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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations(Supplementary) - January, 2019

Regulation: IARE – R16

Design for Manufacturing MEMS and Micro Systems

Time: 3 Hours

(CAD/CAM)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

- (a) Describe the construction and working of a microaccelerometer with a neat diagram. [7M]

(b) What is microfluidics? Write the various applications of microfluidics. Explain any two of microfluidics. [7M]
- (a) Describe the concept of miniaturisation in microsystems with an example. [7M]

(b) What is MEMS? Explain elaborately the applications of MEMS. [7M]

UNIT – II

- (a) What is doping in semiconductor? Mention its need. Explain different dopants with their effects in conduction mechanism. [7M]

(b) Describe the construction and working of a fuel cell with a neat diagram. [7M]
- (a) What is ionisation and explain the concept of ionisation with suitable examples. [7M]

(b) Elaborate the molecular theory of matter with neat diagrams. Write the applications of molecular theory of matter. [7M]

UNIT – III

- (a) Explain stress analysis on thin plate bending. [7M]

(b) Describe normal stress and shear stress and discuss the various stresses induced in thin films. [7M]
- (a) Choose and justify a suitable geometric shape of a diaphragm for a pressure sensor. [7M]

(b) “Finite element method is a powerful tool in stress analysis”, Justify. [7M]

UNIT – IV

- (a) Discuss the process of heat conduction in multilayered thin films and the methods to enhance the energy transfer. [7M]

(b) What are the modes of heat transfer? Explain them between solids and fluids. [7M]
- (a) Describe the conceptual design of a silicon die to fabricate a micro pressure sensor. [7M]

(b) What are the properties of fluids? Compare and contrast fluids in macro and micro scale. [7M]

UNIT – V

9. (a) What is photolithography? Explain the concept of photolithography with applications. [7M]
- (b) List any four active substrate materials. Explain in detail any three active substrate materials. [7M]
10. (a) List the types of chemical vapour deposition of a substrate. Describe any one process. [7M]
- (b) “Substrates and Wafers are very usefull in fabrication of MEMS” Justify the statement with its applications and describe with neat sketches. [7M]