

# BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

## Pilani Campus

Second Semester 2021-2022

Mid-Semester Test (Closed Book)

Multimedia Computing (CS F401)

March 15, 2022 (02:00 PM – 03:30 PM)

Max. Marks: 35

**Q1.** Answer the following precisely.

- 1.1 Write the main difference between interlaced and progressive scanning?
- 1.2 Why sensitivity of human auditory system is different for the different audible frequencies?
- 1.3 Why median-cut method for devising a color look-up table is computationally less extensive as compared to clustering based method?
- 1.4 Which step of JPEG compression do cause the loss of information?
- 1.5 What is the advantage of true type font over the stroked-fonts?

211	211	200	200
211	150	125	132
200	125	221	132
200	132	132	188

Table 1

6	8	4
1	0	3
5	2	7

Table 2

Marks Q1 [1 x 5 = 5]

**Q2.** Given an 8-bit grayscale 4 x 4 image (Table 1), apply the 3 x 3 ordered dither (Table 2) on this image.

Marks Q2 [1 + 4 = 5]

**Q3.** Compress the 8-bit gray-level image (Table 1) using Huffman codes derived from Huffman tree and write your answer in the form of a table. Find the compression ratio.

Marks Q3 [6 + 1.5 = 7.5]

**Q4.** A character string of length 1000 characters (a character is originally represented by 8-bit) each from the alphabets a, b, c, d, and e, with their probability of occurrence as 0.4, 0.2, 0.2, 0.1, and 0.1 respectively. Do the following:

- 4.1 Find the entropy of the string.
- 4.2 Using arithmetic coding compress, the string 'acad' by assigning ranges in the order a to e.
- 4.3 How many strings can be generated by using the randomly picked 20 characters of the given string
- 4.4 If the 1000-character string is compressed using arithmetic compression what will be the compression ratio assuming that a floating point number is represented using 64-bits.
- 4.5 Using arithmetic decoding find the first three characters of the string represented by 0.525 by assigning ranges in the order a to e.

Marks Q4 [1.5 x 5 = 7.5]

**Q5.** Write a computer program to draw an animated motion (anti-clockwise starting from the farthest point along positive x-axis where the polygon intersect with x-axis) of a small red-color ball (represented as a small circle of radius 3 pixel units and solid-filled with given color) along a blue-color regular polygon (centered at the centre of the screen) of n (ranging between 3 and 15 inclusive) sides (with each side of length l ranging between 50 and 100 inclusive pixel-length). You can use the following functions which are assumed to be already available (i.e. do not develop code for these functions) to you.

resolution(int &Width, int &Height);	/* Width & Height of the screen in number of pixels */
circle(int h, int k, int r, color CircleColor);	/* draws a circle (of radius r & in color CircleColor) centered at (h, k), color is structure of int Red, Green, Blue */
line(int x1, int y1, int x2, int y2, int t, color LineColor);	/* draws a line-segment (of thickness t & color LineColor) joining (x1,y1) & (x2,y2), color is structure of int Red, Green, Blue */
delay(int T)	/* Introduces a delay of T mili-seconds */

Marks Q5 [10]