Total number of printed pages: **Programme(UG)/Semester/UECE813A**

2023

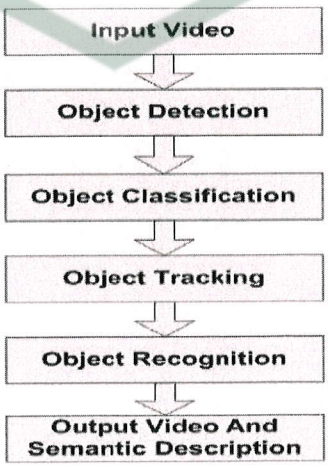
Computer Vision

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	State application of Feature extraction in computer vision. Name five feature extraction techniques.	2+2
	b)	State why of the Psi-Tomasi corner detection algorithm performs better over Moravec' corner detection algorithm. Discuss how the corners are detection using these algorithms.	3+13
2	a)	Write the Mean-shift algorithm for image segmentation. Write the expression of Normal kernal and Epanechinov kernel for mean shift algorithm.	10+2
	b)	State active contour algorithm for image segmentation	8
3	a)	State the difference between Xray, CT-scan and MRI imaging. State how Radon transform forms 3D image from 2D projection of X-Rays.	5+10
	b)	Name two quality metric which measures the performance of image segmentation. Write the mathematical formulae of them.	5
4	a)	Discuss the function of each steps of video surveillance system in the following figure 	12

	b)	Discuss the unified representation of rotation for 3D images for three different camera axes.	8
5)	a)	Arrange the following steps in image formation by camera. a) Real world coordinate b) Camera coordinate c) Image plane coordinate d) Object coordinate e) Pixel coordinate Discuss which are among them are intrinsic and extrinsic parameters.	2+2
	b)	Discuss the image formation in a single camera setup with necessary mathematical interpretation.	16
6)	a)	What is stereo metric vision. Is depth-sensing is possible in a single-camera system? How stereo-metric vision helps to estimate depth of an object?	1+2+8
	b)	Define optical flow. State the assumptions considered in Lucas-Kanade motion estimation method. Discuss how motion is estimated using Lucas - Kanade motion estimation method.	2+7
7		Write short notes (Any two)	10x2
	a)	SIFT	
	b)	Horn-Schunk's Motion estimation method	
	c)	Harris Corner detection	
	d)	Line and curve detection using Hough transform	