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E&I
27/4/16 FN

Question Paper Code : 52598

B.E/B.Tech. DEGREE EXAMINATION, APRIL 2016

Eighth Semester

Electronics and Instrumentation Engineering

EE 2023/EE 603/10133EEE14 – ROBOTICS AND AUTOMATION

(Common to Instrumentation and Control Engineering)

(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is meant by robot anatomy ?
2. Write Asimov's laws of robotics.
3. What is gear ratio ?
4. Write the role of tactile sensor.
5. Define actuators.
6. Mention the features of grippers.
7. Determine the co-ordinates of a robot having arm length of 500 mm, its initial position is (5,10) and rotates at an angle of 30° clockwise.
8. An RR robot has two links of length 1m. Assuming that the origin of the global co-ordinate system is at joint J1. Determine the joint rotation if the end-effector is located at (2,5).
9. Name few applications of multiple robots.
10. What are the parameters to be considered for selecting a robot ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Explain the various generations of robots. (8)
(ii) State and derive Asimov's laws of robotics. Also give its features and limitations. (8)

OR

- (b) With necessary diagrams, explain the different types of robotics in different applications. (16)

12. (a) (i) Explain with an example about path determination. (8)
(ii) Discuss about micro machines in robotics. (8)

OR

- (b) (i) Discuss the co-ordination of vision system with robots. (10)
(ii) Explain about the application of tactile sensors. (6)

13. (a) Describe the open and closed loop control system used in robotics with block diagram. (16)

OR

- (b) Classify the different types of mechanical gripper with simple sketches along with its industrial applications. (16)

14. (a) (i) Discuss the different inputs to an inverse kinematics algorithm. Explain the solution of a simple inverse kinematic algorithm. (12)
(ii) Elucidate on Jacobian work envelope. (4)

OR

- (b) (i) What is robot software? List the advantages and disadvantages of off-line programming. Explain the different robot layouts. (10)
(ii) Enumerate on Hill climbing techniques. (6)

15. (a) (i) Discuss about the robot machine interface with neat diagram. (8)
(ii) With neat sketch explain the multiple robot co-ordination in manufacturing. (8)

OR

- (b) (i) Explain the robot cell construction and its working principle. (8)
(ii) Discuss about the robot application for space shuttles. (8)