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D-1518

Reg. No. : .....

Name : .....

**Seventh Semester B.Tech. Degree Examination, November 2017  
(2013 Scheme)  
13.702 : MECHATRONICS (MPSU)**

Time : 3 Hours

Max. Marks : 100

**PART – A**

Answer **all** questions. **Each** question carries **2** marks.

1. Write a note on hysteresis in sensors.
2. List four examples for temperature sensors.
3. Illustrate the feature of resolvers.
4. Distinguish between directional valve and direction control valve.
5. Sketch a rotary actuator and write its feature.
6. Distinguish between isotropic and anisotropic etching in MEMS fabrication.
7. How aerostatic LM bearing works ?
8. Sketch an XOR circuit in PLC ladder program.
9. Write a note on tactile sensing.
10. Bring out the features of ultrasound based range finders. **(10x2 = 20 Marks)**

**PART – B**

Answer **one complete** question from **each** Module. **Each** question carries **20** marks.

**Module – 1**

11. a) Illustrate an arrangement to apply Hall effect to sense the level of liquid in a shallow container.  
b) Describe the working of an incremental rotary encoder to sense angular displacement and rotation speed of a shaft.

OR

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12. a) Describe the working of an acoustic emission sensing system. List any four applications.  
b) Sketch the scheme of a piezoelectric vibration sensor. Describe its working.

**Module – 2**

13. a) Develop a hydraulic circuit, using standard symbols, to impart to-and-fro motion to a double acting cylinder. The speed of backward motion needs to be faster than forward motion. Explain the functioning of the system.  
b) Write notes on pressure relief and pressure sequence valves.

OR

14. a) Describe any four disposition techniques in MEMS fabrication.  
b) Illustrate the working of capacitance based MEMS accelerometer.

**Module – 3**

15. a) Explain the construction, working and pre-loading of recirculating ball bearings.  
b) Distinguish the functioning of 'Timer' and 'Counter' in automated circuits. Write one example for the use of each.

OR

16. Bring out the features of Adaptive Control System (ACS). Describe the working of various types of ACS.

**Module – 4**

17. Illustrate the working of Harmonic drives and Stepper motor with neat sketches.

OR

18. a) Explain the image processing techniques using histogram.  
b) Sketch a typical car park barrier system and write its functioning in sequence. Develop a PLC program to automate the functioning. **(4×20 = 80 Marks)**
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