

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023

ROBOTICS AND AUTOMATION

(2020 SCHEME)

Course Code: 20RBT312

Course Name: Sensors and Transducers

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

1. Compare proprioceptive sensors and exteroceptive sensors.
2. List any three applications of Inertial Measurement Unit.
3. Explain the principle of operation of 1D Laser displacement sensor.
4. Differentiate between Contact and Non-Contact Sensors.
5. Explain the working principle of Image Sensor.
6. Explain Stereovision.
7. Compare primary and secondary transducers.
8. What are Piezoelectric transducers?
9. Illustrate the different types of Orifice plates.
10. What is the application of a Bourdon tube?

PART B

(Answer one full question from each module, each question carries 14marks)

MODULE I

11. a) Explain the working of any two position sensors used in robotics. (10)
- b) Illustrate the working of Global Positioning System and its applications. (4)

OR

12. a) Explain the working of any two velocity sensors used in robotics. (10)
- b) Illustrate the following sensor specifications: (i) Hysteresis (ii) Non linearity. (4)

MODULE II

13. a) Explain the working of active range sensors and its applications. (10)
b) Explain the working of : (i) Limit Switch (ii) Bumper sensor switch (4)

OR

14. a) Explain the concept of tactile sensing. Elaborate whether tactile sensors can be replaced by proximity sensors for robotic applications. (10)
b) Illustrate the phase shift measurement using Laser Range Finder. (4)

MODULE III

15. a) Explain the working principle of CCD camera. (6)
b) Illustrate the various techniques used for image processing. (8)

OR

16. a) Explain the working of a Kinect Sensor and its applications. (6)
b) Describe the various elements of a vision sensor. How can the features be extracted using vision sensor? (8)

MODULE IV

17. a) What is LVDT? What are the parameters that can be measured by this? Describe with a neat diagram how displacement is measured using LVDT. (10)
b) Differentiate analog and digital transducers with suitable examples. (4)

OR

18. a) Draw and explain any two types of accelerometers. (6)
b) Explain any two types of velocity transducers. (8)

MODULE V

19. a) List out different types of Thermocouples. Mention the materials used for its construction. Explain how temperature is measured using Thermocouples. (6)
b) Explain the working principle of any two types of flow transducers with neat diagrams. (8)

OR

20. a) What are Thermistors? Explain how temperature is measured using Thermistors. (6)
- b) Explain the working principle of any two types of level transducers with neat diagrams. (8)
