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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – JANUARY 2016

Course & Branch	:	**B.E.- Electrical & Electronics Engg.**	**Semester**	:	**VII**
Subject	:	**Digital Image Processing**	**Max. Marks**	:	**100**
Subject Code	:	**EEPE49**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

1. a) Explain the fundamental steps involved in digital Image Processing — CO1 (10)

   b) A medical image has a size of 8×8 inches. The sampling resolution is 5 cycles/ mm. How many pixels are required? Will an image of size 256×256 be enough? — CO1 (06)

   c) Suppose a camera is focused at a pillar of height 2 meters and situated at a distance of 10 meters. If the focal length of the camera is 10mm. What will be the height of the image produced in camera? — CO1 (04)

2 a) Describe the components of an image processing system. — CO1 (10)

   b) For V={2,3.4} compute the length of shortest 4,8,m path between p & q in the following image shown in image 2b). Repeat the same for V={1,2,3} — CO1 (06)

3	4	1	2	0
0	1	0	4	2q
2	2	3	1	4
P3	0	4	2	1
1	2	0	3	4

fig: image 2(b)

   c) An image in 2400 pixels wide and 2400 pixels high. The image was scanned at 300 dpi. What is the physical size of the image? — CO1 (04)

UNIT – II

3. a) Explain in details any two type of image enhancement techniques. CO1 (10)

   b) consider the following image shown in image 3b), having grey value between 0 to 15. Stretch the grey values uniformly and linearly in the entire range. CO1 (06)

   fig: image 3b)

10	11	12	11	10
12	12	13	5	4
13	12	5	3	5
13	12	4	3	5
12	4	3	4	4

   c) Draw the histogram of the image shown in image 3(b). CO1 (04)

4. a) Specify the objective of image enhancement techniques. CO1 (06)

   b) Perform law transformation on the given input value shown in image 4c) , for $\gamma=2.5$ and $\gamma=0.4$ and comment on compression and expansion observation. CO1 (08)

   c) Do the transformation $g1(v)=v+1$, $g2(v)=v^2$ and $g3(v)$ = negative transformation of the image $f(x,y)$ shown in image 4c). CO1 (06)

0	10	50	100
5	95	150	200
110	150	190	210
175	210	255	100

fig: image 4(c)

UNIT- III

5. a) Bring out the differences between spatial domain and frequency domain image enhancement approaches. CO2 (06)

   b) For the image segment shown in image 3 (b) apply i) smoothing filter, ii) weighted average filter, iii) median filter, iv) min filter, v) max filter, vi) midpoint filter, vii) laplacian filter only for 3×3 (4 connectivity & 8 connectivity) of size 3×3 and 5×5 on the pixel(3,3) CO2 (14)

6. a) Discuss characteristics of high boost filter in frequency domain. Explain how high boost filtering increases the enhancement of the images. CO2 (10)

   b) Suggest typical derivative for image enhancement CO2 (10)

   i) Roberts ii) Prewitt iii) sobel.

UNIT -IV

7. a) Write the application of image segmentation. CO2 (10)

   b) For the given 8×8 image in fig 7b), implement image segmentation using region growing technique based on CO2 (10)

   Max{f(x,y)}-min{f(x,y)}≤ th, here threshold value i) th= 3 , ii) th=4 and

   R R

   Seed points are pixel P(4,6) and pixel q(5,4).

5	6	6	6	7	7	6	6
6	7	6	7	5	5	4	7
6	6	4	4	3	3	5	6
5	4	3	2	7	5	4	3
5	4	4	3	2	1	0	2
1	2	2	3	3	4	4	5
1	0	0	4	4	5	5	6
7	7	6	6	5	5	4	4

fig: image 7b)

8. a) Write in details edge based segmentation. CO2 (10)

   b) For the given 8×8 image in fig 7b), implement image segmentation using region merging technique based on CO2 (10)

   Max{f(x,y)}-min{f(x,y)}≤ th, here threshold value i) th= 3 , ii) th=2.

   R R

UNIT -V

9. a) U=[1 1 1 1 CO3 (10)
   1 1 1 1
   1 1 1 1
   1 1 1 1], find forward and inverse hadmard transform.

   b) Find 2×2 Haar matrix H_2. Then find the forward Haar transform for CO3 (10)
   u=[1 1
   1 1].

10. a) Write the properties of DFT, DCT & DST CO3 (06)

    b) Find the transform matrix & KL transform of u=[4 -2 CO3 (14)
    -1 3]

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