Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 1724104 Date: 04-12-2014

Subject Name: Digital Video Processing

Time: 02:30 pm - 05:00 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)**	Justify the need of digital video over analog video. Briefly explain various Digital video Standards. Also list out disadvantages/limitations of digital video.	**07**
	(b)	Derive the equation of rotation matrix with Eulerian angles in Cartesian co-ordinates for rigid object.	**07**
Q.2	**(a)**	Describe perspective projection in detail.	**07**
	(b)	Derive the equation that relates Fourier Transform of sampled signal $S_p(F_1, F_2)$ to that of Fourier Transform of continuous signal $S_c(F_1, F_2)$ for rectangular sampling.	**07**
		OR	
	(b)	Explain photometric image formation.	**07**
Q.3	**(a)**	Explain sampling of time varying images $S_c(X, t) = S_c(x_1, x_2, t)$ on three dimensional sampling structure.	**07**
	(b)	Briefly describe the Occlusion problem and Aperture problem in motion estimation.	**07**
		OR	
Q.3	**(a)**	Describe sampling lattice conversion in detail.	**07**
	(b)	Explain Netravali-Robbins Algorithm for motion estimation.	**07**
Q.4	**(a)**	Briefly describe optical flow with it difference from two dimensional displacement/velocity. Also derive Optical Flow Equation (OFE).	**07**
	(b)	Derive the relationship between minimization of the Displaced Frame Difference (DFD) and Optical Flow Equation (OFE)?	**07**
		OR	
Q.4	**(a)**	Describe two block motion models namely translational and deformable block motion.	**07**
	(b)	Write a short note on gradient based optimization.	**07**
Q.5	**(a)**	Write a short note on Motion tracking.	**07**
	(b)	Write a short note on Direct methods for motion segmentation.	**07**
		OR	
Q.5	**(a)**	Briefly explain phase correlation method and it implementation on computer hardware.	**07**
	(b)	Write a short note on sub-Nyquist spatio-temporal sampling.	**07**

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