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Question Paper Code: 31778

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

Elective

Mechanical Engineering

01UME924 - ROBOTICS

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define work volume.
2. List the six basic robot motions.
3. Tell about full-step and half-step in stepper motors.
4. Give examples of the tools used as end effectors by robots.
5. Define Hall effect.
6. Quote the five categories of lighting for machine vision.
7. Contrast repeatability and accuracy of a robot.
8. Name any four MOTION commands in Robot programming language.
9. Define AGV system.
10. Discuss MARR in EUAC method of economic analysis of robots.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Illustrate with neat sketches the types of joints in Industrial robots. (10)
(ii) Demonstrate joint notation system for the robot manipulator. (6)

Or

- (b) (i) Summarize the general characteristics of industrial work situation that tend to promote the substitution of robots for humans. (8)
 - (ii) Explain the applications of industrial robots in the area of material handling. (8)
12. (a) (i) Discuss the advantages and disadvantages of pneumatic actuators. (8)
- (ii) Tabulate the differences between DC motors and stepper motors. (8)

Or

- (b) Explain the factors to be considered for the selection and design of grippers. (16)
13. (a) Explain the necessary characteristics of a sensor. (16)

Or

- (b) Describe the applications of machine vision. (16)
14. (a) Given the world coordinates for a Backward transformation of a RR:R robot as $x = 300 \text{ mm}$, $z = 400 \text{ mm}$, and $\alpha = 30^\circ$; and given that the links have values $L_1 = 350 \text{ mm}$, $L_2 = 250 \text{ mm}$ and $L_3 = 50 \text{ mm}$, determine the joint angles θ_1 , θ_2 and θ_3 . (16)

Or

- (b) (i) Define Robot program. Name the robot programming methods. (4)
 - (ii) Write the advantages and disadvantages of lead through programming. (6)
 - (iii) Mention the advantages of textual programming languages for robots and name any four sensor and interlock commands. (6)
15. (a) Mention the types of automated guide vehicles and explain its applications. (16)

Or

- (b) (i) Explain the levels of safety sensor systems and safety monitoring strategies that might be followed while using robots. (10)
 - (ii) List the steps to be followed to implement a robotics program in industries. (6)
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