Roll No. .....

# 22225

## M.Tech 1st Semester Mechanical Engg. (Machine Design)

## Examination–May, 2014

### MECHATRONICS AND PRODUCT DESIGN

**Paper-M-809-A**

***Time : 3 hours*** ***Max. Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

**Note :** Attempt any **five** questions.

**1.** (a) Mechatronics is the synergistic integration of mechanical engineering with electronics and control engineering for the design and manufacture of products. Justify the statement. *10*

(b) Describe the role of Mechatronics in Industries. *10*

**2.** (a) How are the microcontrollers classified? Explain Briefly. *10*

(b) What are Buses ? Explain various types of buses. *5*

(c) What are Registers ? Explain various types of registers. *5*

**3.** (a) Discuss the static and dynamic characteristics of sensors. *10*

(b) Differentiate between sensors and transducers. Explain the types and working of light sensors. *10*

**4.** (a) What is a strain gauge ? Explain with neat sketches, the wire wound, Foil-type and capacitive strain gauge. *10*

(b) Derive the model equation of a rotational mechanical system with spring, mass and damper. *10*

5. (a) Explain the basic elements of a closed loop control system with the help of an automatic water level controller. *10*

(b) Explain mechanical electrical analogies. *10*

6. (a) What is the output of a system with transfer function $s/(s+3)^2$ and subject to a unit step input at time t = 0 ? *10*

(b) Discuss briefly the various fluid systems building blocks. *10*

7. (a) Describe various types of digital to analog converter. *10*

(b) Explain the working of ball screws, solenoids, line actuators and controller in CNC machines. *10*

8. How the use of MATLAB and SIMULINK software are used in designing mechatronics product ? Explain with example. *20*

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