Reg. No. ☐☐☐☐☐☐☐☐☐☐

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

II SEMESTER M.TECH. (CSE/CSIS)

END SEMESTER EXAMINATION, MAY 2023

SUBJECT: COMPUTER VISION & IMAGE PROCESSING [CSE 5005] (ELECTIVE – II)

(26 / 05 /2023)

Time: 3 Hours   MAX. MARKS: 50

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| **Instructions to Candidates:** |
| ❖ Missing data may be suitably assumed. |
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Q No.	Questions	Marks	CO	AHEP LO	Blooms Level
1A.	Comment on the results of reducing gray level resolution and spatial resolution of an image? How do you enhance image by applying piecewise linear transformation function.	4M	CO1	1	2
1B.	With respect to histogram processing, illustrate the process of matching histogram of one image with that of a reference image.	4M	CO1	1	3
1C.	It is required to compute the threshold automatically for different images. Provide the necessary steps to achieve this.	2M	CO2	3	3
2A.	Give details on how 2D spatial filtering will be used for image enhancement.	3M	CO1	1	1
2B.	Identify the main limitation of Harris interest point detector? How does Scale Invariant Feature Transform (SIFT) overcome this limitation?	4M	CO2	3	3
2C.	Mention any four factors that cause edges in an image. How do you perform non maxima suppression to detect pixels close to the true edges in a given image.	3M	CO2	3	1
3A.	According to you whether Hit or Miss transform can be used for template matching? If yes, how is it done?	3M	CO2	3	3
3B.	How are lanes and lines detected using Hough Transform? Consider slope intercept line equation and explain.	4M	CO2	3	1

3C	A mobile robot is fitted with stereo cameras. How will it calculate the depth from two *stereo* images? Illustrate with a neat diagram.	3M	CO3	2	2
4A.	Elucidate the steps involved in Hartley's 8-point algorithm to compute Fundamental matrix.	3M	CO3	2	3
4B.	Describe the optical flow method for motion estimation. Mention the practical difficulties?	4M	CO4	1, 3	2
4C.	Derive the motion vector matrix using Lucas Kanade method.	3M	CO4	1, 3	3
5A.	With respect to camera calibration, what are intrinsic and extrinsic camera parameters? Provide the 3D transformation matrices that are required to derive a camera matrix? Write the matrices in homogeneous form.	4M	CO3	2	3
5B.	How do you use K nearest neighbor for object classification? Explain.	3M	CO5	1, 3	3
5C.	With respect to the model fitting method RANSAC, answer the following. (i) Suppose we know that 30% of our data is outliers. How many times do we need to sample to assure with probability 20% that we have at least one sample being all inliers? (Consider number of points in the sample = 2) (ii) What is the minimum number of points we must sample in a seed group to compute an estimate for a circle?	3M	CO2	3	3

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