

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170308

Date:07-12-2024

Subject Name: Biomedical Image Processing

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1** (a) Differentiate between major camera sensors. **03**
 (b) Explain formation of image in human eye. **04**
 (c) Explain image sampling theory along with various sampling types. **07**

- Q.2** (a) Explain basics of derivative based edge detection method. **03**
 (b) Explain color model conversion from HSV to RGB. **04**
 (c) What is histogram? Explain histogram equalization process with example. **07**

OR

- (c) Explain Laplacian of Gaussian filter. Apply it on image given below. **07**

22	56	25	24
34	28	21	24
25	56	34	22
11	25	15	56

- Q.3** (a) Write down various applications of Morphological Operations. **03**
 (b) Explain intensity slicing with example. **04**
 (c) Draw block diagram of Frequency domain filtering. Explain various frequency domain low pass filters with necessary example. **07**

OR

- Q.3** (a) Explain extraction of connecting components in morphology. **03**
 (b) Perform boundary extraction on following image. **04**

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

- (c) Explain Hit or Miss transform with example. **07**

- Q.4** (a) Explain Applications of segmentation in medical images. **03**
 (b) Explain difference between thickening and thinning. **04**
 (c) Perform opening, closing, dilation and erosion on following image with given structural element. **07**

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

Image

1	0	1
1	0	1
1	0	1

Structural element

OR

- Q.4** (a) Give difference between global and adaptive thresholding. **03**
(b) Explain linear hough transform using example. **04**
(c) Explain region based segmentation. **07**

- Q.5** (a) Explain Chain codes in brief. **03**
(b) Explain lossy compression method with example. **04**
(c) Discuss K-means clustering algorithm with necessary equations. **07**

OR

- Q.5** (a) Enlist types of image features. Explain any one in brief. **03**
(b) Draw and explain image compression model. **04**
(c) Discuss Huffman coding with suitable example. **07**
