

Total No. of Questions : 10]

SEAT No. :

P2228

[Total No. of Pages : 3

[5254]-560 -A
B.E. (Mechanical Sandwich)
ROBOTICS (Elective -II)
(2012 Pattern)

Time : 2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt all questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of pocket non programmable electronic calculator is allowed.*

- Q1)** a) Explain SCARA robot configuration. [5]
b) Explain the D-H Convention with neat sketch. [5]

OR

- Q2)** a) Explain the gometric approach. [5]
b) Write a short note on algebraic approach. [5]

- Q3)** a) Explain the following notations used to describe robot system. [5]
i) RLR
ii) LL-TRL
b) What is the physical significance of angular velocity vector. [5]

OR

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- Q4)** a) What are homogeneous transformation, explain its importance. [5]
b) Explain velocity and force transformation. [5]

- Q5)** a) Explain the significance of Singularities. [10]
b) For the vector, $V = 25i + 10j + 20k$, Perform a translation by a distance 6 in the X direction, 4 in y direction and 2 in the Z direction. [8]

OR

- Q6)** a) A two jointed robot as shown in Fig. 1 has length of its arm as 15cm. and 20cm. The first arm makes an angle of 20° and second arm makes an angle of 35° to the first arm. Compare the co-ordinate position for the end of the arm. [10]
b) (UVW) is obtained from (XYZ) by rotation of 90° about Z-axis followed by rotation of 90° about X axis. Then (UVW) locates a point P at $u = 20$, $V = 30$, $W = 40$. Determine its co-ordinate with respect to (XYZ). [8]

- Q7)** a) Explain general block diagram of robot control system. [8]
b) Explain PID types of controllers used in industrial robots. [8]

OR

- Q8)** a) Explain Cartesian space trajectory planning. [8]
b) Describe the different steps in trajectory planning. [8]
- Q9)** a) Explain the different steps involved in segmentation. [8]
b) Describe the elements of the Artificial intelligence. [8]

OR

- Q10)**a) Explain the forward and backward search technique in problem solving for AI. [8]
- b) Explain with neat block diagram of machine vision system. [8]

