Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 713103N **Date: 03-12-2014**

Subject Name: Biomedical Image Processing

Time: 10:30 am - 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 *Log* and *Power-law* transformations and discuss their applications for biomedical images.	**07**
	(b)	A medical x-ray image has poor contrast at diagnostically important area. State and explain *any two techniques* for improving its contrast.	**07**
Q.2	**(a)**	Define 2-D Fourier transform and state its limitations. What is a short term Fourier transform (STFT)? Discuss its applications for medical images.	**07**
	(b)	Explain *Gabor transform* in detail stating suitable applications for medical images.	**07**
		OR	
	(b)	What is a *Random transform?* State is applications.	**07**
Q.3	**(a)**	Explain *mean* and *median* filters with their appropriate applications to medical images.	**07**
	(b)	What is image degradation? Discuss various spatial filtering methods used for image restoration.	**07**
		OR	
Q.3	**(a)**	Explain various *image sharpening methods* stating their typical applications to the medical images.	**07**
	(b)	Explain *minimum mean-square error* and *least-square error* restoration methods.	**07**
Q.4	**(a)**	How is *segmentation* useful for medical images? Discuss with a case study.	**07**
	(b)	Explain *Sobel* and *Canny edge detection* techniques.	**07**
		OR	
Q.4	**(a)**	Explain threshold-based segmentation approaches with applications.	**07**
	(b)	Explain *region growing* and *region splitting & merging* segmentation techniques.	**07**
Q.5	**(a)**	Explain *Global* and *Local histogram equalization* techniques. How they are useful for biomedical images?	**07**
	(b)	State and describe various arithmetic and logic operations for image enhancement. Write their usefulness for medical images.	**07**
		OR	
Q.5	**(a)**	Describe the process of *spatial filtering* of an image. What is a *Laplacian mask?* State its usefulness and applications.	**07**
	(b)	Explain *unsharp masking* and *high-boost filtering* methods with their typical applications.	**07**

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