

Total No. of Questions : 12]

SEAT No. :

P815

[Total No. of Pages : 2

[4659]-61

B.E. (Mechanical-Sandwich)

c-ROBOTICS

(2008 Course) (Semester-I) (Elective-III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 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 side indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of non-programmable electronic calculator is allowed.*

SECTION-I

- Q1)** a) What is the shape of workspace in each of the following configurations.
i) Post type, ii) Polar, iii) Gantry robot, iv) Joint arm. [8]
b) Explain socio-economic aspects of robotisation. [8]

OR

- Q2)** a) Explain various generations of robots in brief. Also state the generation to which today's industrial robot belongs. [8]
b) Sketch and explain the motions of 3 DOF wrist can perform. [8]

- Q3)** a) A vacuum gripper is used to lift flat steel plates 8mm x 650mm x 950mm. The gripper uses two suction cups, 140mm in diameter each and they are located 500mm apart for stability. Assume a factor of safety of 1.8 to allow for acceleration of the plate. Determine the negative pressure required to lift the plates if the density of the steel is 8.0543×10^{-6} kg/mm³. [8]
b) Explain following types of proximity sensors
i) Capacitive sensors ii) Ultrasonic sensors. [8]

OR

- Q4)** a) Explain remote center compliance device. [8]
b) Write a note on: [8]
i) Criteria of gripper design.
ii) Rules for gripper design.

P.T.O.

- Q5) a)** Discuss advantages, disadvantages and characteristics of stepper motors. [9]
b) Explain control law partitioning for second order system. [9]

OR

- Q6) a)** A rotary arm of a manipulator is to rotate from 23° to 117° in 9 seconds. Determine coefficients of cubic polynomial to interpolate the smooth trajectory. Plot the position velocity and acceleration variation against time. [10]
b) Discuss geometric problems with Cartesian path. [8]

SECTION-II

- Q7) a)** Write short notes on:
i) Kinematic Redundancy ii) D-H parameters. [12]
b) Describe the concept of acceleration of rigid body. [6]

OR

- Q8) a)** Explain with suitable sketch, the different between forward and inverse kinematics. [12]
b) Explain with suitable example, the concept of Newton-Euler's dynamic formulation. [6]

- Q9) a)** What are the different considerations in the efficient transmission systems? [8]
b) Write short notes on Image Processing Techniques. [8]

OR

- Q10) a)** Explain the concept of solid modeling for robot using simulation. [8]
b) What is need of vision system in robot? Classify the robotic vision system. [8]

- Q11) a)** Explain and compare the different method of robot programming. [8]
b) State and explain in brief, the different robot languages. [8]

OR

- Q12) a)** Write short notes on 'Artificial Intelligence'. [8]
b) Write short notes on Future of Industrial robots. [8]

