Enrolment Number: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.TECH EXAMINATION (MID SEMESTER)

8th SEMESTER (EVEN-2024)

SUBJECT NAME (CODE): Digital Image Processing for Biomedical (203111453) **BRANCH: Biomedical Engg**

DATE: 24/01/2024 **TIME: 10:30 A.M. To 12:00 P.M.** **TOTAL MARKS: 40**

Sr No.		Marks
Q.1 (A)	**Multiple Choice Questions:**	**05**
(1)	Which of the following is NOT a common image file format? (a) JPEG (b) GIF (c) BMP (d) XML	
(2)	What does the term "RGB" stand for in the context of color representation in digital images? (a) Red, Green, Blue (b) Real, Gradient, Brightness (c) Retro, Grey, Black (d) Rough, Grayish, Brown	
(3)	What is the purpose of the Fourier transform in image processing? (a) To convert an image to the frequency domain (b) To reduce the number of pixels in an image (c) To add color to a grayscale image (d) To rotate an image by 90 degrees	
(4)	Which of the following is the first and foremost step in Image Processing? (a) Image acquisition (b) Segmentation (c) Image enhancement (d) Image restoration	
(5)	_____ represents the transition between image function's continuous values and its digital equivalent. (a) Rasterization (b) Quantization (c) Sampling (d) None of the above	
Q.1 (B)	What is the Singular value decomposition for the image F? $F = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & -1 & 0 \end{bmatrix}$	**05**
Q.2	**Attempt any four (Short Questions):**	**12**
(1)	What is the need of image transform? List out various transform used in image Processing.	
(2)	Give the difference between Image Enhancement and Image Restoration.	

(3) Compute D_e, D_4, and D_8 distance between two pixels x and y be (0, 0) and (6, 3) respectively.

(4) Check whether the matrix $A=\begin{bmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$ is orthogonal or not.

(5) What do you mean by Image Negative? Obtain the digital negative of the following 8 x 8 grey scale image.

122	150	200
225	225	225
250	250	240

Q.3 Attempt any two: **08**

(1) What are the various fundamental steps in digital image processing? Explain in detail.

(2) What do you mean by Bit-plane slicing? Show the bit-plane slicing on the following image and prove the transformation of an image.

7	6	5
4	3	2
1	1	0

(3) Prove that Hadamard Transform works for the following image

$$F=\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$

Q.4 (A) Find the 2D convolution of the given matrices. **05**

Input

5	8	3
3	2	1
0	9	5

Kernel

-1	-2	-1
0	0	0
1	2	1

Q.4 (B) Explain image quality assessment tool on given image matrix and Calculate Histogram based on frequency and also Histogram based on Probability. **05**

0	5	7	7	5	8	7	8
7	2	6	2	6	5	6	8
6	9	7	7	0	7	2	7
6	6	1	7	6	7	7	5
9	6	0	7	8	2	6	7
2	8	8	2	7	6	7	8
7	3	2	6	1	7	5	8
9	9	5	6	7	7	7	7

OR

What is Histogram? Perform Histogram equalization for the 8 x 8 image shown in table:

r_k	0	1	2	3	4	5	6	7
p_k	2	2	10	10	20	8	6	8