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10MAR13

First Semester M.Tech. Degree Examination, June/July 2011

Robotics for Industrial Automation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain the types of automation with suitable examples. **(10 Marks)**
b. Define robot and explain the structure of robot with neat sketches. **(10 Marks)**

2 a. Explain the devices like potentiometer and resolvers used in robot function. **(10 Marks)**
b. Define external sensor and explain their types with neat sketches. **(10 Marks)**

3 a. Explain the basic control system concepts and encoders related to robot. **(10 Marks)**
b. Write the schematic diagram with explanations of a robot joint control design. **(10 Marks)**

4 a. Explain the Euler angle table application and system II of Euler angles with neat sketches. **(10 Marks)**
b. Give an expression for kinetic energy of a robot system using joint velocities. **(10 Marks)**

5 a. What is trajectory planning? Explain with the example of 3rd degree polynomial. **(10 Marks)**
b. Write an expression for 4-3-4 trajectory planning calculations. **(10 Marks)**

6 a. Explain any three teaching methods of robot. **(10 Marks)**
b. A point $p_{abc} = (2, 3, 4)^T$ has to be translated through a distance of +4 units along OX-axis and −2 units along OZ axis. Determine the coordinates of the new point p_{xyz} by homogeneous transformation. **(10 Marks)**

7 a. Explain the classification of sensors with clear examples. **(10 Marks)**
b. What are the real requirements of end effectors in robots? **(10 Marks)**

8 a. Explain image processing and analysis in vision system. **(10 Marks)**
b. Give any five industrial applications of robot in the manufacturing industry. **(10 Marks)**

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