

- (c) What is a I/O line. Explain with examples where they are used. (6)
6. (a) Explain the following terms: Simplex, Half Duplex, and Full Duplex communication. (6)
- (b) Explain the working principle of ultrasound sensors. Give its applications. (6)
- (c) Where are DC motors used in robotics? How can a DC motor be used in both clockwise and anticlockwise direction in a robot? (6)
7. (a) Elaborate on various challenges faced in robotics. (6)
- (b) Discuss the application of robotics in the field of healthcare. (6)
- (c) Explain the mechanism for speed control of a DC motor in robotics (6)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5067

J

Unique Paper Code : 2514010017

Name of the Paper : Robotics

Name of the Course : **B.Sc. (H) Electronics (GE)**

Semester : VI

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** questions carry equal marks.
3. **First** Question is Compulsory.

1. (a) What are sensors? Explain 2 different types of sensors used to measure distance. (6×3=18)
- (b) Explain the importance of pattern recognition in robotics?

- (c) Define the terms Yaw, Pitch and Roll.
- (d) What is the features and purpose of Sophia Robot.
- (e) Identify the following as a sensor or an actuator :
- (i) Gripper
 - (ii) LCD display
 - (iii) Camera
- (f) What are 4 D's of Robotics?
2. (a) Define robotics. Discuss the main components of a robotic system. (6)
- (b) Mention Sir Isaac Asimov's three Laws of Robotics, and how do they guide robot behavior? (6)
- (c) Explain the following terms: Payload, Reach and Precision. (6)
3. (a) What are links and joints? Discuss the degree of freedom for various kinds of joints available. (6)

- (b) What is the significance of magnetometer, gyroscope and accelerometer in smartphone applications. Mention any two applications where these sensors are used. (6)
- (c) Explain the role of Grippers in a pick and place robot. Mention various types of grippers. (6)
4. (a) Explain the various signals available in an Arduino board. Discuss the usage of these signals in real-world application. (6)
- (b) What are setup() and loop() functions in Arduino IDE. What is a library? Mention any 3 libraries and their uses. (6)
- (c) Write a program/ algorithm / pseudocode for a robot to alert through a buzzer if an object is detected. (6)
5. (a) Explain any 3 performance characteristics of a sensors. (6)
- (b) Classify and discuss various kinds of actuators used in robotics based on the source of their input power. List two advantages and disadvantages for each. (6)