Total No. of Questions : 12]

SEAT No. :

P2021

[Total No. of Pages : 3

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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) Explian following operations of image enhancement. **[4]**

i) Power law transformation.

ii) Contrast streching.

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 Runlenght 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]**