

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023**(2020 SCHEME)****Course Code: 20RBT292****Course Name: Sensors and Actuators for Robot****Max. Marks: 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. List the advantages of linear potentiometer position sensor.
2. Appraise pulse counting method of velocity measurement.
3. List the disadvantages of limit switch contact sensor.
4. Write short note on force contact sensor.
5. Categorize areas of processing and analysis of images in robot vision.
6. Outline kinect sensor user interface.
7. Draw the block diagram of DC Chopper speed control.
8. Enlist the advantages of brushless motors.
9. Summarize common methods of linear actuation mechanism.
10. Explain the working principle of Cam & follower.

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

11. a) Illustrate strain gauge accelerometer with suitable diagram. (7)
- b) Outline ultrasonic trilateration system to position series robots. (7)

OR

12. a) Interpret optical gyroscope for measuring angular speed. (7)
- b) Write short note on torque sensors. (7)

MODULE II

13. a) Infer tactile sensor working for object detection with respect to multiformity. (7)
- b) Identify doppler-based motion detector. (7)

OR

14. a) Describe inductive proximity sensor of non-contact method. (7)
- b) Summarize structured lighting method of range finding. (7)

MODULE III

15. a) Identify edge detection technique for segmentation. (7)
b) Explain CID camera for image acquisition. (7)

OR

16. Illustrate criteria for selection of sensors for robotic application. (14)

MODULE IV

17. a) Inspect and explain an electric motor in robot arm to pick an object. (10)
b) List the advantages of pneumatic actuator over hydraulic actuator. (4)

OR

18. a) Demonstrate the basic components of a hydraulic system with application in robot. (10)
b) Outline the motor characteristics for selection. (4)

MODULE V

19. a) Compare and contrast belt driven and ball screw driven actuator with advantages and disadvantages. (6)
b) Classify and explain different types of gears in transmission mechanism. (8)

OR

20. a) Explain the working principle of electromagnetic and piezoelectric actuation. (10)
b) Describe ratchet and pawl transmission. (4)
