

Total No. of Questions : 10]

SEAT No. :

**P4942**

[Total No. of Pages :3

**[4959]-1109**

**B.E. (Elex) (Elective - II)**  
**(b) : Robotics and Automation**  
**(2012 Pattern)**

*Time : 2.½ Hours]*

*[Maximum Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Q. 9 or Q. 10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks*
- 4) *Assume suitable data, if necessary.*

**Q1)** a) Define “ Automation”. Draw and explain Automation pyramid. **[5]**

b) What are CNC Machines, Explain types of CNC machines **[5]**

OR

**Q2)** a) Draw and explain architecture of industrial automation systems. **[5]**

b) Write application of CNC machines. **[5]**

**Q3)** a) Write and explain “Three Rules (or Laws) of the Robotics”? **[5]**

b) How do we classify Robots. Explain any two **[5]**

OR

**Q4)** a) Describe Robot drive systems. Explain Hydraulic systems in detail. **[5]**

b) Explain: (Any two) **[5]**

i) Accuracy

ii) Repeatability

iii) Robotic Joints

**P.T.O.**

- Q5) a)** What are different types of grippers? Explain any three in detail. [8]
- b) Write note on (Any Four): [8]
- i) Pressure sensor
  - ii) Force sensor
  - iii) Proximity sensor
  - iv) LASER range finder
  - v) Tactile sensors
  - vi) Range sensor

OR

- Q6) a)** Draw and explain Slider crank mechanism based grippers. [6]
- b) What do you mean by Vision sensors. Draw and explain vision based Inspection systems. [6]
- c) What do you mean by homogeneous coordinate systems. [4]
- Q7) a)** What is Jacobian control ? Discuss the jacobian in terms of DH matrices. [8]
- b) What do you mean by trajectory planning? Explain types of motions used in it. [8]

OR

- Q8) a)** State and explain Newton-Euler dynamics of robots. Explain Newton-Euler formulations for manipulators. [8]
- b) Write notes on (Any two) [8]
- i) Solvability
  - ii) Stiffness
  - iii) Singularities

- Q9)** a) What are different types of Robotic controllers. Explain any two in detail. **[8]**  
b) Draw and explain basic architecture of Fuzzy logic controller. **[5]**  
c) Describe vision based object tracking robot. **[5]**

OR

- Q10)** a) Discuss advanced strategies for control of aerial vehicles. **[8]**  
b) Write note on direction control of X4-flyer. **[5]**  
c) What are different applications of neural networks in Robotics. **[5]**

