Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2018

Subject Code: 2181102 Date: 30/04/2018

Subject Name: Fandamental of Image Processing(Departmental Elective - III)

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.**

Q.1 **(a)** Explain basic processes involved in generation of digital image. **03**

(b) Explain structure of human eye and discuss human vision system **04**

(c) Consider that image is corrupted by salt and pepper noise. Suggest better method to remove salt and pepper noise from the image. Explain that method and write pseudo code for the same. **07**

Q:2 **(a)** Explain the gamma correction technique for image enhancement **03**

(b) What is contrast stretching? Explain any one contrast stretching function with help of graph **04**

(c) What do you mean bit plane slicing? Explain in brief. Consider the image given below. Obtain the new image if we set **07**

1. Lower order two bit plane to zero.
2. Higher order two bit plane to zero

12	13	14	15
4	5	6	7
8	9	10	11
0	1	3	2

OR

(c) Equalize the given histogram **07**

Grey value	0	1	2	3	4	5	6	7
Probability	790	1023	850	656	329	245	122	81

Q.3 **(a)** Explain procedure for Image sampling and quantization. **03**

(b) What is an image averaging? Discuss an application of same. **04**

(c) (a) Explain why the discrete histogram equalization technique does not, in general, yield a flat histogram. Suppose that a digital image is subjected to histogram equalization. **07**

(b) Show that a second pass of histogram equalization will produce exactly the same result as the first pass.

OR

Q.3 **(a)** Discuss the limiting effect of repeatedly applying 3x3 lowpass spatial filter to a digital image. You may ignore border effects. **03**

(b) Explain the following spatial filters (1) Derivative filter (2) Laplacian filter **04**

(c) What are the processing steps for Frequency domain filtering? What is ringing effect and why it happens? Compare ideal, Butterworth and Gaussian low pass filters. **07**

Q:4 **(a)** Explain the process of edge detection using gradient operators **03**

(b) Explain segmentation using Laplacian of Gaussian. **04**

(c) Explain global and local thresholding in image segmentation. **07**

OR

Q.4	**(a)**	What is morphology? Discuss two basic morphological operations Erosion and Dilation.	**03**
	(b)	Prove that dilation and erosion are duals of each other with respect to set complementation and reflection.	**04**
	(c)	Explain HIT-MISS transformation with example.	**07**
Q.5	**(a)**	What is inverse filtering?	**03**
	(b)	Explain Noise probability density function for Gaussian noise and impulse noise.	**04**
	(c)	What type of redundancy is removed by the arithmetic coding? Decode the message 0.23355 using arithmetic decoding. Symbol and its probability is given below:	**07**

Symbol	Probability
a	0.2
e	0.3
i	0.1
o	0.2
u	0.1
!	0.1

OR

Q.5	**(a)**	Discuss 2D Discrete Fourier Transform with the help of equations.	**03**
	(b)	What is the difference between image enhancement and image restoration? Explain image degradation model.	**04**
	(c)	Perform LZW compression on string “ABABBABCABABBA”.	**07**

OR

Q.5	**(a)**	What is pseudo colouring?	**03**
	(b)	What are different ways of region based segmentation? Explain anyone with an example.	**04**
	(c)	Explain homomorphic filtering with block diagram.	**07**

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