Total No. of Questions : 12] **SEAT No. :**

P870 **[Total No. of Pages : 3**

[4458] - 445

B.E. (Mechanical) (Semester - II)

ROBOTICS

(2008 Course) (Elective - III (c))

Time : 3 Hours] ***[Max. Marks :100***

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain the five basic robot configurations according to the work envelope and applications. **[10]**

b) Define Repeatability, Precision and Accuracy of Robot? Why repeatability is important design characteristics? **[6]**

OR

Q2) a) How does the SCARA arm geometry differ from the vertical articulated arm? **[4]**

b) Why is the SCARA arm more ideal for assembly applications? **[4]**

c) Explain the term "Compliance" in terms of a robot? Explain types of Compliance. **[8]**

Q3) a) Discuss various types of grippers used in robotics. What is the meaning of the term "end effector"? **[8]**

b) Which sensor can be used along with the gripper to sense whether the object is falling? Explain the working principle. **[8]**

OR

P.T.O.

Q4) a) Explain the Design considerations of gripper selection. **[8]**

b) Compile a list of sensors that might be used in robotic systems. For each sensor, give an application. **[8]**

Q5) a) Explain the advantages/disadvantages of using pneumatics vis a vis hydraulics as power source for drives in Robotics. **[8]**

b) A joint in a PTP robot, Which rotates from an initial angle of 5° to a final angle of 65° in 5 sec with a constant velocity. Determine the position of the joint in 1,2,3,4 secs and plot the results. **[10]**

OR

Q6) a) Enlist the different Components used in transmission systems of a robot. Write advantages & disadvantages of each in perspective of accuracy of robot. **[8]**

b) Explain different types of controllers used in robots. **[10]**

SECTION - II

Q7) a) {UVW} is obtained from {XYZ} by rotation of 90° about Z axis followed by rotation of 90° about U axis. Then {UVW} locates a point P at U = 20, V = 30 and W = 40. Determine its coordinates with respect to {XYZ}. **[10]**

b) With the help of suitable illustration, explain the significance of D-H Parameters. **[8]**

OR

Q8) a) 2 DOF planar RR manipulator has /1=120mm, /2=75mm. Determine joint angles so that free end is located at (100,70). **[8]**

b) Write short notes on : **[10]**

i) Singularity,

ii) Kinematic Calibration.

Q9) a) What is the need of Sampling and quantization. **[8]**

b) Write short note on “Development of languages for recent robot systems”. **[8]**

OR

Q10) a) Write a short note on "Image Acquisition". **[8]**

b) Explain WAIT, SIGNAL and DELAY commands in Robot Programming Language. **[8]**

Q11) a) Write a short note on "Need and application of Artificial Intelligence". **[8]**

b) Discuss in details the future scope for robotisation? **[8]**

OR

Q12) a) Write a short note on "Tools and Techniques of Simulation". **[8]**

b) Discuss the Safety aspects for robot and associated mass. **[8]**