

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

PAPER ID :

Roll No.

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B.TECH.

Theory Examination (Semester-VI) 2015-16

ROBOTICS AND AUTOMATION

Time : 3 Hours

Max. Marks : 100

Note: Attempt all questions as directed & assume missing **data suitably**, if any.

SECTION – A

1 Attempt all questions

(10*2 = 20)

- State the Asimov's laws of robotics.
- Describe the technical features to be considered while designing a robot.
- Summarize the merits and demerits of hydraulic actuators.
- Describe a tactile sensor.
- Summarize the disadvantages of magnetic grippers.
- Prioritize the factors to be considered in the selection and design of grippers.
- Analyze the ways of accomplishing lead through programming.
- Discuss the features of second generation languages.
- Explain gantry robots.
- Differentiate palletizing and depalletizing.

SECTION – B

2. Attempt any FIVE Questions

(5*10 = 50)

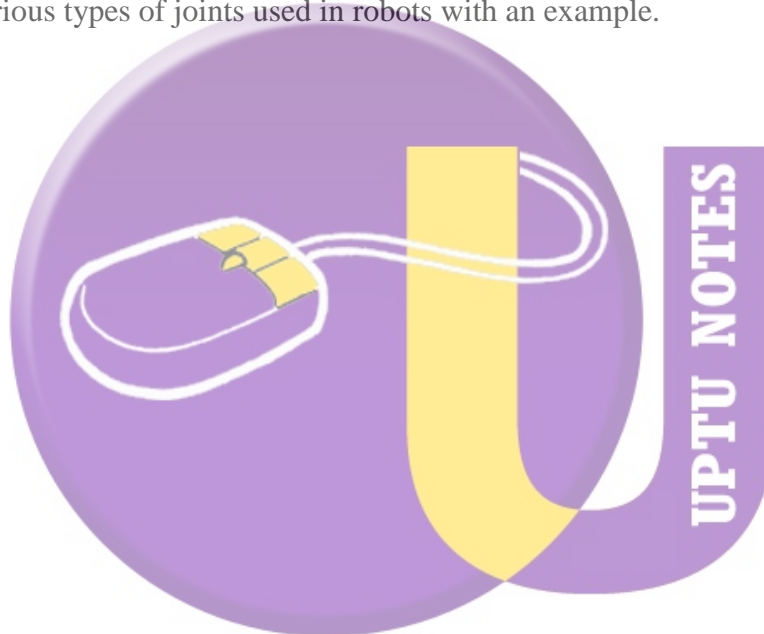
- Differentiate between servo controlled and non-servo controlled robots. Sketch and explain the servo control system for point to point positioning.
- Evaluate the Robot Characteristics and its specifications. Assess the anatomy of robot and explain the important parts of a robot with a neat sketch.
- Describe the different stages of machine vision system and its types of illumination systems.
- Distinguish between tactile and non-tactile sensors. Sketch and working of an acoustic sensor.
- Describe with neat sketches the features, merits, limitations and applications of Magnetic gripper and Vacuum Gripper
- What is an actuator? What are the different types of actuator used for robots? Explain the working of a hydraulic actuator system.
- What is homogeneous transformation (HT) of coordinates? Write the Homogeneous transformation matrices for (i) Translation in 3D space. (ii) Rotation in 3D.
- Explain the relative merits and demerits of different textual robot languages. Explain the different program instructions.

SECTION – C

Attempt any two questions.

(2*15 = 30)

- 3 (a) Write the homogeneous transformation matrix for a rotation of 90 degrees about the Z axis followed by a rotation of 90 degrees about the axis, followed by a translation of (3, 7 and 9).
(b) Describe the various types of drive system for robots and its limitations.
- 4 (a) Discuss response, range, accuracy and sensitivity in relation to robot sensors. Explain the working principle of proximity sensor.
(b) Sketch and explain a pneumatic manipulator control circuits used for robots.
- 5 (a) Analyze the advantages and disadvantages of off-line programming ? Name four of the known off-line programming systems.
(b) Summarize the inverse kinematic solution of LL Robot.
(c) Illustrate the various types of joints used in robots with an example.



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