

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2020****Subject Code:2170308****Date:21/01/2021****Subject Name:Biomedical Image Processing****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1** (a) Explain visual perception of human eye. **03**
(b) Explain RGB and HSI color model. **04**
(c) Explain basic and non-uniform quantization of image. **07**

- Q.2** (a) Write applications of image processing in biomedical engineering. **03**
(b) Explain process of image filtering in spatial domain. **04**
(c) Discuss objectives of Image Enhancement. Explain enhancement using Arithmetic & Logic operations. **07**

- Q.3** (a) Explain need of morphological image processing. **03**
(b) Explain Hit or Miss Transform of image in Morphological Image Processing. **04**
(c) Explain Gaussian filter in frequency domain. Discuss its advantages of frequency domain filtering over spatial domain. **07**

- Q.4** (a) Explain opening and closing of image. **03**
(b) Explain High-boost filtering. **04**
(c) Write various filter masks for Image sharpening. Apply Image sharpening method on given image. **07**

$$f(x, y) = \begin{bmatrix} 3 & 4 & 5 \\ 6 & 6 & 7 \\ 1 & 2 & 2 \end{bmatrix}$$

- Q.5** (a) Explain basics of circular Hough transform. **03**
(b) Explain Canny Edge Detection. **04**
(c) Explain Region growing algorithm. Also show the results of the Region growing algorithm of given image. **07**

$$f(x, y) = \begin{bmatrix} 1 & 0 & 1 & 9 & 7 \\ 0 & 1 & 8 & 9 & 8 \\ 0 & 0 & 7 & 9 & 8 \\ 0 & 1 & 8 & 8 & 9 \\ 1 & 2 & 0 & 9 & 7 \end{bmatrix}$$

- Q.6** (a) Explain Bit-plane slicing. **03**
(b) Explain global thresholding. **04**
(c) Explain k-means clustering with example. **07**

- Q.7** (a) Explain image moments. **03**
(b) Explain the chain code with example. **04**
(c) Perform Histogram Equalization of following image. **07**

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

- Q.8** (a) Explain different types of image formats. **03**
(b) Explain image compression model. **04**
(c) Explain Huffman coding with given details. For the symbols a,b,c,d,e the **07**
respective probabilities are $p(a)=0.6$, $p(b)=0.5$, $p(c)=0.2$, $p(d)=0.1$, $p(e)=0.1$.

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