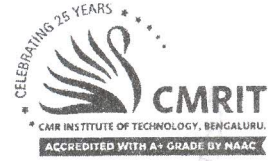


TAT-1 SCHEME OF EVALUATION

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USN

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Internal Assessment Test 1 – Sept. 2017

Sub:	Image Processing	Sub Code:	10EC763/ 10TE754	Branch:	ECE/TCE		
Date:	21/09/2017	Duration:	90 min's	Max Marks:	50		
		Sem / Sec:	7/ECE(D),TCE(A,B)		OBE		
Answer any FIVE FULL Questions					MARKS	CO	RBT
1 (a)	What is digital image processing? With a neat block diagram, explain the fundamental steps in Image Processing.				[10]	CO1	L4
2 (a)	Explain the process of sampling and quantization in image processing with example.				[08]	CO1	L4
	(b) Define spatial and gray level resolution.				[02]	CO1	L1
3 (a)	With a diagram, explain the components of an image processing system.				[06]	CO1	L4
	(b) Define 4- adjacency, 8- adjacency and m- adjacency. Give the advantage of m- adjacency.				[04]	CO1	L1
4 (a)	Explain image acquisition using single sensor.				[06]	CO1	L4
	(b) Calculate, how many minutes would it take to transmit a 512x512 image with 256 grey levels at 300 baud rate(Baud Rate is the number of bits transmitted per second. Assume each byte is one packet with a start bit and stop bit).				[04]	CO1	L3
5	With a neat diagram of the eye, explain the Human Visual System.				[10]	CO1	L4
6 (a)	Consider the image segment given in Fig 1 . Let $V = \{94, 95, 96, 97\}$. Compute the lengths of the shortest 4, 8 and m path between 'p' and 'q'. Indicate the shortest path by double lines.				[06]		
	<p>(p) 96 97 94 97</p> <p style="padding-left: 20px;">98 98 100 96</p> <p style="padding-left: 20px;">99 97 98 95</p> <p>(q) 97 96 97 96</p>					CO1	L3
	Fig 1.						
	(b) Mention the various applications of image processing.				[04]	CO1	L1
7	Discuss the following as applicable to image processing:				[10]		
	i) Image formation in the eye.					CO1	L2
	ii) Brightness adaption and discrimination in the eye.						
	iii) False contouring.						
	iv) Checker board effect.						

Pranav
18/5/17

SCHEME OF EVALUATION & SOLN. FOR NUMERICAL PROBLEMS

- 1) Digital image processing - Definition [1.5] [10M]
Fundamental steps in Image processing [8.5]
→ Block diagram [3.5]
→ Explanation for each block [5]
-
- 2) a) Sampling & Quantization - Definition [2+2] [8M]
Explanation with respect to image [2]
Relevant figures as example [2]
b) Definitions Spatial Resolution [1] [2M]
Gray level resolution [2]
-
- 3) a) Components of image processing system [6M]
→ Block Diagram [2]
→ Explanation for each block [4]
b) Definitions 4-adjacency [1] [4M]
8-adjacency [1]
m-adjacency + advantage [2]

Image acquisition using single sensor

[6M]

- Relevant figure [2]
- Brief explanation [3]
- Advantage and application area [1]

b) soln
 $M \times N = 512 \times 512$

[4M]

$$L = 256 \text{ (gray levels)} \Rightarrow L = 2^k = 2^8$$

$$k = 8$$

Total No. of bits $b = M \times N \times k$
 $= 512 \times 512 \times (8 + 2)$ [1 start & stop bit per packet]

$$b = 2,621,440 \text{ bits}$$

$$b = 320 \text{ KB} \quad [2]$$

Total time required to transmit this image over a 300 bps baud link

$$T = \frac{b}{\text{baud rate}} = \frac{320 \text{ KB}}{300}$$

$$T = \frac{320 \times 1024 \times 8}{300} = \frac{2621440}{300}$$

$$T = 8738.13 \text{ s}$$

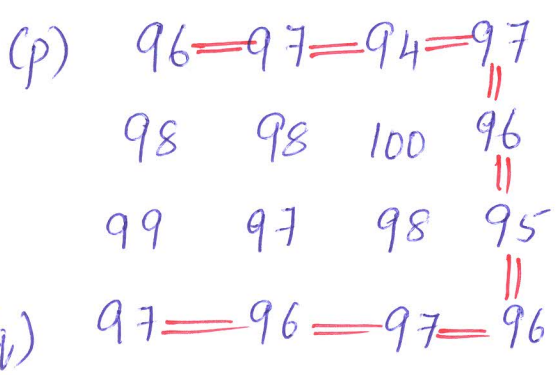
$$\Rightarrow T = 145.63 \text{ minutes} \quad [2]$$

5) Human Visual system

[10M]

- Neat diagram of c/s view of eye [5]
- Explanation of each part [5]

Q) To compute lengths of 4, 8 and m path b/w 'p' & 'q'

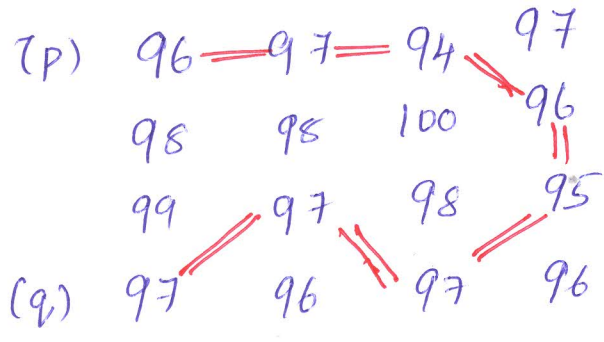


V = {94, 95, 96, 97}

shortest 4 path [2]

length = 9

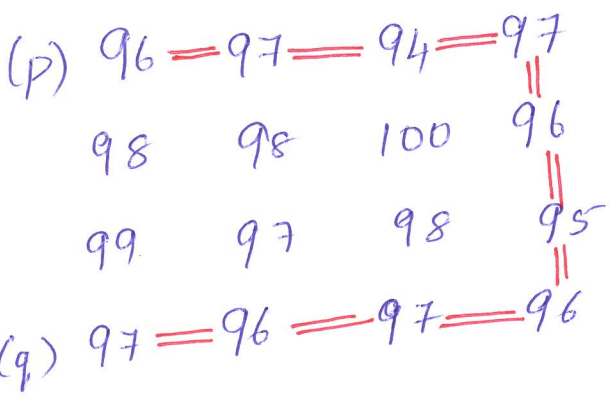
shortest 8 path



The shortest 8 path length = 7

→ It is not unique [2]

shortest m-path



The shortest m-path length = 9

[2]

b) Applications of image processing

[4]

→ Mention the different areas of applications

i) Image formation in the eye [4]

[10 M]

→ Explanation with figure

ii) Brightness adaption & discrimination [3.5]

→ Explain using isopreference curve

iii) Takté contouring [2.5]

→ definition / brief explanation

iv) Checker board effect [1]

→ definition / brief explanation