

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3170308

Date: 03/06/2026

Subject Name: Biomedical Image Processing

Time: 02:30 PM TO 05:00 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.

- Q.1**
- (a) Elaborate Image formation in human eye. 03
 - (b) Discuss Steps for digital image processing. 04
 - (c) Explain various pixel operations and connectivity. 07

- Q.2**
- (a) Describe image negative with its application on 5*5 image size examples. 03
 - (b) Discuss various quantization methods. 04
 - (c) Apply contrast stretching for the given below image. 07

100	200	223	145	156
120	143	170	136	230
130	200	176	158	180
147	210	186	250	164
168	215	216	254	179

OR

- Q.2**
- (c) Draw histogram of given below image and perform equalization. 07

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

- Q.3**
- (a) Explain bit plane slicing using example. 03
 - (b) Explain Sharpening frequency domain filters. 04

(c) Perform Hit-or-Miss Transform on following data.

07

0	1	0	0	1		1	1	1
1	1	1	0	1		1	0	1
1	0	1	0	0		1	1	1
1	1	1	0	1				
0	0	1	0	0				
image					structuring element			

OR

Q.3 (a) Explain Region filling. 03

(b) Explain Thinning and Thickening morphological operations. 04

(c) Perform opening and closing on following data. 07

1	1	0	0	1		1	1	1
1	1	1	0	1		1	0	0
1	0	1	1	1		1	0	0
1	1	1	0	1				
0	0	1	0	0				
image					structuring element			

Q.4 (a) Explain Convex Hull 03

(b) Explain canny edge detection. 04

(c) Perform dilation and erosion on following data. 07

1	1	0	0	1		1	1	0
0	1	0	0	1		0	1	0
1	1	1	1	1		0	1	1
1	1	1	0	1				
0	0	1	1	0				
image					structuring element			

OR

Q.4 (a) Differentiate between Adaptive and Global thresholding. 03

(b) Explain Circular Hough transform in brief. 04

(c) Discuss K- Means clustering for image segmentation. 07

- Q.5**
- | | | |
|------------|--|-----------|
| (a) | Give difference between Lossy and Loss less Compression. | 03 |
| (b) | Draw and Explain Compression model. | 04 |
| (c) | Explain region based segmentation techniques with one example. | 07 |

OR

- Q.5**
- | | | |
|------------|--|-----------|
| (a) | Explain any one lossy compression technique. | 03 |
| (b) | Explain Arithmetic Coding in brief. | 04 |
| (c) | Explain Following: | 07 |
| | 1. Chain Codes | |
| | 2. Image Features. | |
