Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1724104 **Date: 11/12/2015**

Subject Name: Digital Video Processing

Time:2:30 pm to 5:00 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 basic concept and need for Digital Video Processing.	**07**
	(b)	List out the various observation noise in the digital video.	**07**
Q.2	**(a)**	Explain the sampling lattice conversion technique in detail with suitable example.	**07**
	(b)	Explain the perspective projection geometry model with necessary equations.	**07**
		OR	
	(b)	What are the conditions for the existence of normal flow? Can we always recover optical flow from the normal flow? Discuss the relationship between the spatial image gradients and the aperture problem.	**07**
Q.3	**(a)**	How do you deal with the boundary effects in the phase-correlation method? Can we use the discrete cosine transform (DCT) instead of the DFT?	**07**
	(b)	Discuss how you would digitize an image that is not bandlimited, because images with sharp spatial edges are not bandlimited.	**07**
		OR	
Q.3	**(a)**	State the conditions on spatio-temporal image intensity and the velocity under which the optical flow equation can be used for displacement estimation. Why do we need the small motion assumption?	**07**
	(b)	Discuss the aperture problem for the cases of (i) single pixel matching, (ii) line matching, (iii) curve matching and (iv) corner matching.	**07**
Q.4	**(a)**	Explain the Bayesian Segmentation algorithm in detail.	**07**
	(b)	How do you define the joint pdf of a discrete-valued GRF?	**07**
		OR	
Q.4	**(a)**	Discuss the Wiener-Estimation based algorithms in detail with suitable derivations.	**07**
	(b)	Explain the selection procedure of the parameters λd, λ0, and λl for the MAP estimator using Konrad-Dubois Method.	**07**
Q.5	**(a)**	Show that the MAP segmentation reduces to the K-means algorithm if we assume the conditional pdf is Gaussian and no *a priori* information is available.	**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)**	Do you prefer to model the flow discontinuities through a segmentation field or through line fields? Why?	**07**
	(b)	Explain the Spatio-Temporal Fourier spectrum in detail.	**07**

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