Roll No. ……..

National Institute of Technology, Hamirpur
M.Sc. End Term – 2020

Subject Name: Digital Image Processing
Subject Code: MA-733
Branch: Mathematics and Scientific Computing

Semester: 3rd
Full Marks: 50
Time: 2 hours

Note: All questions are compulsory. Be precise in writing answers.

1. Preform dilation and erosion on given image sets and show the result of each in clear diagram. [8]

   A = {(1,1), (1,2), (2,1), (3,0), (3,2)}, **B** = {0,0), (0,1)}

2. True or False? [10]
   a. Opening operation is a dilation followed by erosion.
   b. JPEG compression is lossy.
   c. Low frequency content represents the sharpened area.
   d. High pass filter restricts high frequency components.
   e. False contouring is an effect of low sampling.

3. Calculate the DCT of following image (2D Sequence), where **N**=4. [8]

2	1	1	2
1	2	1	2
2	1	1	2
1	2	1	2

4. Calculate contrast stretching for following transformation function and show the result in plotted graph. [8]

$$s = \begin{cases} \alpha r & 0 \le r < r_1 \\ \beta(r - r_1) + s_1 & r_1 \le r < r_2 \\ \gamma(r - r_2) + s_2 & r_2 \le r \le L - 1 \end{cases}$$

80	120	62	73
56	210	8	5
35	2	78	152
16	7	17	243

where, **r1 =** 90**, r2 =** 190**, s1 =** 50**, s2 =** 100

5. State the relation between redundancy and compression ratio. What does it signify? [8]
6. Perform histogram matching (specification) for the following given information. [8]

r_k	n_k	$p(r_k)$
0	790	0.19
1	1023	0.25
2	850	0.21
3	656	0.16
4	329	0.08
5	245	0.06
6	122	0.03
7	81	0.02

z_k	$p(z_k)$
0	0
1	0
2	0
3	0.15
4	0.20
5	0.30
6	0.20
7	0.15