



End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: B.Tech and VII sem (**M E**)

Name of the Paper: **Mechatronics**

Paper Code: **TME 708**

Time: 3 hour

Maximum Marks: **100**

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1

(2X10=20 Marks)

- (a) Define Mechatronics. Explain in detail the elements of a mechatronic system and discuss its significance in modern mechanical design. CO1
- (b) Explain the process of signal conditioning in a mechatronic system. Discuss the functions of amplifiers, filters, and converters used in signal conditioning.
- (c) Discuss various digital signal filtering techniques and their role in improving signal quality in mechatronic systems.

Q2 **(2X10=20 Marks)**

- (a) Explain the construction, working, and characteristics of stepper motors. Discuss their applications in precision control. CO2
- (b) Explain the operation of control valves in hydraulic and pneumatic systems. Discuss their types and performance parameters.
- (c) Explain the principle, construction, and applications of piezoelectric actuators in precision systems.

Q3 **(2X10=20 Marks)**

- (a) Define sensors and transducers. Explain the differences between them with examples. CO3
- (b) Explain the construction and operation of a piezoelectric accelerometer. Mention its advantages and limitations.
- (c) Compare light and laser sensors in terms of accuracy and application. What factors are considered in the selection of sensors for a mechatronic system?

Q4 **(2X10=20 Marks)**

- (a) With a neat diagram, explain the architecture of a microcomputer system and describe its major components. CO4
- (b) What are the functions of a programmable logic controller (PLC)?
- (c) Explain the power supply requirements and interfacing techniques used in microcontroller-based mechatronic systems.

Q5 **(2X10=20 Marks)**

- (a) Explain the concept of mathematical modeling and derive the transfer function for a simple mechanical system (mass-spring-damper). CO5
- (b) Develop the mathematical model and derive the transfer function for a simple electrical system.
- (c) Discuss the modeling of fluid systems. Explain how flow and pressure relationships are represented mathematically.

Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.