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20SCS332

Third Semester M.Tech. Degree Examination, Jan./Feb. 2023
Robotics and Automation

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List and explain the reasons for automation. (10 Marks)
   b. Explain Ten strategies of automation and production systems. (10 Marks)

OR

2 a. Explain the components of a manufacturing system. (10 Marks)
   b. Explain with a diagram a typical automation migration strategy. (10 Marks)

Module-2

3 a. Define an Industrial Robot and State Asimov's laws for robotics. (08 Marks)
   b. Discuss robot anatomy and sketch the following robot configuration :
      (i) Polar configuration   (ii) Cylindrical configuration. (12 Marks)

OR

4 a. Explain the following with respect to robot :
      (i) Spatial resolution   (ii) Accuracy (10 Marks)
   b. How work volume of robot is determined? Sketch work volumes of cylindrical and Cartesian robots. (10 Marks)

Module-3

5 a. What is block diagram? Explain basic elements of Block diagram. (10 Marks)
   b. For the set of equation below, develop the block diagram which uses X(s) as the system input and Y(s) as the system output.
$$W(s) = X(s) - Y(s)$$
$$V(s) = W(s) - Z(s)$$
$$Z(s)(s+5) = V(s)(s+2)$$
$$Y(s)(s^2 + 5s + 6) = Z(s)$$
(10 Marks)

OR

6 a. Explain: (i) Potentiometer   (ii) Encoder (10 Marks)
   b. Explain Hydraulic and Pneumatic actuators. (10 Marks)

Module-4

7 a. Explain the uses of sensors in Industrial Robotics. (10 Marks)
   b. Explain with a neat sketch Proximity sensor using reflected light against a sensor array. (10 Marks)

OR

8 a. Explain the operation of the machine vision system with a neat diagram. (12 Marks)
   b. Explain the segmentation technique with an example. (08 Marks)

Module-5

9   Write a short notes on the following :
    a. Mechanical design features
    b. Robot Intelligence
    c. Mobility, Locomotion and Navigation
    d. System integration and networking   **(20 Marks)**

OR

10   a. What are the goals of Artificial Intelligence Research?   **(10 Marks)**
    b. List all search techniques in problem solving and explain Breadth first search.   **(10 Marks)**

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