Total No. of Questions : 12]

SEAT No. :

P2675

[Total No. of Pages : 3

[5154]- 45
B.E. (Mechanical)
ROBOTICS
(2008 Pattern) (Semester - II) (Part -II) (Elective - III) (402049 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) Define a robot and state its related three laws. **[8]**

b) Give classification of robot in detail. **[8]**

OR

Q2) a) Explain the anatomy of a robot. **[8]**

b) What are the socio economic aspects of robotisation? **[8]**

Q3) a) Which sensor can be used along with the gripper to sense whether the object is falling? Explain the working principle. **[8]**

b) Explain the criteria for gripper design. **[8]**

OR

Q4) a) Discuss in brief " classification of grippers used in robotics". **[8]**

b) Discuss the various characteristics of sensing devices used in industrial robot. **[8]**

P.T.O.

Q5) a) Explain different types of controllers used in industrial robots. **[8]**

b) A revolute joint in a PTP robot moving with velocity of 20 deg/sec traverses from an inital position of 20º. Determine the position and velocity of the joint at the end of each second and plot the results. The range of initial and final position is covered in 4 seconds with a finite acceleration of 6 deg/sec^2 **[10]**

OR

Q6) a) What is point-to-point and continuous path planning? Enlist at least two applications for each. **[8]**

b) Explain types of control systems used in present industrial robots. **[10]**

SECTION - II

Q7) a) The coordinates of a point qabc is given by $[7\ 5\ 3]^T$ which is rotated about the OX-axis of the reference frame OXYZ by an angle of 60º. Determine the coordinates of the point qxyz? **[10]**

b) Explain the procedure for Denavit - Hartenberg parameters representation. **[8]**

OR

Q8) a) A mobile body reference frame OABC is rotated about 60º about OY-axis of reference frame OXYZ. If $Pxyz = [2\ 4\ 6]^T$ and $Qxyz = [3\ 5\ 7]^T$ are the coordinates with respect to OXYZ plane, What are the corresponding coordinates of P and Q with respect to OABC frame.**[10]**

b) Explain the terms **[8]**

i) direct kinematics

ii) Indirect kinematics

Q9) a) Explain the image Processing techniques. **[8]**

b) Explain typical vision system for a robot. **[8]**

OR

Q10)a) Explain the following (Any 2). **[10]**

i) Image acquisition

ii) Sampling

iii) Edge detection

b) Write various technical features required of robot for spot welding and spray coating application. **[6]**

Q11)a) Explain various characteristics of induction motor. **[8]**

b) Explain WAIT, DELAY, SIGNAL command with suitable example. **[8]**

Q12)a) Write a note on stepper motor. **[8]**

b) Explain generations of robot programming language. **[8]**