Reg.No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH MECHATRONICS ENGINEERING

END SEMESTER MAKE – UP EXAMINATIONS, JUNE/JULY 2016

SUBJECT: INDUSTRIAL ROBOTICS, [MME 316]

Time: 3 Hours **MAX. MARKS: 50**

Instructions to Candidates:

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

1A. List the fundamental economic and commercial responsibilities of the management of manufacturing organizations. **(03)**

1B. One of the joints of a certain industrial robot is a linear type with a range of 0.5 m. The bit storage capacity of the robot controller is 10 bits for this joint. The mechanical errors form a normally distributed random variable about a given taught point. The mean of the distribution is zero, and the standard deviation is 0.06mm. The errors will be assumed to be isotropic (the same in all directions).

Determine:

i. The Control Resolution
ii. The Spatial Resolution
iii. The Accuracy
iv. The Repeatability

(04)

1C. What are 'codes of practice'? State two prominent codes of practice that currently relate industrial robotic installations. **(03)**

2A. Write short notes on LVDT and Potentiometer. **(04)**

2B. Outline the factors that are brought into play to reduce the risks of accident at shop floor. **(03)**

2C. Explain the relative merits and demerits of hydraulic, pneumatic and electrical drive systems. **(03)**

3A. Enlist the factors that are to be considered in the selection and design of grippers. **(04)**

3B. Define an automated system. What is the risk encountered in fixed automation? **(02)**

3C. Discuss how the sensing capacity of an ultrasonic sensor varies with respect to:

i. Target Size
ii. Target to sensor distance
iii. Temperature of the surroundings
iv. Type of target to be sensed

(04)

4A. State the features and capabilities of future robots. **(03)**

4B. Describe the construction and operating principle of a Vidicon camera. **(04)**

4C. Give the reasons as to why manual workers should approve introduction of robots into workplace. **(03)**

5A. Relate the movement of robotic wrist with respect to an aircraft motion. **(02)**

5B. Explain the conversion of an analog image into a digital one. **(04)**

5C. Apart from the capital cost of the robot what are the other costs that should be considered during the implementation of robots in an industry? Justify. **(04)**

6A. With the aid of sketches, discuss the concept of links and joints for a manipulator. **(04)**

6B. Classify mechanical grippers based on the type of kinematic device used to actuate the finger movement. **(02)**

6C. Why do manufacturing industries use robots? Explain why the cost of end effector is normally a substantial proportion of the cost of a robot installation. **(04)**