E. Sem-VII - (CBSGS) - EXTC - Image & Video Processing - NOV-17

Q. P. Code: 24459

(Time: 3 hours) [Total Marks: 80]

N.B: 1) Question number **1** is **compulsory**

1) Attempt any **three** questions out of the remaining five questions

2) In all four questions to be attempted

3) Figures to the **right** indicate full marks

Q.1 (a) Justify or Contradict the following Statements (10)

(i) Histogram is a unique representation of an image.

(ii) Quality of an image is decided by its tonal and spatial resolution

(b) Explain in brief: Image Enhancement in frequency domain (05)

(c) Explain effects of (i) Opening (ii) Closing (05)

Q.2 (a) Write applications\advantages of following (10)

(i) Compass operator (ii) Motion Vector (iii) Hough transform

(iv) Bit plane slicing (v) High Boost filtering

(b) Find K. L. transform of following image: $\begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$ (10)

Q. 3 (a) Define edge in an image. Detect edge in the following image using strength (magnitude) and direction of gradient. Use Prewitt operator. (10)

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

(b) Explain in detail optical flow equation for motion estimation in video signal. (10)

Q.4 (a) Perform region filling operation to fill the image (A) ,using structuring element (B) (06)

Image A = 

Image B = 

(b) State and prove translation property of DFT. (04)

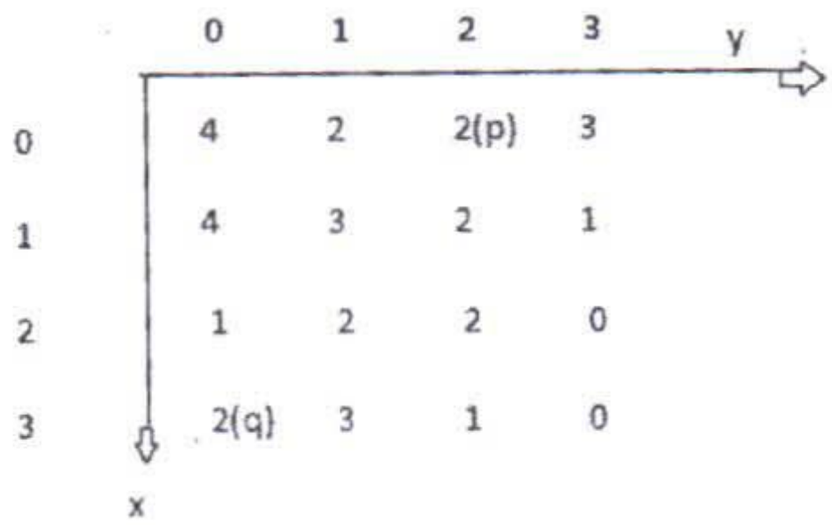
(c) Explain in detail wiener filter .Derive formula for transfer function of wiener filter in frequency domain. What are the advantages of wiener filter over inverse filter? (10)

Q. 5 (a) For the following image, Perform: (i) Low Pass Filtering (ii) High pass filtering (iii) Median filtering Comment on your results. (10)

| | | |
|---|---|---|
| 0 | 2 | 1 |
| 1 | 100 | 2 |
| 2 | 0 | 1 |

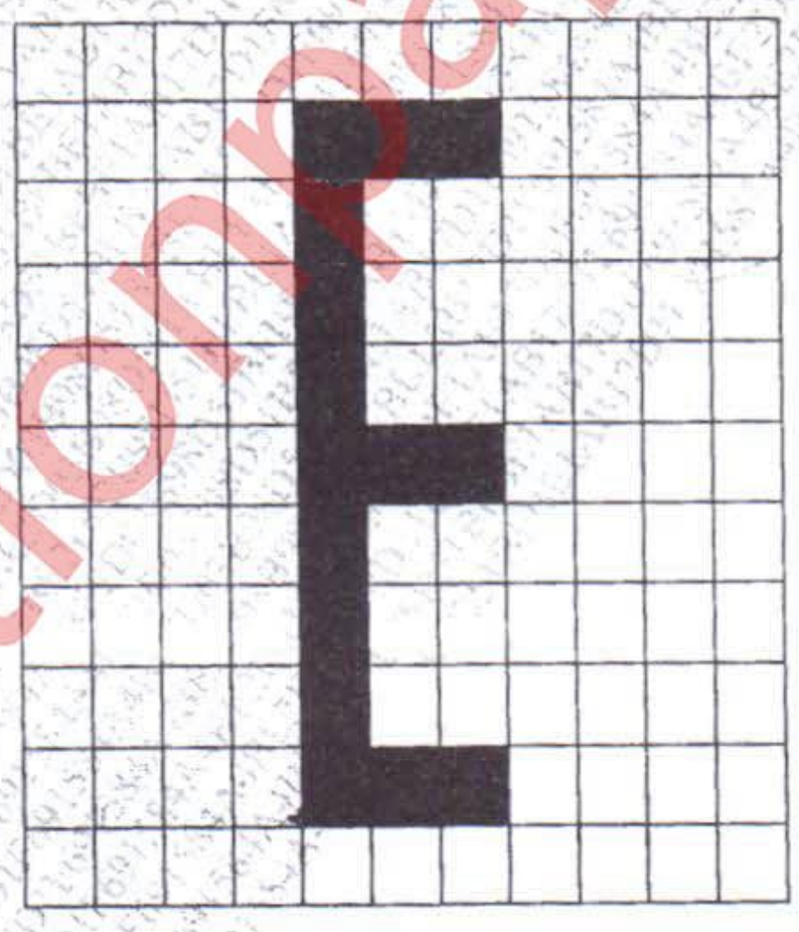
(b) Write difference between: Image Enhancement and Image Restoration (05)

(c) A 4x4 sub image is shown below. Let V = {2, 4}. Compute $D_4$, $D_8$ and $D_m$ distance between point p and q. (05)




Q.6 (a) Explain pixel based method of motion detection technique in video. (08)

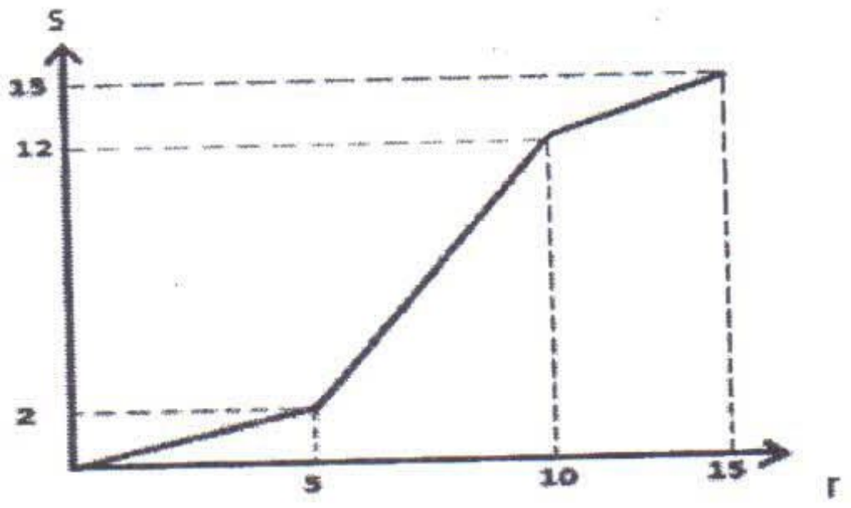
b) Segment the following image using split and merge technique .Draw quad tree representation for the segmented image (06)



(c) For the digital image shown below in figure D, perform following operations (06)

| | | | |
|---|---|---|---|
| 10 | 2 | 13 | 7 |
| 11 | 14 | 6 | 9 |
| 4 | 7 | 3 | 2 |
| 0 | 5 | 10 | 7 |

Figure (D)




Figure(C)

1) Contrast stretching as per the characteristics given in figure (C).
2) Draw the histogram of original and new image
3) Equalize the histogram