Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B. Tech. Summer 2018 - 19 Examination

Semester: 8 **Date: 29/04/2019**
Subject Code: 03107451 **Time: 10:30 am to 01:00 pm**
Subject Name: Digital Image Processing **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** - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1. The effect, caused by the use of an insufficient number of gray levels in smooth areas of a digital image is called……..
2. For a given set of conditions, the current sensitivity level of the visual system is called……
3. The range of values spanned by the gray scale is called…….range.
4. ……embodies the achromatic notion of intensity.
5. ……..is called automatic image enhancement technique.
6. PDF in image processing is called……
7. Dark characteristics in an image are better solved using……
8. Gaussian noise is referred to as……. noise.
9. Pseudo colours are also known as……. colours.
10. Thinning operation is used to remove the ……..pixels.
11. In contrast stretching, if $r1 \leq r2$ and $s1 \leq s2$ then which of the following is true?
    A. The transformation function is double valued and exponentially increasing.
    B. The transformation function is double valued and monotonically increasing
    C. The transformation function is single valued and monotonically increasing
    D. The transformation function is single valued and exponentially increasing
12. A spatial domain filter of the corresponding filter in frequency domain can be obtained by applying which of the following operation(s) on filter in frequency domain?
    A. The narrower the frequency domain filter results in increased blurring
    B. The wider the frequency domain filter results in increased blurring
    C. The narrower the frequency domain filter results in decreased blurring
    D. None of these
13. Which image processing technique is used to eliminate electronic noise by mathematical process?
    A Frame averaging C Image understanding
    B Image compression D None
14. RGB colors on internet applications are called
    A. Safe colors B. Colors space
    C. Safe web colors D. Web colors
15. Power spectra and noise of undegraded image must be known is a statement of
    A Wiener filter C Inverse filter
    B Constrained least squares filter D Max filter

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

A) Draw the block diagram of components of digital image processing and briefly explain each of the block.

B) Draw and explain in brief the model of the degradation/restoration process.

C) Define the following terms:
1. Radiance: 2. Luminance, 3. Brightness, 4. All-systems safe colour, and
5. False colour (Pseudocolor) image processing

D) What is redundancy in image? Explain in brief different types of redundancy available in the digital image.

Q.3 A) The intensity distribution of a 3-bit image of size 64×64 pixels is given below: **(07)**

r_k	r_0	r_1	r_2	r_3	r_4	r_5	r_6	r_7
n_k	790	1023	850	656	329	245	122	81

B) "Multiplying the image with $-1^{(x+y)}$ in spatial domain leads to shift of 2-D Fourier transform to the centre." Justify the statement with necessary derivations. **(08)**

OR

B) What are lossless compression techniques? Explain Huffman encoding with suitable example. **(08)**

Q.4 A) Discuss image gradient and its properties with necessary equations? List out the mask of various operators used for image segmentation based on edge detection. **(07)**

OR

A) Explain dilation and erosion morphological operations. Prove that dilation and erosion are duals of each other with respect to set complementation and reflection. **(07)**

B) Explain Canny edge detection technique in detail. **(08)**