

Total No. of Questions : 12]

SEAT No. :

P2021

[Total No. of Pages : 3

[5059] - 624

B.E. (E&TC) (Elective - I)

DIGITAL IMAGE PROCESSING

(2012 Course)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Your answers will be valued as a whole.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Explain the Human Visual system in detail. **[4]**
b) Explain in brief & with example three distance measures between pixels. **[3]**

OR

- Q2)** a) What is image subtraction? How the pixels are scaled between 0 to 255 after image subtraction. Give application of image subtraction operation. **[4]**
b) Explain HSI color model of an image **[3]**
- Q3)** a) Filter the following image using 3×3 neighbourhood averaging by assuming zero padding. **[4]**

$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 4 & 2 & 5 & 1 \\ 1 & 2 & 6 & 3 \\ 2 & 4 & 6 & 7 \end{bmatrix}$$

- b) Explain any three noise models in short. **[5]**

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OR

- Q4)** a) Explain following operations of image enhancement. [4]
i) Power law transformation.
ii) Contrast stretching.
b) Explain the concept of Homomorphic filtering. [3]

- Q5)** a) Compute the entropy of the image given by [4]

$$f(x,y) = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 3 \\ 1 & 2 & 2 & 3 \end{bmatrix}$$

- b) Explain the concept of bit plane coding. [3]

OR

- Q6)** a) Draw the block diagram of JPEG base line encoder. Explain each block in short. [4]
b) Define Lossless & Lossy compression. Explain with example how Runlength coding technique is used for Lossless Compression. [3]

SECTION - II

- Q7)** a) What is edge detection? Compare the performance of first order & second order derivative w.r.t. an image? Which one would you prefer for detecting edges? Why? [9]
b) Define image segmentation. What is Region based approach for image segmentation Explain Region growing & Region splitting and merging technique in detail. [9]

OR

- Q8)** a) Explain the following in detail. [10]
i) Hough transform
ii) Hit or Miss transform
b) Explain Global, adaptive and otsu's method of thresholding. [8]

Q9) a) What is the need of boundary descriptor. Explain 4-directional & 8-directional chain code with example. Hence obtain the object shape represented by 8-directional chain code (clock wise)

{0, 1, 5, 0, 6, 6, 4, 4, 4, 4, 2, 2} [8]

b) Explain the following Regional descriptors

i) Topological Descriptors [4]

ii) Texture descriptors [4]

OR

Q10)a) Explain in detail the concept of Fourier descriptor based boundary representation. What are its advantages [8]

b) Explain in detail the following [8]

i) Statistical moments

ii) Principle component Analysis

Q11)a) What is Pattern? Explain the representation of different pattern classes. [8]

b) Explain Biometric based Authentication system using image processing. [8]

OR

Q12)a) Explain Minimum distance classifiers and correlation based classifier in detail [8]

b) Explain Medical application of image processing in detail. [8]

