

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID :121658

Roll No.

**B.TECH.**

**Theory Examination (Semester-VI) 2015-16**

**MECHATRONICS**

*Time : 3 Hours*

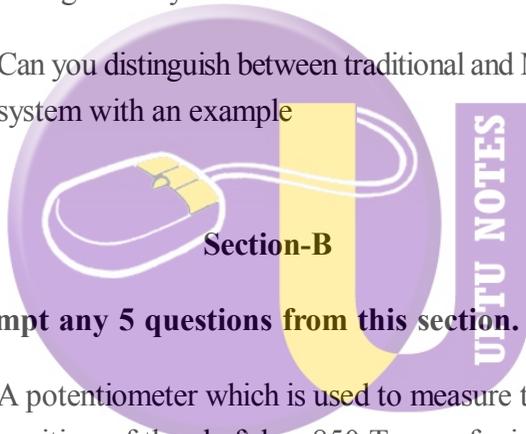
*Max. Marks : 100*

**Section-A**

1. **Attempt all parts. All parts carry equal marks. Write answer of each part in short.** (2×10 = 20)

- (a) What are the advantages of the plastic film type of potentiometer when compared with the wire - wound potentiometer?
- (b) Give an example for a transducer and state its transduction principle.
- (c) A pneumatic system is operated at a pressure of 1000 *kPa*. What diameter cylinder will be required to move a load requiring a force of 12 *kN*?
- (d) How would you classify actuator based on motion?

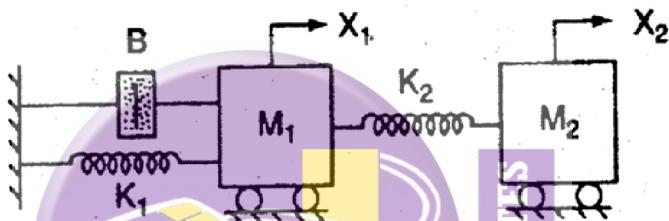
- (e) Highlight the properties of a stepper motor.
- (f) Mention the two specific features of PLCs
- (g) Name the three elements of a microprocessor system?
- (h) State the various Mechatronics elements present in a vehicle suspension system.
- (i) List any four major sensors used in the car engine management system.
- (j) Can you distinguish between traditional and Mechatronics system with an example



**Note: Attempt any 5 questions from this section. (10×5=50)**

2. A potentiometer which is used to measure the rotational position of the shaft has 850 Turns of wire. The input range is from  $-160^\circ$  to  $+160^\circ$ . The output range is from 0 V to 12 V. Determine
- (i) The span
  - (ii) Sensitivity
  - (iii) Average resolution in volts.

3. Explain the constructional features of the DC motor with a neat sketch and discuss about their steady state characteristics with suitable graphs.
4. Explain the various elements of Microcontroller with a neat sketch.
5. Obtain the differential equation of the system as shown in figure.



6. Explain fluid system building blocks.
7. Write notes on the following
  - (i) Directional control valves
  - (ii) Data acquisition
8. Sketch the basic architecture of a PLC and explain the function of each element?
9. Considering a NC Machine as a Mechatronics system. Discuss the design considerations and design solutions to those considerations.

## Section-C

**Note: Attempt any 2 questions from this section. (15×2=30)**

10. (a) Explain the principle of various sensors used for measuring displacement. (8)
- (b) An actuator has a stem movement which at full travel is 40 mm. It is mounted with a linear plug process control valve which has a minimum flow rate of 0 and a maximum flow rate of  $0.2 \text{ m}^3/\text{sec}$ . What will be the flow rate when the stem movement is 20 mm? (7)
11. (a) Explain the specification of a stepper motor in detail. (6)
- (b) Explain various types of ball and roller bearings with neat sketch. (9)
12. (a) Explain the car engine management system and discuss the parameters relevant to the engine performance. (8)
- (b) What way would you design of a Mechatronics system considering Computer Printers as an example? (7)