Printed Pages : **NAU-023/EAU-013**

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

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)**

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

SECTION – B

2. Attempt any FIVE Questions **(5*10 = 50)**

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