Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER M.TECH (Manufacturing Engineering and Technology)

END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: INDUSTRIAL ROBOTICS [MME 580]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.

1A.	Obtain kinematic arm equation by Denavit-Hartenberg (D-H) algorithm.	4
1B.	Draw the flow chart for bolt insertion program.	4
1C.	What are the different safety guidelines?	2
2A.	Write a short note on: a) Robot arm kinematics b) Transformations c) Composite rotation matrix d) Robot dynamics	(2.5x4) 10
3A.	Derive an expression for brush type DC motor.	4
3B.	The coordinate of a point $q_{abc} = [7, 5, 3]^T$ in the body coordinate frame OXYZ is rotated by 60° about OX axis. Determine the coordinates of the vector q_{xyz} with respect to base reference coordinate frame.	4
3C.	With the help of an example, explain the Contour Tracking algorithm for generating chain code (8-connectivity)	2
4A.	Derive an expression for force analysis of gripper mechanism.	4
4B.	Sketch and explain stepper motor and vane motor	4
4C.	What are the desirable characteristics of sensors and how are they classified?	2
5A.	Explain hazard analysis? What are the ways to prevent accidents and injuries in robotic environment	3
5B.	Write a short note on robotic application in space and service industry	3
5C.	Explain the Walking Algorithm of a 6-legged robot in a tripod gait? Record the Stance and Swing for each leg for a slow walk, if the time for swing is the same as that of stance.	4
6A.	Explain elements of robot cost.	4
6B.	Explain Image Processing and Analysis	4
6C.	What are the characteristics of future robot task?	2