Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 1724104 **Date: 20-06-2014**

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)**	Explain the NTSC and PAL video standards in detail.	**07**
	(b)	Explain the perspective projection in detail.	**07**
Q.2	**(a)**	Images with sharp spatial edges are not bandlimited. Discuss how you would digitize an image that is not bandlimited	**07**
	(b)	Discuss photometric effects of 3-D motion.	**07**
		OR	
	(b)	Discuss the conditions under which the orthographic projection provides a good approximation to imaging through an ideal pinhole camera.	**07**
Q.3	**(a)**	Explain the nonparametric models for 2D motion estimation.	**07**
	(b)	Explain gradient estimation using finite differences and gradient estimation by local polynomial fitting approach in detail.	**07**
		OR	
Q.3	**(a)**	Discuss the aperture problem for the cases of (i) single pixel matching,(ii) line matching,(iii) curve matching, and (iv) corner matching.	**07**
	(b)	Explain Wiener-estimation based method for block motion with suitable equations.	**07**
Q.4	**(a)**	The MAP estimator has been found to be highly sensitive to the values of the parameters λ_d, λ_0 and λ_1 , which are free parameters. How would you select them?	**07**
	(b)	Explain the Bayesian Segmentation algorithm in detail.	**07**
		OR	
Q.4	**(a)**	Show that the MAP segmentation reduces to the K-means algorithm if we assume the conditional pdf is Gaussian and no ñ*a priori*ò information is available.	**07**
	(b)	Explain the Region Tracking algorithm and show the state-space formulation for Kalman Motion filters and Geometric filters.	**07**
Q.5	**(a)**	Explain the motion tracking with monocular video in detail.	**07**
	(b)	Can you conclude that the best motion-compensated filtering strategy is filtering along the motion trajectory, even in the case of an arbitrary motion trajectory?	**07**
		OR	
Q.5	**(a)**	Derive the equation : $X\hat{c}_R = R_R X_R + T_R$.	**07**
	(b)	Comment on the tradoffs between the width of the passband versus the number of framestores required to implement a motion-compensated low-pass filter, and the ability to reject close replicas versus motion estimation errors.	**07**

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