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Reg. No. : .....

Name : .....

**Seventh Semester B.Tech. Degree Examination, October 2014**  
**(2008 Scheme)**  
**08.702 : MECHATRONICS (MPU)**

Time : 3 Hours

Max. Marks : 100

**PART – A**

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

1. Explain the advantages of pneumatic actuators over hydraulic ones.
2. Explain cushioning of pneumatic cylinders.
3. Explain the working of a parallel plate MEMs accelerometer.
4. Explain the stick and slip effect in friction guide ways.
5. What do you mean by a first order system ?
6. Explain latching in PLC ladder logic.
7. Explain adaptive control as applied to the machine tools.
8. Distinguish between servo and stepper motors.
9. Distinguish between tactile and proximity sensors.
10. Explain the histogram analysis technique.



**PART – B**

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

**Module – I**

11. a) Explain any four static characteristics of transducers and their effects on the measured variable. 8
- b) Explain the working of incremental and absolute optical encoders. Why grey code is used in coding absolute encoders ? 12

OR

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12. a) Explain the dynamic characteristics of transducers and their effects on performance of the transducer. 8
- b) Explain the components of a hydraulic actuation system with neat sketches and block diagrams. Distinguish between a servo valve and a direction control valve. 12

### Module – II

13. a) Explain the mathematical model for a spring-mass-dashpot system. 8
- b) Design a PLC ladder logic for operating two cylinders A and B in the sequence, A+ B+ A – B – . 12
- OR
14. a) Explain the preloading of ball screws in recirculating ball screw mechanisms. 6
- b) Design a ladder logic for controlling water levels in an over head tank and a sump using a pump and two level switches each for the sump and the tank to sense high and low levels. All level sensors should be NO type. 14

### Module – III

15. a) Explain the different configurations used for industrial robotic arms. 6
- b) Explain the application of mechatronics in a modern engine management system, with regards to the sensors, control system and actuators. 14
- OR
16. a) Explain any two range finding methods using laser beams. 6
- b) Explain the working of a hybrid stepper motor with neat sketches and explain the terms pull-in torque, pull-out torque and slew range. 14