



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 147653**

Roll No.

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## B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15  
**ROBOTICS AND AUTOMATION**

Time : 3 Hours]

[Total Marks : 100

- Note :**
- (1) Attempt all questions.
  - (2) All questions carry equal marks.

- 1 Attempt any four parts of the following : **5×4=20**
- (a) Describe briefly the history of robotics and also its generation periodically.
  - (b) What is automation? Discuss the importance and need of automation in Indian industry.
  - (c) Explain the term "Artificial intelligence". How is it used in an intelligent manufacturing system?
  - (d) Differentiate clearly between a CNC machine and robot with its application.
  - (e) What is degree of freedom (DOF)? How many degree of freedom is necessary for simple robotic system?
  - (f) What are the parameters used in robotics design?

**2** Attempt any four parts of the following : **5×4=20**

- (a) Distinguish between open loop and close loop control system used for Robotic control.
- (b) What do you mean by robot arm kinematics? Differentiate between direct kinematics and inverse kinematics.
- (c) Classify the various sensors and actuators used in robotics.
- (d) Enlist the anatomy of robot briefly with suitable diagram.
- (e) What is the purpose of control system. Explain the type of controlling used in robotics?
- (f) What do you understand by power drives in robotic system? Define them briefly with its advantage and disadvantage.

**3** Attempt any two parts of the following : **2×10=20**

- (a) Explain the following terms related to robotic system : Resolution, Accuracy and Repeatability.
- (b) Design typical robot link controlled by DC servo motor and its typical components.
- (c) Give a systematic procedure for planning and implementing a robotized project.

4 Attempt any two parts of the following :  $2 \times 10 = 20$

- (a) What is robot Programming? Define the key features related to the programming.
- (b) State the working principle and applications of:
  - (i) Digital to analog convertor
  - (ii) Stepper motor
- (c) Explain among the following methods of robot programming:
  - (i) Lead through teaching
  - (ii) Walk through teaching
  - (iii) Off-line programming

5 Attempt any two parts of the following :  $2 \times 10 = 20$

- (a) Draw a neat schematic diagram of robotic configurations :
  - (i) Polar coordinate configuration
  - (ii) Jointed arm configuration
- (b) Describe the planar 2R manipulator by using forward kinematics and how is it different from SCARA robotic system.
- (c) What is hydraulic, pneumatic and electric drives? How are they used in simple robotic system?