Register No.:　.................................　Name:　...

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 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. State the purpose of a heading sensor. List various types of heading sensors.
2. Explain the working principle of a DC tachogenerator.
3. Differentiate between Contact and Non-Contact Sensors.
4. List the applications of tactile sensing in Robotics.
5. What is Thresholding in vision systems?
6. Explain the working principal of Image Sensor.
7. Differentiate between primary and secondary transducers.
8. Explain the principle of operation of a velocity transducer.
9. Illustrate the different types of Orifice plates.
10. List out any six types of Thermocouples.

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

MODULE I

11. a) Explain the working of an optical absolute encoder. How the number of tracks and sectors of absolute encoder is related to the resolution of the encoder? (8)

　　b) Illustrate the measurement of velocity using Hall Effect sensors. (6)

OR

12. a) Illustrate the working of Global Positioning System and its applications. (8)

　　b) Define following sensor characteristics:
　　　i. Sensitivity　ii. Precision　iii. Resolution (6)

MODULE II

13. a) Differentiate between optical triangulation (1D) and structured light(2D) methods with neat diagrams.   (10)

    b) Explain the working of i. Limit Switch   ii. Bumper sensor switch.   (4)

OR

14. a) Illustrate the working of capacitive proximity sensor with applications.   (7)

    b) Explain the phase shift measurement using laser range finder.   (7)

MODULE III

15. a) Illustrate any three techniques used for image processing.   (6)
    b) Differentiate between CCD and CMOS cameras with neat skethes.   (8)

OR

16. a) What is visual servoing? Enumerate different types of visual servoing.   (7)
    b) Explain the process of image acquisition.   (7)

MODULE IV

17. a) Illustrate the working of any two types of accelerometers.   (8)
    b) Explain the working principle of a velocity transducer.   (6)

OR

18. a) Enumerate the classification of transducers based on physical effect.   (6)
    b) What is LVDT? What are the parameters that can be measured by this? Describe with a neat diagram how displacement is measured using LVDT.   (8)

MODULE V

19. a) Describe the flow measurement in venturi tube.   (7)
    b) Explain a capacitive level sensor with a neat diagram.   (7)

OR

20. a) What are Thermistors? Explain how temperature is measured using Thermistors.   (7)
    b) Explain level measurement using pressure sensor.   (7)

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