

**VIT[®]****Vellore Institute of Technology**
(Deemed to be University under section 3 of UGC Act, 1956)**School of Computer Science and Engineering****CAT - II****B.Tech [Computer Science] – IV Semester – C2 slot****Subject: Image Processing (CSE4019)****Duration: 90 minutes****Max. Marks: 50****Answer all the questions**

1. Compute Haar transform and its inverse for the given image,

10 marks

 $f(x,y) =$

1	1	1	1
0	0	0	0
0	0	0	0
0	0	0	0

2. Design a high emphasis filter using Butterworth high pass filter with $k_1 = 1$ and $k_2 = 2$ for a 5×5 image. D_0 value can be set by the user.

10 marks

3. Apply histogram based segmentation on the given image using a threshold value 90 and apply region splitting and merging on the segmented image using similarity of pixel gray level values and explain the process using a quad tree approach.

10 marks

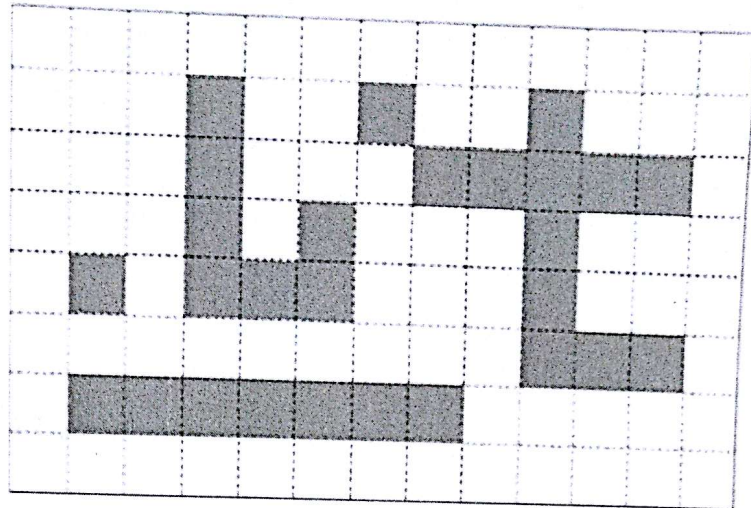
45	101	101	101	101	100	97	95
12	80	96	121	116	117	118	100
35	77	15	20	4	5	170	150
100	8	16	1	2	12	11	240
102	56	17	15	1	10	8	255
170	97	12	12	9	3	12	120
145	35	37	17	16	12	34	120
90	43	234	120	100	8	160	8

4. Apply Hit or Miss Transform on the given image and find the 4 connected endpoints using the structuring elements given below. Give the step by step procedure for at least two structuring elements. Black represents 1 and white represents 0.

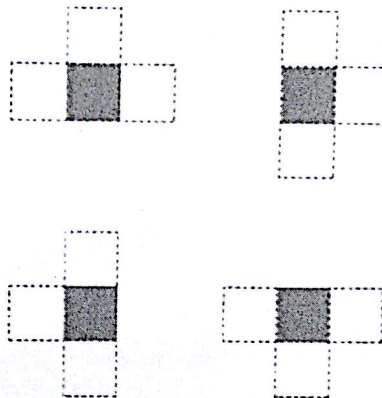
10 marks

P.T.O

A =



Structuring Elements



5. Apply skeleton for the given image A using the structuring element B.

10 marks

A =

1	1	1	0	0	1	1	1
0	1	1	0	0	1	1	0
0	1	1	1	1	1	1	0
0	1	1	1	1	1	1	0
0	1	1	1	1	1	1	0
0	1	1	1	1	1	1	0
1	1	0	0	0	0	1	1
1	1	1	1	1	1	1	1

B =

0	1	x
1	1	1
0	1	0