00195

# BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

## Term-End Examination

## June, 2012

## BME-006 : MECHATRONICS

*Time : 3 Hours* *Maximum Marks : 70*

***Note :*** *Use of **calculator** is allowed. **Question No. 1** is **compulsory**. Answer **any six** out of remaining.*

1. (a) A 6-bit D/A converter gives an output voltage of 17.250 volts for an input of 010111. What is the step size, the full range voltage, and the percentage resolution ? **5+5**

   (b) Show the binary addition and subtraction of 175 (decimal) and 225 (decimal).

2. (a) Describe the components of a continuous sensing system with a neat block diagram. **5+5**

   (b) What are the main advantages of a capacitive proximity switch over the inductive proximity switch ?

3. (a) What is a temperature transducer ? How are these classified ? Briefly explain all of them. 5+5

(b) Describe the methods for range sensing.

4. (a) Briefly explain the desired qualities of a hydraulic oil. 5+5

(b) Explain what is meant by sequential control and illustrate your answer by an example.

5. (a) What are the advantages of hydraulic system over mechanical system ? 5+5

(b) With the help of a neat sketch, describe how the hydraulic system can be used to amplify force.

6. (a) Describe the functioning of a pilot operated check valve. 5+5

(b) Differentiate between a pressure relief valve and a pressure reducing valve.

7. (a) What is ZOH in a control system ? How is it represented in a control system ? Derive the expression for its Laplace transform. 5+5

(b) Prove that the Z - transform of a unit step function is $\frac{Z}{Z-1}$.

8. (a) What do you mean by inverse kinematics ? Briefly explain the importance of path planning. 5+5

(b) How can a transister be used as a switch ? Explain.

9. (a) Explain bit, byte, word and instruction. How many bytes make a word of 32 bits ? 5+5

(b) Compare micro - computer and micro - processor.

10. (a) What are the two types of data transfer techniques used in computer interfacing ? List out the main differences between them. 5+5

(b) Describe and compare the characteristics of proportional plus integral plus derivative control.