Total No. of Questions : 8]

SEAT No. :

PF-5374

[Total No. of Pages : 2

[6627]-226
B.E. (Mechanical Engineering)
AUTOMATION AND ROBOTICS
(2019 Pattern) (Semester - VIII) (402051C) (Elective - VI)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain and justify "Which type of drive system is more suitable for heavy load robot application?" **[8]**

b) Compare pneumatic drive robots with electric motor drive robots. **[10]**

OR

Q2) a) Compare Planetary Gearbox with Harmonic Gearbox. **[10]**

b) Explain with neat sketch working of Harmonic drive system. **[8]**

Q3) a) What is a mechanical gripper? Explain Vacuum Grippers in detail. **[9]**

b) Describe the Types, Construction, Working, Selection and Design Considerations of proximity sensors used in various Robotic Applications? **[8]**

OR

Q4) a) Explain and illustrate Remote center Compliance devices. **[9]**

b) Explain, illustrate and give practical examples of the applications of machine vision system used in Robotics. **[8]**

P.T.O.

Q5) a) Explain Direct and Inverse kinematics. **[10]**

b) Explain and illustrate Lagrangian formulation of equations of motion of planar two joints/link PR manipulator. **[8]**

OR

Q6) a) Solve inverse kinematics for the planar manipulator shown in Figure 6a along with its DH parameters. **[10]**

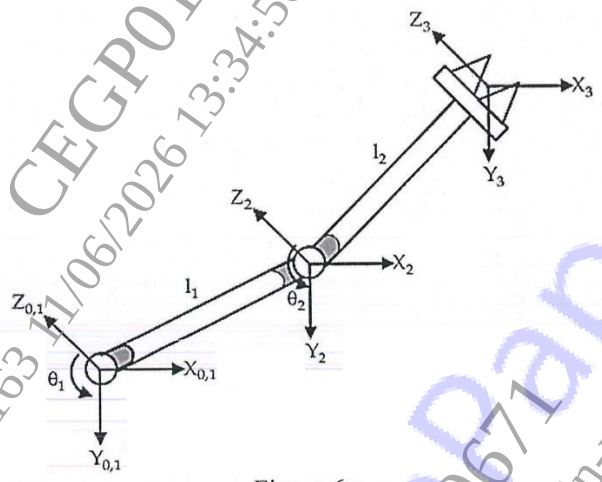


Figure 6a

Table - DH Parameters

i	θ_i	α_{i-1}	a_{i-1}	d_i
1	θ_1	0	0	0
2	θ_2	0	l_1	0
3	0	0	l_2	0

b) Explain the Static Analysis of robot with an example of any one of the basic robot. **[8]**

Q7) a) Explain the Robot Programming Methods. **[8]**

b) Explain in detail Robot-based Manufacturing System. **[9]**

OR

Q8) a) What is field robotics? Explain its advantage and application. **[9]**

b) Explain Industry 4.0 and use of Robots. **[8]**

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