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MECHATRONICS

Option II

ME-403N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Briefly explain the design of mechatronics systems. 8

   (b) What is Control System ? What are its requirements ? Also explain the basic elements of a feedback system. 7

2. What are Boolean algebra and Boolean numbers ? Explain the different types of number representation systems with suitable example. 15

Unit II

3. (a) State, in general, the principle of operation of transducers and highlight their difference with sensors. Distinguish between accuracy and sensitivity of a transducer. 7

   (b) Discuss how velocity is measured by using electromagnetic transducers. 8

4. What are the three types of pressure control valves ? Explain the working of these valves. 15

Unit III

5. What are the factors to be considered when selecting the belt drives ? With a neat diagram explain the "timing belt" used in transmission system with its advantages. 15

6. Explain the procedure of how external devices can be connected to a microprocessor. Design hardware to interface 7 segment LEDs with 8085 microprocessor. 15

Unit IV

7. Compare the PLC and a general-purpose computer. Draw the ladder rungs to represent the following :
(a) two switches that are NO and either of the switches have to the closed for a lamp (b) to operate; (c) both NO switches have to the closed for a coil to be energized in order for a solenoid to operate (d) a control valves is switched ON by pressing a spring return pushbutton start switch and it remains actuated until another spring return pushbutton stop switch is pressed (e) a motor is to come ON if there is no input from thermostat switch; (f) stop a motor from running when a pushbutton is pressed. The input field device is a closed pushbutton. **15**

8. What are the uses of robots in modern industries ? What are its essentials components ? Explain the selection parameters of a robot. **15**