Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

I SEMESTER M.TECH. (INDUSTRIAL AUTOMATION AND ROBOTICS)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: INTRODUCTION TO INDUSTRAIL ROBOTS [MTE 5102]

REVISED CREDIT SYSTEM
(26/11/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Apart from the capital cost of the robot which are the other costs that should be considered during the implementation of robots in an industry?	**4**
1B.	Design safety guidelines for an industrial robot to avoid accidents.	**2**
1C.	Discuss harmonic drives with a neat sketch. Mention its areas of use.	**4**
2A.	Discuss the features of future assembly robots on account of latest developments in tactile sensing techniques and artificial intelligence.	**5**
2B.	Using VAL instructions write a program for palletizing objects from pallet A to pallet B.	**5**
3A.	In a robot slide mechanism of 0.9m length. The mechanical accuracy associated with the moving arm is a random variable with standard deviation of 0.2mm. Determine control resolution, spatial resolution, accuracy (in terms of C.R) and repeatability for both 8 bit and 12 bit control memory capacity.	**3**
3B.	Show with calculations how a robot equipped with an ultrasonic sensor at its wrist can inspect the level of liquid in the beverage filling station. Assume all the required data.	**4**
3C.	Draw the robotic configuration having a joint notation scheme of RRR and TRL	**3**
4A.	Represent direct and inverse kinematics concept in the form of line diagram. Derive an expression of motion of a 2R manipulator using direct kinematics.	**6**
4B.	What kind of grippers can be used for palletizing task of thin metal sheets? List its advantages and disadvantages.	**4**
5A.	Show and describe point to point control and continuous path control system of robots. Give two applications for each.	**3**
5B.	Explain region growing and edge detection techniques with respect to a robotic vision system	**4**
5C.	Discuss the working of hybrid stepper motor used as robotic actuator. Differentiate between unipolar and bipolar types of stepper motors.	**3**

6A. Explain the following characteristics of sensors **5**
a) Sensing Distance
b) Reduction factor
c) Influence of target
d) Frequency of operating cycle.
e) Hysteresis

6B. Show graphically different stages of failure in an industrial robot **3**

6C. Outline a procedure of programming a deburring robot with teach pendant. **2**