Reg. No. : ....

Name : ....

Seventh Semester B.Tech. Degree Examination, November 2015
(2008 Scheme)
08.702 : MECHATRONICS (MPU)

Time: 3 Hours

Max. Marks: 100

PART – A

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

1. Explain time constant of a sensor.

2. Define a second order system with examples.

3. Differentiate between null and deflection sensors.

4. Explain on-off type close loop control system.

5. Explain the construction of a vane type hydraulic motor.

6. Explain the stick-slip effect in friction guide ways.

7. What is latching of the output of a PLC ?

8. What are recirculating roller screws ?

9. Explain the deep reactive ion etching for MEMs fabrication.

10. What are aerostatic bearings ? Where are they used ?   **(10×4=40 Marks)**

PART – B

Answer **one** question from **each** Module.

Module – I

11. a) Explain the construction and working of a piezoelectric accelerometer. What are the necessary signal conditioning required for it ?

    b) What are the steps involved in photolithography technique ? Explain with neat diagrams, the additive and subtractive photolithography processes.

OR

12. a) Explain the construction and working of different types of optical encoders.

    b) Explain the working of a transverse comb MEMs accelerometer.

Module – II

13. a) Build the mathematical model for a fluid reservoir with q1 and q2 as inlet and outlet flow rates and h as the fluid level.

    b) Design a ladder diagram for operating a pump when the water level in an over head tank is below a lower limit and to switch it off as the level reaches a high level. Also add a manual override option for starting and stopping the pump.

OR

14. a) Explain the internal architecture of a PLC.

    b) Construct a ladder diagram to start a motor using a switch and after a delay of 10 seconds a pump. When the motor is switched off, the pump follows after a delay of 10 seconds. The pump should automatically stop if water level is reached a high level in the tank.

Module – III

15. a) Explain any two types of proximity sensors used in robotics and industrial automation with neat sketches.

    b) Explain the working of a CCD camera. What are its advantages over evacuated tube cameras ?

OR

16. Design PLC based automated car parking barrier system with suitable sensors and actuators. Design the ladder logic for the PLC so that the system collects coins for parking cars and the barrier prevents the entry of more than one vehicle for a single coin collection.

(3×20=60 Marks)