Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

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

MAKEUP EXAMINATIONS, DECEMBER 2019

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

REVISED CREDIT SYSTEM

(28 /12/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Write an algorithm to find corners in an image using Harris corner detection method. **5**

1B. Derive the clockwise rotation matrix along X, Y and Z direction. **3**

1C. Discuss the properties of a Gaussian. Show that Gaussian is separable. **2**

2A. Explain the steps involved in finding an edge in an image using the Canny edge detector. Table: Q.2A shows the image smoothened by Gaussian. Check if the pixel value 6 represents an edge using the Canny edge detector. Use central difference for filtering. Assume a threshold of 0.1. **5**

Table: Q.2A

5	4	3	2
4	6	4	2
3	4	5	3
4	3	4	4

2B. Using 3 x 3 median filter smoothen the image data given in Table: Q.2B **3**

Table: Q.2B

25	5	10	20	20
20	15	10	20	15
30	20	30	30	20
15	20	35	10	50
10	10	10	10	10

Also, Prove that the median filter is not a convolution.

2C. Prove or Disprove the following statement: **2**

Parallel lines in 3D space converge to a vanishing point in the image plane.

3A. Bring out the relation between Correlation and Sum of square differences. Show how this result helps in finding the difference in intensity E(u,v) at a shifted location (u,v) on using the window function. **5**

3B. Explain the SIFT feature extraction algorithm. Also explain, why it is scale invariant. **3**

3C. A scene point at coordinates (800, 1200, 2400) is perspectively projected into an image at coordinates (48,72), where both coordinates are given in millimeters. The camera coordinate frame and the camera's principal point is at coordinates (0,0,f). What is the focal length of the camera? **2**

4A. Using Principal Component Analysis (PCA) to reduce the dimensionality of the data given below: **5**

X	10	20	30	40	50	60	70	80	90
Y	20	30	40	50	60	70	80	90	100

4B. Explain different image segmentation techniques. **3**

4C. Write an algorithm for finding optical flow using Horn and Schunck method. **2**

5A. Write an algorithm to detect human in an image. **5**

5B. Explain the method for face detection using skin pixel identification. **3**

5C. If F is the fundamental matrix of the camera-pair (P, P'), then what is the fundamental matrix for (P', P) ? **2**