No. of Printed Pages : 4

Sl. No.

B3.E6-R5 : DIGITAL IMAGE PROCESSING

DURATION : 03 Hours **MAXIMUM MARKS : 100**

Roll No. : | | | | | | |

Answer Sheet No. : | | | | | | |

Name of Candidate : _____ **; Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English Language only.
- **Question paper contains Seven questions. The Question No. 1 is compulsory. Attempt any FOUR Questions from Question No. 2 to 7.**
- **Parts of the same question should be answered together and in the same sequence.**
- **Questions are** to be answered in the **ANSWER SHEET** only, supplied with the Question Paper.
- **Candidate cannot leave the examination hall/ room without signing on the attendance sheet and handing over his/her Answer Sheet to the Invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

1. (a) Define immersive and non-immersive Virtual Reality.

(b) What do you mean by Bit depth, Resolution, Horizontal resolution and Vertical resolution ?

(c) Explain the Mach band effect used in image processing.

(d) What do you mean by point and neighborhood processing ?

(e) Define Global and Local thresholding used in image segment.

(f) Explain the need of image fusion.

(g) Describe the role of λ in a Constraint least square filter.

(7x4)

2. (a) What do you mean by lower-level processing and higher-level processing used in image enhancement ? Explain their significance.

(b) Explain the role of Human Visual System in image processing.

(c) Compute the path length using 4, 8 and m-adjacency between p and q for V={0,1} of the following :

3		1	2	1(q)
2		2	0	2
1		2	1	1
1(p)		0	1	2

(6+6+6)

3. (a) How can you represent a digital image ? Enlist different types of images.

(b) Analyze and compare the output of Min, Max and Median filter of the following image :

1	4	0	1	3	1
2	2	4	2	2	3
1	0	1	0	1	0
1	3	1	0	2	2
2	5	3	1	2	5
1	1	4	2	3	0

(c) What are the different distance measures used to find the distance between two points ? Let p and q be the pixels at coordinates (10,15) & (15,25) respectively. Find out which distance measure gives the minimum distance between pixels.

(6+6+6)

4. (a) How does the Homeomorphism filter help to improve the appearance of image ?

(b) What are the filters used to remove noise in an image ?

(c) Suppose that a 3-bit image (L=8) has the intensity distribution shown in following table. What would the new enhanced transformed image after the histogram equalization process ?

Intensity	0	1	2	3	4	5	6	7
Number of pixels	70	100	40	80	60	40	08	02

(6+4+8)

5. (a) Show the steps of encoding the message "ABBABAS" using the LZW algorithm.

(b) How do we classify the image compression algorithm on the basis of coding ?

(c) For the following 8X8 image, show the steps of image segmentation using region splitting technique having the threshold value<=1.

1	1	1	1	1	1	1	2
1	1	1	1	1	1	1	0
3	1	4	9	9	8	1	0
1	1	8	8	8	4	1	0
1	1	6	6	6	3	1	0
1	1	5	6	6	3	1	0
1	1	5	6	6	2	1	0
1	1	1	1	1	1	0	0

(6+5+7)

6. (a) How does the Template matching work to map reference and sense image ? Explain in detail.

(b) (i) What are the basic geometric transformations used in a digital image to extract the features ?

(ii) Explain Histogram thresholding with an example.

(c) What are additive and subtractive color model ?

(6+6+6)

7. (a) How does correlation help to identify the location of an object in an image ?

(b) Explain the sliding window and Bounding Box method.

(c) (i) Enlist the features supported by Augmented Reality for the formation to build the model.

(ii) Explain in detail about the component to build the block of Virtual Reality.

(5+5+8)

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SPACE FOR ROUGH WORK