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## Fifth Semester B.E. Degree Examination, June/July 2019 Automation and Robotics

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Write neat sketches wherever required.*

### Module-1

- 1 a. Define automation. Explain the three different types of automation with graph. (08 Marks)  
b. Enumerate the reasons for Automation in manufacturing industry. (08 Marks)

OR

- 2 a. Explain the basic elements of an automated system with sketch. (08 Marks)  
b. Explain the different types of FMS. (08 Marks)

### Module-2

- 3 a. List the different classification of Robot configuration. Explain briefly with neat sketches the jointed arm and cylindrical co-ordinate configuration robot. (08 Marks)  
b. Define industrial robot as per RIA. With neat sketch, explain the Robot Anatomy. (08 Marks)

OR

- 4 a. Explain the Robot motions and sketch the different types of joints used in robots. (08 Marks)  
b. Explain the following with respect to robot:  
i) Spatial resolution  
ii) Accuracy  
iii) Repeatability (08 Marks)

### Module-3

- 5 a. List out the various types of controllers of control system. Explain the PI and PID controllers with transfer function. (08 Marks)  
b. Write down the characteristic equation for a Spring-Mass-Damper system/ Based on the damping classify the four types of system. (08 Marks)

OR

- 6 a. Explain the following position sensors:  
i) Potentiometers (10 Marks)  
ii) Encoders (06 Marks)  
b. Explain with schematic diagram the working of a stepper motor.

### Module-4

- 7 a. What are tactile sensors? Explain briefly the touch and force sensors. (08 Marks)  
b. Explain the major uses of sensors in industrial robotics and other automated manufacturing systems. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. With a neat block diagram, explain the functions of machine vision system. (08 Marks)  
b. Explain the basic types of lighting devices used in machine vision system. (05 Marks)  
c. Enumerate the scheme of image data reduction in image processing and analysis. Explain any one type. (03 Marks)

Module-5

- 9 Write short notes on the following:  
a. Robot intelligence  
b. Mechanical design features  
c. Mobility, locomotion and navigation  
d. Advanced sensor capabilities (16 Marks)

OR

- 10 a. Explain briefly the two schemes for problem representation with example. (10 Marks)  
b. Explain briefly the following search techniques used in problem solving with sketch:  
i) Depth-first search  
ii) Breadth-first search (06 Marks)

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