Total No. of Questions : 12]

SEAT No. :

P3888

[Total No. of Pages : 4

[4759] - 120

B.E. (Electronics)

ROBOTICS AND AUTOMATION

(2008 Pattern) (Elective - II)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer Three questions from each section.***
2) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Define "ROBOT ". Write and explain the four generations of the Robots in brief. **[8]**

b) What are the major components of the Robots. Explain any three. **[6]**

c) Write and explain any two Industrial applications of the robots. **[4]**

OR

Q2) a) What are the “Three Rules (or Laws) of the Robotics”? **[4]**

b) What do you mean by ‘Work Envelop’. Explain in brief. **[6]**

c) Explain (Any Two): **[8]**

i) Cylindrical Coordinate system.

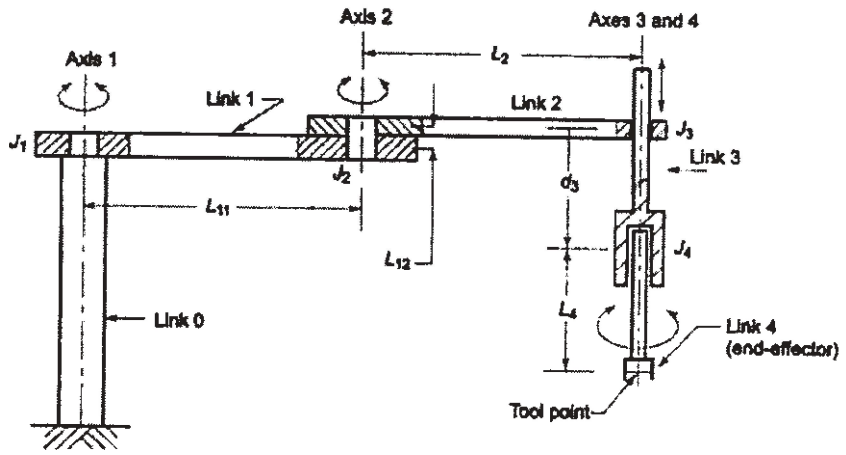
ii) Spherical Coordinate system.

iii) Cartesian Coordinate system.

P.T.O.

Q3) a) What do you mean by Degree of Freedom. Explain. **[4]**

b) Obtain the direct Kinematic equation of the 4-DOF Selective Compliance Assembly Robot Arm (SCARA) robots. **[8]**



c) What is 'Work Space'? Explain Reachable workspace. **[4]**

OR

Q4) a) State and explain the Newton-Euler Equation. Explain its significance. **[6]**

b) What are the steps to get DH parameters. **[6]**

c) What are the steps of the Kane's algorithm? What are the benefits of this algorithm. **[4]**

Q5) a) What are the three different types of the Grippers. Explain in brief. **[4]**

b) Differentiate Serial and Parallel Robots. **[4]**

c) Explain in Brief: (Any Four) **[8]**

i) DC Motor.

ii) Servo Motor

iii) Stepper Motor

iv) Ultrasonic Sensor

v) Laser Range Finder

vi) Tactile Sensor.

OR

Q6) a) Write short note on (Any four) : **[8]**

i) Gears,

ii) Belt and Pulley.

iii) Rack and Pinion.

iv) Slider Crack Mechanisms.

v) Four-Bar Linkage.

b) What do you mean by Actuators. Classify the different actuators. **[4]**

c) What is Optical Encoders, explain in brief. **[4]**

SECTION -II

Q7) a) What do you mean by the following features or the ability of the Robots (Any four). **[8]**

i) Ability to define points in space.

ii) Ability to move between points.

iii) Program control

iv) Control of end effectors.

v) Serviceability

b) What do mean by Error Budgeting. What are the parameters related to it. **[6]**

c) Explain (Any Two) : **[4]**

i) Continuous Path.

ii) Via Points.

iii) Programmed Points.

OR

Q8) a) What do you mean by Denavit-Hartenberg Matrix, explain in brief. **[4]**

b) What is Jacobian Matrix. Write Jacobian form of DH matrix. **[8]**

c) What is PATH planning. What is Trajectory. Differentiate Path and Trajectory. **[6]**

Q9) a) State and explain any two important applications of the Robotic Vision system. **[4]**

b) What do you mean by Imaging Components ? Explain Point, Line and Planer Sensor. **[4]**

c) Explain the following image segmentation techniques with example **[8]**

i) Edge Detection.

ii) Contour Following.

OR

Q10)a) State and explain (with example) the following sensors: **[8]**

i) Status Sensor

ii) Environmental sensor

iii) Noncontact sensors.

b) What do you mean by Video Analytics. Give its benefits. **[8]**

Q11)a) "The Quality of the product depends majorly on the Robotics Intelligence." Justify. **[8]**

b) Draw and explain the standard components in a Inspection system. **[8]**

OR

Q12)a) Explain in brief: **[8]**

i) PLC

ii) DCS system

iii) SCADA

iv) HMI

b) State and explain any one Home Automation system. **[8]**

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