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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, May 2013
(2008 Scheme)
08.626 : Elective – II : DIGITAL IMAGE PROCESSING (TA)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carry **4** marks.

1. State and prove any two properties of 2D DFT.
2. Calculate the time in minutes required to transmit 1024 ×1024, 256 gray level image using 56k modem.
3. An image is given by $u = \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$ and the transform basis is $\frac{1}{\sqrt{2}} * \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$. Find the transformed image.
4. You are given a 4×4 image and a mask. Convolve the image with the mask and give your result. Assume zeros outside the boundary of the image.

$$\begin{bmatrix} 1 & 8 & 6 & 6 \\ 6 & 3 & 11 & 8 \\ 8 & 8 & 9 & 10 \\ 9 & 10 & 10 & 7 \end{bmatrix}, \frac{1}{6} * \begin{bmatrix} 0 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Image **Mask**

5. Differentiate bit plane slicing technique from gray level slicing technique.
6. Whether two different images can have same histogram ? Justify your answer.
7. For an image having 256 gray levels in which each level has equal probabilities of occurrence. Obtain entropy.
8. Explain how region growing method is used.

P.T.O.

9. Mention the different types of edges in an image. Also give different operators that can be used to detect the edges in an image.
10. Briefly explain binary morphology.

PART – B

Answer **two** questions from **each** Module. **Each** question carries **10** marks.

MODULE – I

11. State and prove 2D sampling theorem in detail.
12. A HPF mask $h(x,y) = \begin{bmatrix} -1 & -1 & -1 \\ -1 & 8 & -1 \\ -1 & -1 & -1 \end{bmatrix}$ obtain the frequency domain equivalent H(u, v).
13. Compute 2D DFT of the gray scale image shown below $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{bmatrix}$.

MODULE – II

14. a) Show that a high pass filtered image can be obtained in the spatial domain as High Pass = Original – Low pass. Assume a 3×3 filter masks. 6
    b) Briefly explain histogram equalization. 4
15. a) Briefly explain the principle of homomorphic filtering used in image processing. 5
    b) Write an algorithm for computing median of an n×n neighbourhood. 5
16. Derive the transfer function of Wiener filter. Give the condition in which Wiener filter reduces to an Inverse filter ?

MODULE – III

17. a) How many unique Huffman codes are there for a three symbols ? Construct them. 5
    b) Give the concept of vector quantization compression. 5
18. Briefly explain different types of thresholding techniques used in image segmentation.
19. Write short notes on :
    i) Split and merge procedure in segmentation
    ii) Boundary descriptors.