M.Sc. Examination, 2019
Semester-IV
Computer Science
Course : MCSC-41
(Digital Image Processing)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions

1. a) What is image registration? In this context explain the use of template image. 2+1=3
   b) State the significance of cross-correlation. Justify its limitation with a small example. 1+3=4
   c) Hence mention as to how the limitation of cross-correlation measure may be overcome? 3
2. a) What is the importance of Discrete Fourier Transform in digital image processing? In this context, indicate the forward Fourier Kernel and backward Fourier Kernel. 2+(1+1)=4
   b) State and prove any two properties of Discrete Fourier Transform. (1+2)×2=6
3. a) What is Laplacian operator. State its significance in digital image processing. 2+2=4
   b) Design a two dimensional Laplacian operator of order 1 and hence deduce the corresponding Laplacian mask. 2+2=4
   c) Derive the time overhead of applying a first order Laplacian mask on an image of size M×N. 2
4. a) State one linear and one nonlinear spatial image filter. Explain their functionings. (1+2)×2=6
   b) Hence, compute the space and time overheads for such filters of order r, applied on image of size M× N. (1+1) ×2=4
5. a) Explain with a suitable example – 3×2=6
      i) Histogram equalization ii) Contrast stretching
   b) Explain the following transformations –
      i)Translation ii) Rotation iii) Scaling
      Justify the use of homogeneous representation. (1×3)+1=4
6. Write short notes on (**any two**) : 5×2=10
   a) Walsh-Hadamard Transform
   b) Colour Image Processing
   c) Pixel Adjacency

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