

Register

No.:

Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023**ELECTRONICS AND COMMUNICATION ENGINEERING****(2020 SCHEME)****Course Code: 20ECT362****Course Name: Introduction to MEMS****Max. Marks: 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Draw the block diagram of a MEMS microsensor.
2. Describe the principle of operation of thermocouples.
3. Describe the scaling in dynamic forces.
4. Distinguish between heat conduction and heat convection.
5. List the applications of plates and diaphragms.
6. Describe about intrinsic stresses.
7. Point out the need for LIGA process.
8. Compare plasma etching and chemical etching.
9. Differentiate between MEMS and NEMS.
10. Explain the general considerations in packaging design.

PART B***(Answer one full question from each module, each question carries 14marks)*****MODULE I**

11. a) Explain different types of micro-accelerometers with diagrams. (6)
- b) Explain the principle of operation of MEMS based electrostatic sensors and actuators. (8)

OR

12. a) Explain the basic building blocks of MEMS with neat diagrams. (8)
- b) Explain the principle of operation of thermal sensors and actuators with neat diagrams. (6)

MODULE II

13. a) Derive the expression for longitudinal strain under pure bending in flexural beams. (8)
- b) Illustrate the general stress-strain relationship. (6)

OR

14. a) Illustrate the working of MEMS Cantilevers with neat sketches. (8)
b) Explain the deflection of beams with necessary diagrams. (6)

MODULE III

15. a) Explain the various polymers used in MEMS. (8)
b) Explain the scaling laws in miniaturization. (6)

OR

16. a) Explain the scaling in electrostatic and electromagnetic forces. (8)
b) Point out the importance of silicon-based materials for MEMS. (6)

MODULE IV

17. a) Illustrate the photolithography process used in MEMS fabrication. (8)
b) Describe chemical vapour deposition process used in MEMS fabrication. (6)

OR

18. a) With neat sketches, explain microstereo lithography. (8)
b) Describe surface micro machining techniques. (6)

MODULE V

19. a) Write short notes on (a) Surface bonding (b) Anodic bonding. (8)
b) Illustrate MOEMS and NEMS with neat sketches. (6)

OR

20. a) Describe various levels of micro system packaging. (8)
b) Explain bioMEMS and their applications. (6)
