Total No. of Questions : 12]

SEAT No. :

P3323

[Total No. of Pages :3

[4959]-46
B.E.(Mechanical)
ROBOTICS
(2008 Course) (Part - II) (402049 C) (Semester - II) (Elective - III)

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) "Degrees of freedom in a robot are intended to emulate the versatility of movement possessed by human body". Discuss the statement with neat sketches of a suitable motion configuration. **[10]**

b) What are the functions of a resolver? Explain with neat sketch. **[6]**

OR

Q2) a) "Final accuracy of a robotic system depends on its mechanical inaccuracies, the computer control algorithms and the system, resolution". Discuss. **[8]**

b) Explain the term "Compliance" in terms of a robot? Explain passive type of Compliance. **[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

P.T.O.

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]**

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

b) A revolute joint in a PTP robot moving with velocity of 15 deg/sec traverses from an initial position of 15^{o}. 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 5 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 q_{abc} is given by $[7\ 5\ 3]^T$ which is rotated about the OX - axis of the reference frame OXYZ by an angle of 60^{o}. Determine the coordinates of the point q_{xyz}? **[10]**

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

OR

Q8) a) A mobile body reference frame OABC is rotated about 60^{o} about OY - axis of reference frame OXYZ. If $P_{xyz} = [2\ 4\ 6]^T$ and $Q_{xyz} = [\ 3\ 57]^T$ 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 lead through programming technique. **[8]**

b) Write short note on Edge detection. **[8]**

OR

Q10)a) Explain WAIT, SIGNAL and DELAY commands. **[6]**

b) Explain various Image processing Techniques. **[10]**

Q11)a) Write in brief about AI techniques. **[8]**

b) Explain different Techniques of Simulation. **[8]**

OR

Q12)a) What is the need of Artificial Intelligence and give its application. **[8]**

b) Write in brief about the economical aspects for robot design. **[8]**