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Question Paper Code: 92013

M.E. DEGREE EXAMINATION, OCTOBER - 2014.

Elective

CAD / CAM

01PCD518 – INDUSTRIAL ROBOTICS AND EXPERT SYSTEMS

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is meant by robot anatomy?
2. Distinguish between forward and reverse kinematics.
3. List the types of drives used in robots.
4. Write down the types of actuators used in robot end effectors?
5. Give an application of touch sensor.
6. Write a short notes on pattern recognition.
7. Define the work envelope.
8. What are the general characteristics of industrial work situations that promote the substitution of robots for human labour?
9. State the methods for defining position in space irrespective of robot configuration.
10. Give the types of knowledge required for problem representation in Artificial Intelligence?

PART - B (5 x 14 = 70 Marks)

11. (a) Explain the five basic robot configurations with neat sketches and compare their work envelope, typical applications and power sources. (14)

Or

- (b) (i) What are the major components of a robotic manipulator? Discuss. (7)
(ii) Differentiate servo and non-servo manipulators. (7)

12. (a) Sketch the pneumatic circuits to control different motions of cylindrical and Cartesian coordinate's robot. (14)

Or

- (b) With suitable sketches, explain the operation of motor which provides the output in the form of discrete angular motion increments. (14)

13. (a) List the internal state sensors and explain its functioning (any three) with neat sketches. (14)

Or

- (b) (i) Describe in detail about the image process analysis. (7)
(ii) Write a critical note on a typical machine vision system. (7)

14. (a) (i) With suitable example, explain the various arrangements of robot work cells. (7)

- (ii) Describe three important situations of operator interface in work cell control. (7)

Or

- (b) (i) State five safety hazards that can be identified within industrial robot installations. (7)

- (ii) What are the ten elements in Robot Time and Motion (RTM) and explain the four major groups in detail. (7)

15. (a) Using a simple program for a pick-and-place application, enumerate the features and default structure of Variable Assembly Language robot programming language. (14)

Or

- (b) Describe the different search techniques employed by Artificial Intelligence program. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Write short note on the following:

- (i) Force control of robotic manipulator (5)
(ii) Optical encoder. (5)

Or

- (b) Discuss the following

- (i) Electrical Actuator (5)
(ii) Automation Systems. (5)

