Code No: **R41035** **R10** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

MICRO ELECTRO MECHANICAL SYSTEMS

(Open Elective)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1 a) With the help of suitable diagram explain etching process. [5]

b) What is lithography? With the help of suitable diagrams explain various lithographic techniques. [10]

2 a) Explain the various sensing mechanisms in detail. [10]

b) What factors are affecting flow and pressure measurement by micro phone? [5]

3 a) How do thermally activated MEMS relay works? [9]

b) Elucidate the basics of heat transfer process. [6]

4 a) Is beam splitter a light modulator? Discuss the reasons. [7]

b) Define the terms: i) Reflection ii) Refraction iii) Interference iv) Polarization [8]

5 a) With suitable diagram, explain the principle of operation of magneto resistive sensor. [10]

b) State the applications of Magnetic MEMS actuators [5]

6 a) Write short notes on cantilever resonators. [8]

b) Give exclusive applications of phase shifter. [7]

7 a) Draw a schematic diagram of a diaphragm based micro pump. [8]

b) Discuss the applications of micro fluidic systems. [7]

8 a) Explain the principle of operation of mass-sensitive chemo sensor [8]

b) Write short notes on e-nose. [7]

Code No: **R41035** **R10** **Set No. 2**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

MICRO ELECTRO MECHANICAL SYSTEMS

(Open Elective)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
****

1 a) Describe various steps in surface micro machining with neat sketches. [7]

b) Describe various steps in LIGA process with a neat block diagram. [8]

2 List out various actuation methods used in MEMS. Describe the principles of any two methods with neat sketches. [15]

3 a) What is the function of MEMS thermo vessel chip? What are the basic design requirements of most of micro thermo vessels? [8]

b) Write short notes on data storage cantilever. [7]

4 a) How many types of MEMS micro lens do you know? Explain their design features. [8]

b) Write short notes on micro mirror. [7]

5 Comprehensively discuss the principle of operation of magnetic probe based storage device. [15]

6 a) What is an inductor? What types of MEMS inductors do you know [7]

b) Describe the principle and operation of radio frequency MEM systems. [8]

7 With the suitable diagrams, explain the principles of following:
(i) Dielectro phoresis
(ii) Opto electro wetting [15]

8 Write short notes on following:
(i) fluorescence detection
(ii) Sensing mechanism
(iii) Calorimetric spectroscopy. [15]

Code No: **R41035** **R10** **Set No. 3**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

MICRO ELECTRO MECHANICAL SYSTEMS

(Open Elective)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
****

1 a) Explain various deposition methods used in micro fabrication and explain any one. [8]
b) Define and discuss the diffusion process used in MEMS industry. [7]

2 a) With suitable diagram, describe in detail the principle of Inchworm Technology. [8]
b) List out the physical parameters that can be sensed by using sensory devices [7]

3 Write short notes on following;
(i) Thermistors
(ii) Thermo Devices
(iii) Thermo couple and Thermo pile [15]

4 a) What is wave guide? Show different types of wave guides. [8]
b) Discuss the applications of MOEMS devices. [7]

5 Discuss the principle of operation and construction of a typical micro plate type MEMS magnetic sensor. [15]

6 a) What is varactor? List the advantages of MEMS varactor over the traditional varactor. [7]
b) Mention some of the design scenarios of RF MEMS you know. [8]

7 a) What are three important parameters, which are considered while designing the micro fluidic systems? [8]
b) What are the kinds of fluid actuation methods? Explain any one. [7]

8 a) Write down the principle of operation of a simple biochemical sensor. [8]
b) Write short notes on chemotransistors. [7]

Code No: **R41035** **R10** **Set No. 4**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

MICRO ELECTRO MECHANICAL SYSTEMS

(Open Elective)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1	a)	Give a history of MEMS manufacturing process.	[7]
	b)	Discuss in brief structural and sacrificial materials with their examples.	[8]
2	a)	How does MEMS gyroscope works.	[10]
	b)	What do you meant by piezoelectricity?	[5]
3	a)	Write short notes on micro plate type gas sensor.	[8]
	b)	Discuss the principle of peltier effect heat pump.	[7]
4		Explain the principle of operation of various types of optical switches used in optical communication systems.	[15]
5	a)	Distinguish between magneto transistors and magnetic diodes.	[7]
	b)	State and explain any one type of magnetic actuator with neat sketch.	[8]
6	a)	Briefly discuss about resonator and filter.	[8]
	b)	What are the limitations and advantages of radio frequency MEMS based communication systems?	[7]
7		Write short notes on the following: (i) Electro osmosis flow (ii) electro thermal flow (iii) Micro fluid dispenser	[15]
8	a)	With suitable schematic diagram, explain the principle and operation of chemocapacitor.	[10]
	b)	What do you meant by chem.-lab-on-a-chip (CLOC)?	[5]