

CBCS SCHEME

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20ELD253

Second Semester M.Tech. Degree Examination, July/August 2022 Micro Electro Mechanical Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are the most obvious distinctions between Microsystems and microelectronics technologies? Explain. (10 Marks)
- b. Explain microsystems and miniaturization. (10 Marks)

OR

- 2 a. Explain the applications of MEMS and Microsystems in industrial sectors. (10 Marks)
- b. Explain the difference between MEMS and Microsystems. (10 Marks)

Module-2

- 3 a. Explain the working principle of micro sensors and acoustic wave sensors. (10 Marks)
- b. Explain the applications of micro-actuators. (10 Marks)

OR

- 4 a. Describe the applications of electrochemistry in micro-fabrication with examples. (10 Marks)
- b. Explain the diffusion process with suitable diagram and equations. (10 Marks)

Module-3

- 5 a. Determine the minimum thickness of the circular diaphragm of a micro pressure sensor made of silicon as shown in the Fig.Q5(a) with conditions. Diameter $d = 600\mu\text{m}$; applied pressure $P = 20\text{MPa}$; yield strength of silicon $\sigma_y = 7000\text{MPa}$, $E = 190,000\text{MPa}$ and $\nu = 0.025$.

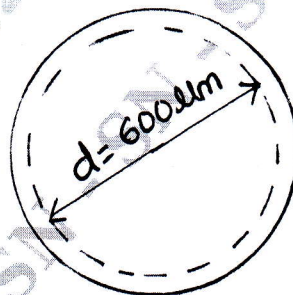


Fig.Q5(a)

- b. Explain different types of mechanical vibration system. (10 Marks)

OR

- 6 a. Explain the thermal induced effects on solid physical behavior. (10 Marks)
- b. Explain stress intensity factor and thin film mechanics. (10 Marks)

Module-4

- 7 a. Draw and explain log plot of all mechanical systems available for exploration. (10 Marks)
- b. Explain the scaling in rigid body dynamics. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Explain how electromagnetic forces are scaled. (10 Marks)
b. Explain how heat conduction is scaled. (10 Marks)

Module-5

- 9 a. Explain bulk micro manufacturing and surface micro machining. (10 Marks)
b. Explain the LIGA process with an example. (10 Marks)

OR

- 10 a. Explain the design considerations followed to design a micro-system. (10 Marks)
b. Write short notes on :
i) Process design
ii) Mechanical design. (10 Marks)

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