Total No. of Questions : 10]

SEAT No. :

**P3099**

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# [5354]-589
# B.E. (Electronics Engineering)
# ROBOTICS AND AUTOMATION
# (2012 Pattern) (Elective - II)

*Time : 2½ Hours]* *[Max. Marks : 70*

***Instructions to the candidates :***

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures to right indicate marks.***

***Q1)*** a) What are CNC machines. Write advantages and limitations of NC and DNC machines. **[5]**

b) What are the specification of robot? Write any 2 specifications in detail? **[5]**

OR

***Q2)*** a) What are the different actuators are used in robotics system. **[5]**

b) What are the various components in robot drive system Hydraulic/ Pneumatic system. **[5]**

***Q3)*** a) Explain the terms. **[4]**

i) Workspace

ii) Manipulator

b) Differentiate the following. **[6]**

i) Reach & Stroke

ii) Hard and Soft Automation

OR

***Q4)*** a) Write a note on. **[6]**

i) Proximity sensor

ii) Vision Sensor

b) What is difference between Robot and manipulator. **[4]**

***P.T.O.***

***Q5)*** a) Write a transformation matrix for cylindrical coordinate systems robot. **[6]**

b) A joint of six robot go from initial angle of 30° to a final angle of 50° in 3 second. Using third degree polynomial calculates the joint angles at interval of 0.5 second. **[8]**

c) Define forward and inverse kinematics. **[4]**

OR

***Q6)*** a) Discuss the steps for obtaining forward solution of a robotic manipulator and explain. **[8]**

b) What is D-H representation? Discuss D-H algorithm. Write table for this representation. **[10]**

***Q7)*** a) Explain the term - Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. **[10]**

b) Explain path planning? What is trajectory? Differentiate path and trajectory. **[6]**

OR

***Q8)*** a) What are different parameters involved in Trajectory Planning problem? Explain different steps in Trajectory planning. **[10]**

b) What is dynamics of robot? How dynamics is different than kinematics? **[6]**

***Q9)*** a) Draw neat block diagram neural controller. Explain function of each block. What is challenge in neural controller? **[8]**

b) Explain with neat block diagram how vision system is used in complex control system. **[8]**

OR

***Q10)*** Write short note on any three : **[16]**

a) Control strategies for Aerial vehicle

b) Control strategies for bidirectional X4 flyer

c) Architecture for human robot interface

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