

# *National Institute of Technology, Hamirpur(HP)*

Name of Examination: M.Tech. VLSI Design

December-2020

Branch : Electronics & Comm. Engineering  
Course Name: MEMS & Microsensor Design

Semester : 1st  
Course Code: EC-731

Time: 2 Hours

Maximum Marks: 50

**Note: 1. All 6 questions are compulsory.**

**2. Use A4 sheets and Write your roll number, name, course code, subject name on top of every sheet and signature with date on the bottom of every answer sheet.**

1. Classify the magnetic MEMS material according to their properties. Discuss the principle of operation of microplate type MEMS magnetic sensor that can detect the magnetic field and current in circuit. What do you mean by sensitivity of a magnetic sensor? Plot the sensitivity curve and explain.  
(8)
2. Describe the process of EMF generation in the thermocouple device, what are the materials used for the thermocouple. Explain the basic working principle of micro machined thermocouple probe. Explain the equivalent structure and fabrication process for this thermocouple probe.  
(8)
3. Explain the surface micromachining process sequence. What are the merits and demerits associated with surface micromachining? Explain the fabrication of any MEMS sensor with surface micromachining.  
(8)
4. Give the overview of the thermoelectric technology and module construction. Explain how we can use this for micro- power generation, heating and cooling applications.  
(8)
5. Explain the fabrication and applications of micromirrors. With the schematic diagram, describe the actuation and image display system that uses DMD. Compare the performance of DLP technology and GLV technology.  
(8)

- 6.
- a) Explain the Magneto Optic Ker effect, how this effect is utilized.
  - b) Explain fabrication of micro spherical lens.
  - c) Explain the flow measurement using integrated paddle cantilever structure.
  - d) What are shape memory alloys.
  - e) Explain the working of thermotransistors.

(2\*5=10)