Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II • EXAMINATION –SUMMER 2015

Subject Code: 2724112 **Date: 01/06/2015**

Subject Name: Digital Video Processing

Time:02:30 p.m. – 05:00 p.m. **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)**	Describe 3-D displacement of a rigid object in Cartesian coordinates.	**07**
	(b)	Explain photometric image formation for a static surface and discuss the photometric effects of 3-D motion.	**07**
Q.2	**(a)**	How to obtain analog and digital video representation? Draw few sampling structures for both the representations along with their corresponding sampling matrix.	**07**
	(b)	Derive the relationship between Fourier transform of sampled signal and that of continuous signal.	**07**
		OR	
	(b)	Explain the process of 1-D interpolation in brief. Also draw impulse response of few practical interpolation filters.	**07**
Q.3	**(a)**	Write a short note on estimations of gradients for optical flow equation.	**07**
	(b)	Explain the search procedures for finding the best matching block.	**07**
		OR	
Q.3	**(a)**	Explain Metropolis algorithm for sampling the solution space.	**07**
	(b)	Discuss how thresholding is used to segment a video frame. Explain the method of finding optimum threshold.	**07**
Q.4	**(a)**	Explain 2-D trajectory model and 3-D rigid motion model in brief.	**07**
	(b)	Differentiate batch estimators and recursive estimators. Explain extended Kalman filtering in brief.	**07**
		OR	
Q.4	**(a)**	Write a short note on 3-D feature matching for motion estimation.	**07**
	(b)	Develop a maximum posteriori probability estimation framework for stereo motion fusion based on dense displacement field models in case of single rigid object in motion.	**07**
Q.5	**(a)**	Define motion trajectory. Derive the spatio temporal spectrum of video having global motion with constant velocity.	**07**
	(b)	What are critical velocities? Discuss in detail.	**07**
		OR	
Q.5	**(a)**	Write a short note on motion compensated reconstruction filtering.	**07**
	(b)	Explain digital video and digital video standards.	**07**

****