Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Summer 2018 - 19Examination

Semester: 8 **Date: 29/4/2019**
Subject Code: 03111452 **Time: 10:30 am To 1:00 pm.**
Subject Name: Digital image processing for Biomedical **Total Marks: 60**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions- (All are compulsory) (Each of one mark) (15)

Multiple Choice Question:

1.Black and white images have only
   A. 2 levels
   B. 3 levels
   C. 4 levels
   D. 5 levels

2. Which is the image processing technique used to improve the quality of an image for human viewing?
   A. Compression
   B. Enhancement
   C. Restoration
   D. Analysis

3.Select one of the most appropriate application of Computer vision?
   A. Medical computer imaging
   B. Remote sensing
   C. Geographical map
   D. Medical diagnosis

4. One that is not field of x-ray band
   A. industry
   B. astronomy
   C. radar
   D. medical diagnoses

5.Each element of matrix is called
   A. dots
   B. coordinate
   C. pixels
   D. value

Fill in the blank:

6.Black color in image processing is usually represented by the_____.

7.Intensity levels in 8bit image are_____.

8.1024 x 1024 image has resolution of_____.

9.Correction of power law response is called_____.

10. Computerized axial tomography uses_____rays.

Answer the flowing questions:

11. What is image?

12. Find the number of bits required to store a 256 X 256 image with 32 gray levels.

13. An audio signal is sampled at 8kHz and quantized with 16bits/sample. What is the bandwidth requirement?

14. What are the types of light receptors?

15. Give the conditions for perfect transform?

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Draw and explain an environment of image processing along with brief survey of image processing applications.

B) What is Histogram? Draw histogram patterns of Dark, Bright, Low and High contrast Image.

C) How to detect discontinuities in a digital image? Explain it in detail.

D)Define:

1). Spatial Resolution 2). Quantization 3). Entropy 4). Magnification factor 5). Bit depth

Q.3 **A)** What is the need of compression? Give the classification of Lossless compression algorithms. Implement Run-Length coding on given image. **(07)**

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

B) Enlist and explain image arithmetic operations with necessary applications. Consider the following two images and perform addition, subtraction, multiplication and division operations on it. **(08)**

$f_1 = \begin{pmatrix} 1 & 3 & 7 \\ 5 & 15 & 75 \\ 200 & 50 & 150 \end{pmatrix}$ and $f_2 = \begin{pmatrix} 50 & 150 & 125 \\ 45 & 55 & 155 \\ 200 & 50 & 75 \end{pmatrix}$

OR

B)Explain principle of Region-Growing algorithm in detail. For the given image show the result of Split-and-merge algorithm. **(08)**

2	2	2	2	2	2
2	9	9	9	9	2
2	4	9	9	4	2
2	4	8	8	4	2
2	4	8	8	4	2
2	4	4	4	4	2

1). What is the result if the Threshold value is 5?

2). What is the result if the Threshold value is 3?

Q.4 **A)** What is the need of image transform? Give the classification of image transform. Also prove that the unitary transforms work for the given image. **(07)**

F=$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ by using the given unitary transform kernel $\frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$

OR

A) Enlist and explain first order Edge Detection operators in detail. **(07)**

B) What is the role of image Morphology operations in image processing? Enlist and explain basic Morphological algorithms in brief. **(08)**