

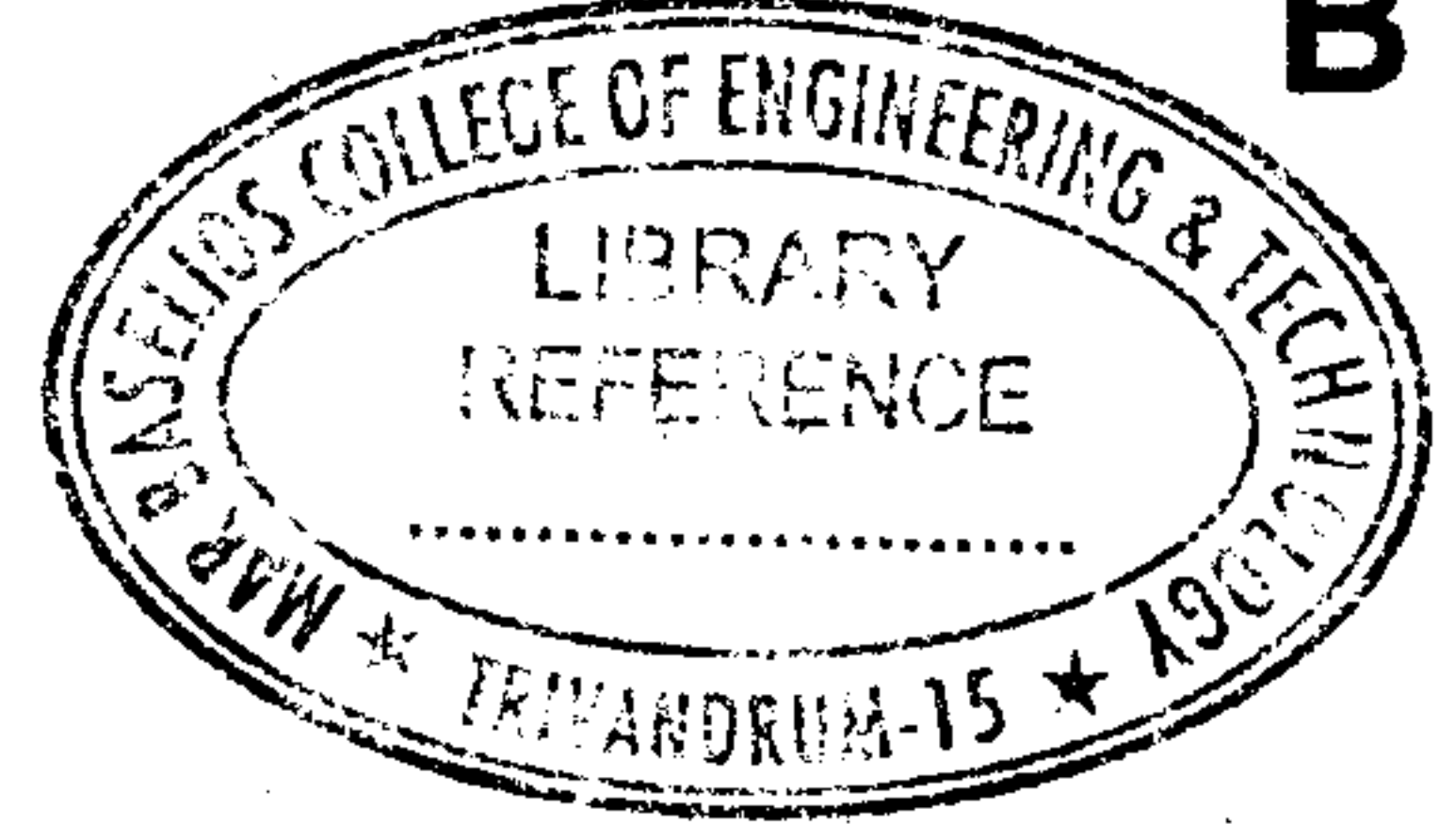


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B – 2910

Reg. No. : .....

Name : .....



**Second Semester M.Tech. Degree Examination, December 2016  
(2013 Scheme)**

**Electronics and Communication Engineering SP  
TAE2003/TSC2002 : DIGITAL IMAGE PROCESSING**

Time : 3 Hours

Max. Marks : 60

- Instructions :** 1) Answer *any two* questions from *each* module.  
2) *All* questions carry *equal* marks.

**MODULE – I**

1. State and prove the convolution property of 2D-FFT.
2. Describe histogram equalization. Obtain histogram equalization for the following image segment of size 5x5. Write the inference on image segment before and after equalization.

20	20	20	18	16
15	15	16	18	15
15	15	19	15	17
16	17	19	18	16
20	18	17	20	15

3. Obtain forward KL transform for the given vectors  $X_1 = [1 \ 0 \ 0]$ ;  $X_2 = [1 \ 0 \ 1]$ ;  $X_3 = [1, 1, 0]$

(Transpose these vectors) and analyze how the principle components are used for remote sensing applications ?

P.T.O.



MODULE - II

4. Compare the performances of the following gradient operators
  - i) Roberts
  - ii) Smoothed
  - iii) Sobel
  - iv) Isotropic.
5. What are the two basic morphological operations ? Explain them with their properties.
6. From the first principles explain (i) Distribution-entropy restoration and (ii) Log-entropy restoration.

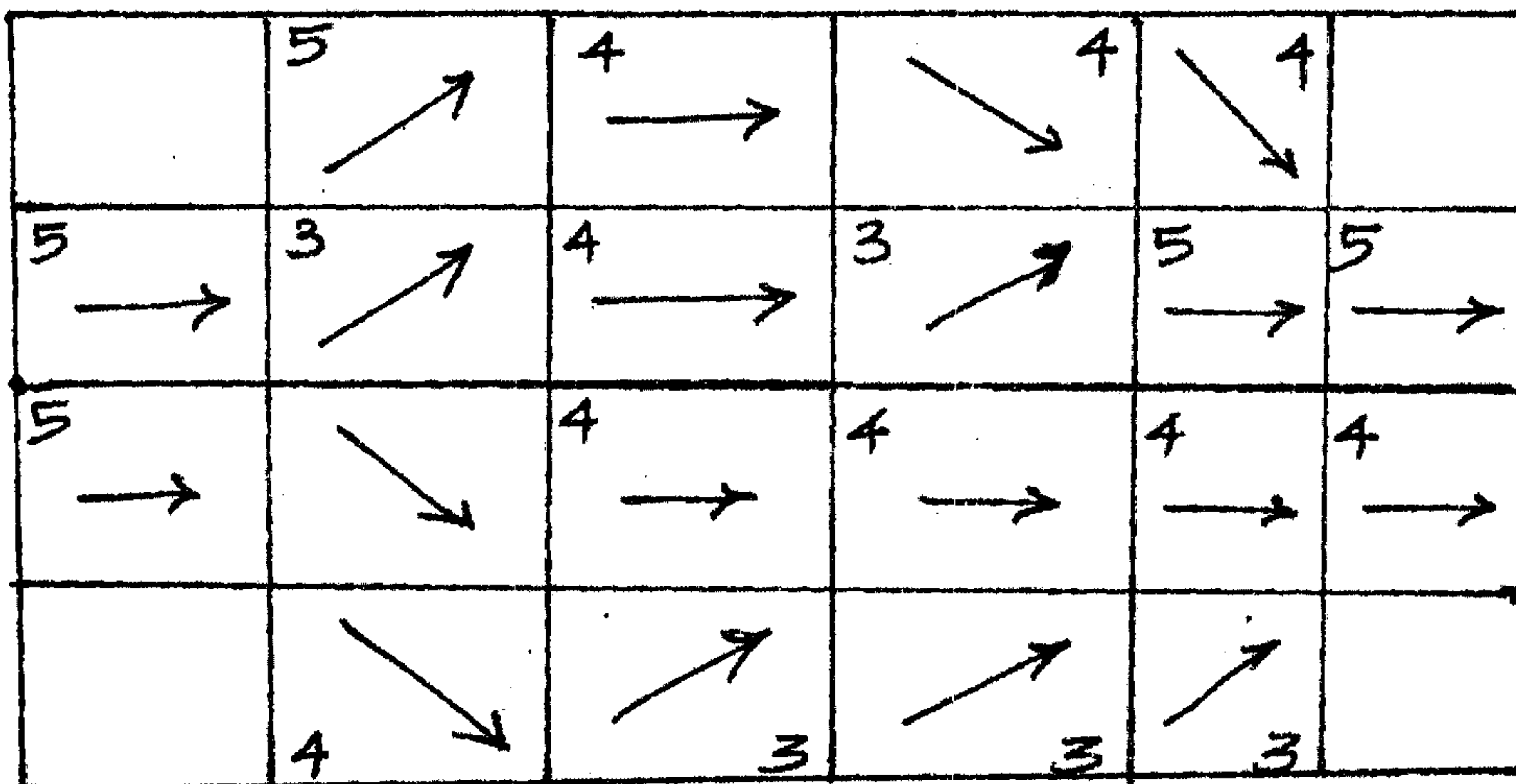
MODULE - III

7. For the image shown below compute the compression ratio that can be achieved

using Huffman coding

$$\begin{bmatrix} 3 & 3 & 3 & 2 \\ 2 & 3 & 3 & 3 \\ 3 & 2 & 2 & 2 \\ 2 & 1 & 1 & 0 \end{bmatrix}$$

8. Prove the following properties of a Radon transform.
  - i) Scaling
  - ii) Mass conservation.
9. The gradient magnitude and contour directions of a 4x6 image are shown in following figure.



Using the linkage rules, sketch the graph interpretation and find the edge path if the evolution function represents the sum of edge gradient magnitudes.