Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(ME) (E-I) (Sem.–2)

MECHATRONICS

Subject Code : MME-510

M.Code : 38211

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

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

1. a) Discuss the major components and features of programmable automation.

   b) Differentiate between a microprocessor and a microcontroller and discuss their applications.

2. a) Differentiate between RTDs and thermistors used for temperature measurement.

   b) Derive the relationship between resistance change and strain for a strain gauge.

3. a) What is the need of signal conditioning in mechatronic systems? Draw the circuit diagram of an inverting op-amp and derive the relation for voltage gain.

   b) Discuss **any three** different types of filters used in signal conditioning.

4. a) Compare the features of pneumatic, hydraulic and electrical actuation systems.

   b) What is the function of bearings in mechatronics systems? Discuss construction and working of journal bearings and ball bearings.

5. a) Draw the schematic diagram of a npn bipolar junction transistor. Draw and discuss the I_c versus V_{CE} curves.

   b) Discuss the principle, construction and working of a permanent magnet DC motor.

6. a) What is the significance of microprocessors in control? Draw general block diagram of a microcontroller and discuss how does it differ from a microprocessor?

   b) State truth tables and Boolean expressions for AND, NAND, NOR and XOR logic functions.

7. a) What are the features of programmable logic controllers, which make them ideally suited for shop floor applications?

   b) Define Transfer Function. Draw the block diagram of a closed loop system having a forward-path TF of 5/(s+3) and a negative feedback-path TF of 10, and determine its overall transfer function.

8. Write short notes on :

   a) Analog-to-digital converters

   b) PID control

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.