

Roll No. 

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Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(ME) (E-I) (Sem.-2)

**MECHTRONICS**

Subject Code : MME-510

Paper ID : [E0413]

Time : 3 Hrs.

Max. Marks : 100

**INSTRUCTION TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1.
  - a) Discuss the roles of sensors, actuators and controllers in mechatronics systems,
  - b) Draw block diagram of a closed loop control system and discuss its terminology.
2.
  - a) How are strain gauges used for force and pressure measurement?
  - b) Discuss the factors to be considered for selecting sensor for a given application.
3.
  - a) What is an operational amplifier? Derive the relation for gain of a basic inverted amplifier.
  - b) Discuss the use of Zener diodes in protection of electrical & electronic circuits.
4.
  - a) Draw neat and labelled schematic diagram of a hydraulic power system and discuss its components and working.
  - b) What are kinematic chains? Discuss a four-bar chain mechanism.
5.
  - a) Discuss the principle, construction and working of a permanent magnet DC motor,
  - b) How will you control the speed in AC motors?
6.
  - a) Draw symbols, make truth tables and write Boolean expressions for any four digital logic gates.
  - b) Illustrate the use of Karnaugh maps in deriving Boolean expressions by considering suitable examples.

7.
  - a) What are the roles of analog-to-digital and digital-to-analog converters in mechatronics systems? Discuss any one type of DAC.
  - b) What are the roles of proportional, integral and derivative actions in PID control?
8. Write short notes on :
  - a) DC servo motors
  - b) SCR drives
  - c) Frequency response and
  - d) PLCs

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