CLASS: BE   SEMESTER: VII
BRANCH: ECE   SESSION : MO/2019

SUBJECT : MEC2011 DIGITAL IMAGE PROCESSING TECHNIQUES

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) A video has one frame of size 640x480, with 3 bytes/pixel. It is assumed that the video is   [2]
         taken at 30 frames/seconds. What is the storage and transmission time required? Consider
         64 kbps link speed.
    (b) Perform the discrete convolution for X (m, n) and H (m, n). Where (0, 0) showing the   [3]
         element is at origin.
         X(m, n)   H(m, n)
          1   4   1   1   1
          2 (0,0) 5   3   1(0,0)   -1

Q2 (a) Formulate a simple image formation model.   [2]
    (b) Consider the image segment shown. Let intensities in domain are V = {1, 2}, Compute the   [3]
         lengths of shortest 4- path, 8-path, and m-path between p and q, if the particular path
         does not exist between these two points, explain why?
                 3   1   2   1   (q)
                 2   2   0   2
                 1   2   1   1
             (p) 1   0   1   2

Q3 (a) Perform the median filtering on y (m) = {2, 3, 8, 4, 2}, consider window w= [-1, 0, 1].   [2]
    (b) Derive the mask for 2D discrete Laplacian operator. Differentiate single derivative and   [3]
         double derivative properties. Give one application of Laplacian in image processing.

Q4 (a) Perform the negative of the image on the following, considering intensities in the range 0-   [2]
         7.
          1   5   3   7   6   2
    (b) Perform the histogram equalization for the 8X8 ,eight level image given below.   [3]
         Pixel distribution of the image

rk	0	1	2	3	4	5	6	7
pk	8	10	10	2	12	16	4	2

Q5 (a) Write down the property for orthogonal matrix and unitary matrix.   [2]
    (b) For the 2-D discrete Fourier transform write the 2x2 kernel, find the coefficients for the   [3]
         given image below. And from the coefficients recover back the image.
                 1   2
                 3   4

Q6 (a) Find the fourier transform for 2D rect function.   [2]
         f(x, y) = 1 for $0 \leq x \leq X$
                    1 for $0 \leq y \leq Y$
    (b) Explain Homomorphic Filter showing steps in block diagram with appropriate   [3]
         mathematics. Assuming the filter to be Gaussian high pass filter. What is the specific
         property of the Homomorphic filter.