B.E. Electronics & Communication/Telecommunication Engineering (Model Curriculum)
Semester-VIII

ET802M - Digital Image & Video Processing

P. Pages : 2 **GUG/W/23/14355**

Time : Three Hours * 7 8 9 4 * Max. Marks : 80

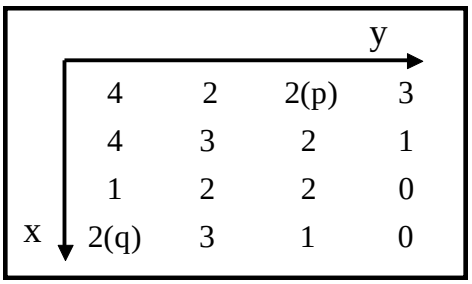
Notes : 1. All questions carry as indicated marks.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Explain the fundamental steps in digital image processing which can be applied to images. **8**

b) Describe JPEG file format. What are the important features of JPEG file format? Also mention advantages and disadvantages of JPEG file format. **8**

OR

2. a) A 4x4 subimage is shown in fig. Let V = {2, 4} and compute the D_4, D_8 and D_m distances between p and q. **8**



b) Define the following terms: **8**
i) Image ii) Resolution
iii) Pixel and iv) Digital Image

3. a) The input matrix x(m,n) and h(m,n). Perform the linear convolution between these two matrices. **8**

$$x(m,n) = \begin{bmatrix} 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \quad h(m,n) = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

b) Generate Haar Basis for N=2.

OR

4. a) Compute the median value of the marked pixels shown in fig. using a 3x3 mask. **8**

$$\begin{bmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & (128) & (24) & (172) & (26) & 23 \\ 22 & 19 & 32 & 31 & 28 & 26 \end{bmatrix}$$

b) Analyze 3x3 mean filter and in the frequency domain and prove that it behaves as a low pass filter. **8**

5. a) Explain about RGB color model. **8**

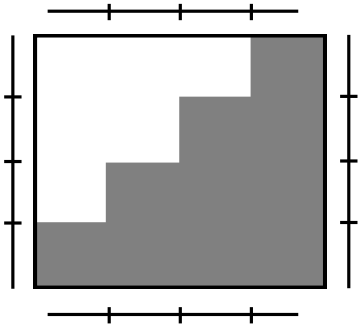
b) Explain pseudo color image processing and pseudo color coding approaches. **8**

OR

6. a) What is a chromacity diagram? Explain CIE chromacity diagram. **8**

b) Explain the operation of color image smoothing and sharpening. **8**

7. a) Segment the following image using region split and merge technique. Draw quad tree representation for the corresponding segmentation. **8**



b) Define image segmentation. Give classification. Explain region based segmentation. **8**

OR

8. a) Define edge in an image. Detect edge in the following image using strength (magnitude) and direction of gradient. Use Prewitt operator. **8**

$$\text{Image} = \begin{bmatrix} 0 & 30 & 60 \\ 5 & 32 & 62 \\ 10 & 38 & 64 \end{bmatrix}$$

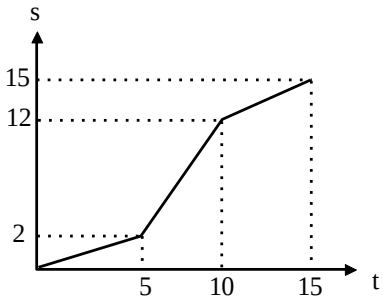
b) Justify the statement "Laplacian is a good edge detector". **8**

9. a) Write video frame classification and various digital video formats. **8**

b) For the digital image shown in fig, perform following operations. **8**

$$\begin{bmatrix} 10 & 2 & 13 & 7 \\ 11 & 14 & 6 & 9 \\ 4 & 7 & 3 & 2 \\ 0 & 5 & 10 & 7 \end{bmatrix}$$

I) Contrast stretching as per the characteristics given below.



II) Draw the histogram of original and new image.

III) Equalize the histogram.

OR

10. a) Write applications and advantages of Motion Vector. **8**

b) Explain deferment types of frames in video signals. **8**

****