

Code: ME7T1

**IV B.Tech - I Semester –Regular / Supplementary Examinations
JANUARY - 2022**

**MECHATRONICS
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) Identify the various elements of mechatronic system.
- b) Name the different light sensors in mechatronics.
- c) What is a diode? Classify them.
- d) List the different types of actuation systems available in mechatronics.
- e) Explain the functions of direction control valve.
- f) Write the mathematical formulation of Translational Spring.
- g) What are the basic elements used for modeling mechanical translational systems?
- h) Write any two differences between Microprocessor and a Microcontroller.
- i) Explain the term derivative control.
- j) What is a PLC? What is its uniqueness?
- k) Name some future mechatronics systems.

PART – B

Answer any **THREE** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Define mechatronics and explain social and economic aspects in mechatronic product design. 8 M
- b) What are the various major fields of applications of mechatronics? Discuss them briefly. 8 M
3. a) Mention the advantages and limitations of pneumatic actuators over hydraulic actuators. 8 M
- b) Explain the construction and principle of operation of permanent magnet stepper motor. What are the applications of it? 8 M
4. a) Explain the difference between first order and second order systems. 8 M
- b) Explain the mathematical modeling of thermal system building blocks with neat sketches. 8 M
5. a) Explain the construction and working of 8051 microcontroller. 8 M
- b) Describe how to select a specific microcontroller for a given application. Briefly give different applications of 8051 microcontroller. 8 M

6. a) Briefly explain the importance of counters and timers in PLC with suitable examples. 8 M
- b) Explain with the help of ladder diagram the jump control mechanism in a programmable logic controller (PLC). 8 M