating to integers.

118	152	12
128	171	18
127	151	14

Table 2

16	11	10
12	12	14
14	13	16

Table 3

Marks Q4 [4]

Q5. Solve the following.

5.1 Find Huffman codes for the characters given in Table 4.

5.2 Compress the string 'there_are_arenas' using LZW and find the compression ratio assuming that original data are in 8-bit and a code in string table is of 9-bit. Given ASCII value of _ is 95.

5.3 Using the frequency table (Table 4), decompress 0.43592583168.

5.4 Compress the string 'microscope' using arithmetic compression.

Char	A	B	C	D	E	F	G	H
Freq	90	60	50	20	12	8	7	3

Table 4

Marks Q5 [3 x 4 = 12]

Q6. Assuming, distance between tracks = 700 nm and width of track = 0.6 μm , estimate the length (in km) of the track in a CD-ROM assume inner radius is 1.5 cm and outer radius is 6.0 cm for the storage area. Given, length of a pit or land = 0.05 μm , calculate storage capacity (in MB) of the CD-ROM? Given, 1 MB = 1024 x 1024 byte, 1 byte = 8 bit.

Marks Q6 [6]