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

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

END SEMESTER EXAMINATION, DEC 2021

SUBJECT: PROGRAM ELECTIVE- IV COMPUTER VISION [ICT 4031]

REVISED CREDIT SYSTEM

(27/12/2021)

MAX. MARKS: 20

Instructions to Candidates:

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

1A. Given the set of values in Table Q.1A, find the new set of values if one of the dimensions is reduced using the PCA algorithm. **5**

Table Q.1A

x	10	15	24	36	26	18	30	16	10	5
y	20	30	50	80	60	40	60	30	15	40

1B. Apply 3 x 3 median filter for the image block given in Table Q.1B. **3**

Table Q.1B: Image Block			
10	20	10	25
40	50	10	20
5	10	15	20
35	40	50	40

1C. Why camera calibration is important? Where is it applied? **2**

2A. How to track a specific object in a video? Assume that the object is a rigid body and only translation and rotations are applied to it. Write an algorithm for the same. **5**

2B. The relative magnitude and orientation in a 4 x 4 neighborhood at a key point are given in Table Q.2B.1 and Table Q.2B.2 respectively. Note that in this problem key point is described using 4 x 4 block instead of 16 x 16 block. Compute SIFT descriptor for this key point. **3**

Table Q.2B.1: Magnitude			
70	60	40	30
50	30	40	20
10	20	45	50
20	25	30	40

Table Q.2B.2: Orientation			
45	180	360	270
90	60	30	300
290	200	75	90
320	190	30	45

2C. Using a suitable image matrix and Gaussian kernel show that 2D Gaussian kernel is separable. **2**