Total No. of Questions : 12]

SEAT No. :

**P3046**

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# [5154]-614

## B.E. (Electronics & Telecommunication)

## DIGITAL IMAGE PROCESSING

## (2012 Course) (Elective - I) (Semester - I) (End Sem)

*Time : 2½ Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

***Q1)*** a) Describe spatial resolution in images. **[4]**

b) List image file formats. Which information is available in the header of image file. **[2]**

OR

***Q2)*** a) Explain the terms: **[4]**

i) City block distance

ii) Chess board distance

b) Explain YIQ colour space. List its application. **[2]**

***Q3)*** a) Explain the difference between point processing and mask processing operation with the help of suitable example. **[4]**

b) What is meant by image smoothing? Write one application of the same. **[3]**

OR

***Q4)*** a) Explain image restoration with the help of block diagram. **[4]**

b) Which filter is used to remove salt and pepper noise effectively? Justify your answer. **[3]**

***P.T.O.***

***Q5)*** a) Explain the need of fidelity criteria in image compression. Write any two fidelity measures. **[4]**

b) How the entropy of image is calculated? Write significance of entropy in image processing. **[3]**

OR

***Q6)*** a) Generate Huffman code for following data. Calculate efficiency of Huffman code. **[4]**

| Graylevel | Probability |
|---|---|
| $a_1$ | 0.1 |
| $a_2$ | 0.4 |
| $a_3$ | 0.06 |
| $a_4$ | 0.1 |
| $a_5$ | 0.04 |
| $a_6$ | 0.3 |

b) What is meant by blocking artifact? Where is it observed? **[3]**

***Q7)*** a) What is image dilation? Perform image dilation of matrix A using structuring element S. **[9]**

$$A=\begin{bmatrix}0&0&0&0&0\\0&1&1&1&0\\0&1&1&1&0\\0&1&1&1&0\\0&0&0&0&0\end{bmatrix} \quad S=\begin{bmatrix}0&1&0\\1&1&1\\0&1&0\end{bmatrix}$$

b) What is image segmentation? Explain adaptive thresholding. Write its application. **[9]**

OR

***Q8)*** a) Explain how boundary extraction is achieved using dilation and erosion. Explain any one application of boundary extraction. **[9]**

b) Explain thinning and thickening operations in image morphology. Explain the term morphology. **[9]**

***Q9)*** a) What are chain codes? Explain with the help of example. **[8]**

b) What is image representation? Explain any two image representation techniques. **[8]**

OR

***Q10)***a) Explain boundary descriptors used in image processing. **[8]**

b) What is principal Component Analysis? Explain in detail and write its application. **[8]**

***Q11)***a) Explain template matching for object recognition with example. **[8]**

b) Explain the concept of classifier with the help of block diagram explain steps in typical object recognition process. **[8]**

OR

***Q12)***a) Explain character recognition system with the help of block diagram. **[8]**

b) What is content Based Image Retrieval? Explain one application in detail. **[8]**