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Total Pages : 03

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May 2026

B. Tech. (Mech.) (Sixth Semester)

Mechatronic Systems (PEC-ME-606-21)

Time : 3 *Hours*] [*Maximum Marks :* 75

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a) State the constituent elements of a measurement system. **1.5**

(b) Differentiate between open-loop and closed-loop systems. **1.5**

(c) What is meant by signal conditioning ? **1.5**

(d) State the function of a process control valve. 1.5

(e) What is meant by cylinder sequencing ? 1.5

(f) What is the function of a ratchet and pawl mechanism ? 1.5

(g) Define a kinematic chain. 1.5

(h) What do you understand by 'gear train' ? 1.5

(i) Define system transfer function. 1.5

(j) What the purpose of a Karnaugh map ? 1.5

Part B

2. Discuss different types of sensors used for measuring temperature. Also explain the criteria for selection of sensors. 15

3. (a) Discuss the main types of pressure control valves. 10

(b) Discuss the following directional control valves : 5

(i) Spool valve

(ii) Poppet valve.

4. Discuss the following types of stepper motor : 15

(i) Variable reluctance stepper motor

(ii) Permanent magnet stepper motor

(iii) Hybrid stepper motor.

5. Derive expression for hydraulic-mechanical system of lifting heavy load through a distance X. 15

6. Explain the following in brief :

(i) Logic gates 10

(ii) Basic structure of Programmable Logic Controller (PLC). 5

7. Write short notes on the following : 15

(i) Solid-state switches

(ii) Operational amplifier.

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