

7E4066

Roll No. : _____

Total Printed Pages : **3****7E4066**

B. Tech. (Sem. VII) (Main/Back) Examination December- 2012
Mechanical Engg.
7ME6.2 Mechatronics

Time : **3 Hours**][Maximum Marks : **80**[Min. Passing Marks : **24**

*Attempt any five questions. Selecting one question from each unit.
 All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units and quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)

1. NIL2. NIL

All questions carry same marks (8 marks for each sub-question and a total of 16 marks for each main questions)

UNIT - I

- 1 (a) Write down the classification of mechatronics products and their enabling technologies given by the Japan Society for the Promotion of Machine Industry (JSPMI).
- (b) Discuss applications of mechatronics devices in various disciplines.

OR

- 1 (a) Discuss the historical perspective of the evolution of Mechatronics devices.
- (b) Write down the key elements of mechatronics and explain by suitable examples.

UNIT - II

- 2 (a) Differentiate between sensors and transducers. State various types of elastic transducers justifying their application suitability.



- (b) A 5 V voltmeter is connected to an LVDT output through an amplifier (amplification factor is 300). Now, when the core inside LVDT moves through a distance of 0.5 mm, output across LVDT terminals recorded to be 1.5 in.V. Assess the sensitivity of the LVDT. Also find the resolution of the instrument (LVDT and the amplifier) in mm if the scale of 5 V voltmeter has 100 divisions and the scale can read to $1/5^{\text{th}}$ of a division.

OR

- 2 (a) Give a classification of sensors and transducers. List main characteristics of generally used transducers.
- (b) List various types of thermocouples and discuss their general characteristics. Recommend a thermocouple type for a particular application of heat treatment of forgings of C60 steel where the temperature of 900 degree Celsius is to be monitored.

UNIT - III

- 3 (a) Give a brief classification of electric motors. What are commutation spikes and how these are used to find speed of the motor?
- (b) What is Armature Reaction and what are its effects? How this can be minimized?

OR

- 3 (a) Write a short note on electrical and pneumatic actuators.
- (b) Explain the working principle of pneumatic air muscle actuator and state its advantages over conventional electric motors.

UNIT - IV

- 4 (a) Deduce a relation between time and frequency response system for a second order dynamic system giving suitable illustration.
- (b) Write down the performance specifications and common applications of digital to analog convertors.

OR

- 4 (a) Discuss the working of digital to analog signal converters and the analog to digital signal converters.
- (b) State the advantages of digital communication over analog communication.



65
UNIT - V

- 5 (a) Discuss the design of a lift control system.
(b) Write a short note on CNC lathe, describing its specifications, working and controls methods.

OR

- 5 (a) Explain the design of a temperature control system for an electric furnace with illustrations.
(b) Describe the design steps for an EOT Crane control panel.

