

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJASTHAN)
Second Semester, 2022-2023
Mid-Semester Test

Course Number: CS F401

Date & Time: March 18, 2023 (09:00 AM – 10:30 AM)

Course Title : Multimedia Computing

Marks & Nature: 30 Marks, Closed Book

Note: Answer all parts of a question in sequence and in continuation.

Q1. Answer the following briefly.

1.1 For a multimedia system why computer supported integration of media is desirable?

1.2 What does granularity characterize?

1.3 Expand the term SMIL.

1.4 Define authoring program.

1.5 Write basic strategy of dithering.

1.6 Name (name only) two techniques to devise a colour lookup table.

1.7 Why continuous media has to be processed differently?

Marks Q1 [1 x 7 = 7]

Q2. 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. Huffman codes for JPEG compression are given overleaf. DC of previous block is 0.

Marks Q2 [0.5 x 7 + 1 = 4.5]

Q3. Assuming 8-bit representation, find the block (as a part of JPEG decompression) represented by the 3 x 3 quantized DCT block (Table 2) using the quantization table given in Table 3.

Marks Q3 [0.5+2.25 + 0.75= 3.5]

Q4. Find optimised Huffman codes of the characters given in Table 4 and also find the compression ratio achieved if originally data is represented by 8-bits and Huffman code table is not considered as part of compressed data.

Marks Q4 [2 + 1 = 3]

Q5. Compress the string 'iceisnicer' using arithmetic compression and find the compression ratio achieved assuming that a character is originally represented by 8-bit and 64-bit floating point arithmetic is used.

Marks Q5 [1 + 2.5 + 0.5 = 4]

Q6. Solve the following and answer in proper unit. There will be no partial marking.

6.1 For 8-bit representation if R = 130, G = 150 and B = 210, find the values for C, M, Y and K?

6.2 A signal with dynamic range 20 dB has minimum amplitude equal to 100 units. Find quantization noise if the quantizer uses four bits?

6.3 If the signal $256 \cdot \cos(\omega t + \pi/4)$, where $\omega = 8\pi \times 10^5$ radian/second, is sampled at double the Nyquist frequency, what is the time interval (in μsec) at which the signal is sampled?

6.4 For a monitor supporting 24-bit true colour, with spatial resolution 800 x 600, how much time (in seconds) is required to transmit a two hour movie in uncompressed form over a 2.45 kBps transmission line if refresh rate is 60 Hz? Given 1 kB = 1024 Byte.

Marks Q6 [2 x 4 = 8]

Table 1 (8 x 8 Block)

-9	0	0	3	7	0	0	0
4	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	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	1	0	0	0

Table 2

-11	-1	0
-1	0	0
-1	0	0

Table 3

15	10	10
10	12	14
14	10	16

Table 4

Char	A	B	C	D	E	F	G	H	I	J
Freq	80	60	60	50	40	30	20	20	20	20

P.T.O.

Table A: Default Huffman codewords for encoding AC coefficients

Skip/SSS	Codeword
0/0	1010
0/1	00
0/2	01
0/3	100
0/4	1011
0/5	11010
0/6	111000
0/7	1111000
0/8	1111110110
0/9	111111110000010
0/10	111111110000011
1/1	1100
1/2	111001
1/3	1111001
1/4	111110110
1/5	1111111010
1/6	111111110000101
1/7	111111110000101
1/8	111111110000110
1/9	111111110000111
1/10	111111110001000
2/1	11011
2/2	11111000
2/3	1111110111
2/4	111111110001001
2/5	111111110001010
2/6	111111110001011
2/7	111111110001100
2/8	111111110001101
2/9	111111110001110
2/10	111111110001111
3/1	111010
3/2	111110111
3/3	11111110111
3/4	1111111110010000
3/5	1111111110010001
3/6	1111111110010010
3/7	1111111110010011
3/8	1111111110010100
3/9	1111111110010101
3/10	1111111110010110
4/1	111011
4/2	1111111000
4/3	1111111110010111
4/4	1111111110011000
4/5	1111111110011001
4/6	111111111001101
4/7	1111111110011011
4/8	111111111001110
4/9	1111111110011101
4/10	1111111110011110
5/1	1111010
5/2	1111111001
5/3	1111111110011111
5/4	1111111110100000
5/5	1111111110100001
5/6	1111111110100010
5/7	1111111110100011
5/8	1111111110100100

Skip/SSS	Codeword
5/9	1111111110100101
5/10	1111111110100110
6/1	1111011
6/2	11111111000
6/3	1111111110100111
6/4	1111111110101000
6/5	1111111110101001
6/6	1111111110101010
6/7	1111111110101011
6/8	1111111110101100
6/9	1111111110101101
6/10	1111111110101110
7/1	11111001
7/2	11111111001
7/3	1111111110101111
7/4	1111111110110000
7/5	1111111110110001
7/6	1111111110110010
7/7	1111111110110011
7/8	1111111110110100
7/9	1111111110110101
7/10	1111111110110110
8/1	11111010
8/2	1111111111000000
8/3	11111111101110111
8/4	1111111110111000
8/5	1111111110111001
8/6	1111111110111010
8/7	1111111110111011
8/8	1111111110111100
8/9	1111111110111101
8/10	1111111110111110
9/1	111111000
9/2	1111111110111111
9/3	1111111111000000
9/4	1111111111000001
9/5	1111111111000010
9/6	1111111111000011
9/7	1111111111000100
9/8	1111111111000101
9/9	1111111111000110
9/10	1111111111000111
10/1	111111001
10/2	1111111111001000
10/3	1111111111001001
10/4	1111111111001010
10/5	1111111111001011
10/6	1111111111001100
10/7	1111111111001101
10/8	1111111111001110
10/9	1111111111001111
10/10	1111111111011000
11/1	111111010
11/2	1111111111010001
11/3	1111111111010010
11/4	1111111111010011
11/5	1111111111010100
11/6	1111111111010101
11/7	1111111111010110
11/8	1111111111010111
11/9	1111111111011000

Skip/SSS	Codeword
11/10	1111111111011001
12/1	111111010
12/2	1111111111011010
12/3	1111111111011011
12/4	1111111111011100
12/5	1111111111011101
12/6	1111111111011110
12/7	1111111111011111
12/8	11111111111000000
12/9	1111111111100001
12/10	1111111111100010
13/1	11111111010
13/2	1111111111100011
13/3	1111111111100100
13/4	1111111111100101
13/5	1111111111100110
13/6	1111111111100111
13/7	1111111111101000
13/8	1111111111101001
13/9	1111111111101010
13/10	1111111111101011
14/1	111111110110
14/2	1111111111101100
14/3	1111111111101101
14/4	1111111111101110
14/5	1111111111101111
14/6	111111111110000
14/7	111111111110001
14/8	111111111110010
14/9	111111111110011
14/10	111111111110100
15/0	111111110111
15/1	111111111110101
15/2	111111111110110
15/3	111111111110111
15/4	111111111111000
15/5	111111111111001
15/6	111111111111010
15/7	111111111111011
15/8	111111111111100
15/9	111111111111101
15/10	111111111111110

Table B: Default Huffman codewords for Variable-length coding

Number Of bits needed	Huffman codeword
0	010
1	011
2	100
3	00
4	101
5	110
6	1110
7	11110