

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

| April-May 2023 (B.Tech) Program: EX Examination: LY Semester: VIII | | | | |
|--|---|----------------|----|---|
| Course Code: EXDLC8033 Duration: 2.5 Hours | | Max. Marks: 60 | | Course Name: Autonomous Vehicle Date of Exam: 18/05/2023 |
| Instructions: (1) All questions are compulsory. (2) Draw neat diagrams wherever applicable. (3) Assume suitable data, if necessary. | | | | |
| | | Max. Marks | CO | BT level |
| Q 1 | Solve any six questions out of eight: | 12 | | |
| i) | Define sensor calibration with example | 2 | 2 | U |
| ii) | Explain sensor fusion with Example. | 2 | 1 | U |
| iii) | Define monocular cue. | 2 | 3 | R |
| iv) | List steps required in motion estimation method for obstacle detection. | 2 | 3 | U |
| v) | How gradient is calculated for Hog descriptor. | 2 | 5 | U |
| vi) | Define mapping problem and localization problem | 2 | 4 | U |
| vii) | Explain how maps are represented in autonomous vehicle. | 2 | 5 | U |
| viii) | Explain Belief Representation in AV. | 2 | 3 | U |
| Q.2 | Solve any four questions out of six. | 16 | | |
| i) | Explain Algorithm for Hough Transform. | 4 | 1 | Ap |
| ii) | Explain Sensor model for Landmark based Maps | 4 | 2 | U |
| iii) | Compare different levels of Autonomous vehicle based on autonomy level. | 4 | 3 | U |
| iv) | Explain the architecture of Planning and control System of AV. | 4 | 4 | U |
| v) | Explain modular design architecture of dragon fly vehicle. | 4 | 5 | U |

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|------|--|----|---|----|
| vi) | What is CANopen protocol and explain the usability of object dictionary for it. | 4 | 2 | Ap |
| Q.3 | Solve any two questions out of three. | 16 | | |
| i) | What are the different types of 3D camera, list down application of 2D and 3D camera | 8 | 5 | U |
| ii) | Explain YOLO algorithm for object detection. | 8 | 4 | U |
| iii) | Explain seven layers of technologies to build Computer Vision hardware for autonomous vehicle. | 8 | 1 | U |
| Q.4 | Solve any two questions out of three. | 16 | | |
| i) | Explain Sensor calibration process using Example. | 8 | 2 | U |
| ii) | Explain Markov Localization algorithm. | 8 | 3 | U |
| iii) | Explain Model Predictive control for autonomous Vehicle. | 8 | 6 | U |
