Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (INFORMATION TECHNOLOGY / COMPUTER AND COMMUNICATION ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2018

SUBJECT: PROGRAM ELECTIVE IV: COMPUTER VISION [ICT 4018]

REVISED CREDIT SYSTEM

(27/11/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any, may be suitably assumed.

1A. Explain median filter. What advantage does a median filter have over a mean filter? Is median filter a kind of convolution? Using a window size of three apply a median filter for the 1D signal X=(2, 80, 60, 3, 4, 7, 6, 10, 10, 2). **5**

1B. List and explain any three constraints/criterion to consider into account while designing for a good edge detector. **3**

1C. Prove that the composition of two isometries is an isometry. **2**

2A. Explain how Scale Invariant Feature Transform can be used to build for

i) Detector
ii) Descriptor

5

2B. For the below assertion, say whether it is true or false and support your answer with example or counter example.

i) As σ increases, less pixels are involved in the average.
ii) Corner location is covariant w.r.t. rotation.
iii) Two dimensional Gaussian can be separated into 2 one-dimensional Gaussians.

3

2C. Explain hysteresis threshold step used in Canny edge detection method. **2**

3A. Derive the equation for optical flow. Explain how Horn and Schunck method is used to find the optical flow. **5**

3B. Consider a vector whose endpoint is (X1,Y1,Z1). Let R denote the length of the vector and φ denote the angle the vector makes with X-axis. Assume that the vector is rotated by angle Θ around the Z-axis in the counter clockwise direction. Find

i) The new coordinates (X2,Y2,Z2) of the point after rotation.
ii) The rotation matrix.
iii) The inverse rotation matrix.

3

3C.	Explain how final feature vectors are generated for 64 x 128 image in HOG descriptor.	**2**
4A.	Write an algorithm for finding fundamental matrix.	**5**
4B.	Explain Histogram based threshold method to segment the text in the gray scale image.	**3**
4C.	Explain probabilistic skin classification method.	**2**
5A.	Write step by step procedure for face recognition. Give the steps for training and recognition.	**5**
5B.	Write Hough transform algorithm for fitting circle using polar form of equation of a circle.	**3**
5C.	Briefly explain any four feature of an image.	**2**