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B.E./ B.TECH. (FULL-TIME) DEGREE END SEMESTER EXAMINATIONS - NOV. / DEC. 2011

**COMMON TO MECHANICAL AND MANUFACTURING ENGINEERING
VII SEMESTER
ME 9402 - MECHATRONICS
(REGULATION 2008)**

Time : 3 Hours

Max. Mark : 100

Answer ALL Questions

PART-A (10 x 2 = 20 Marks)

1. Define the term mechatronics.
2. Identify the sensor, signal conditioner and display elements in the measurement system of a mercury-in-glass thermometer.
3. What is a freewheeling diode?
4. What do you understand by darlington pair?
5. What is a servo motor?
6. What are all the uses of 'H' bridge circuit?
7. Devise a timing circuit using Programmable Logic Controller (PLC) that will switch an output on for 10 s then switch it off.
8. What is a latching contact with respect to PLC?
9. List the parameters to be considered for designing an intelligent mechatronic system.
10. Compare the traditional design of a weighing machine with that of the mechatronic design.

PART-B (5 X 16 = 80 Marks)

11. Draw the graphical representation of a mechatronic system and also explain the need and different classes of mechatronics.
12. a. i. Explain the various methods used to avoid the effect of switch bouncing. **8**
ii. Describe pyroelectric and tactile sensors. **8**
(OR)
b. i. A load cell consists of four strain gauges of equal resistance R. On applying load to it, two strain gauges undergo tensile stress and the other two suffer compressive stress, this leads to a change in resistance of ΔR in all the strain gauges. If all these four strain gauges are connected to a Wheatstone bridge. Calculate its output. **12**
ii. List out the displacement sensors in the ascending order with respect to range. **4**
13. a. i. Explain the working principle and the method of controlling the movement of the rotor of a brushless Direct Current (DC) permanent magnet motor. **12**
ii. Suggest possible motors, DC or Alternating Current (AC), which can be considered for applications where (a) cheap, constant torque operation is required, (b) high controlled speeds are required, (c) low speeds are required, (d) maintenance requirements have to be minimized. **4**
(OR)
b. i. Explain the interfacing circuit for a microprocessor to actuate a stepper motor. **8**
ii. Describe the stepper motor specifications in detail. **8**