

Total No. of Questions : 12]

SEAT No. :

P1869

[Total No. of Pages : 3

[5059]-180**B.E. (E&Tc)****MICRO ELECTROMECHANICAL SYSTEM SYSTEM AND ON CHIP
(2008 Pattern)***Time: 3 Hours]**[Max. Marks : 100**Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answer 3 questions from section I and 3 questions from section - II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define transducer. Draw block schematics of transducers and explain transduction with respect to signal domains. [8]
- b) What is microsystem? What figure of merits are used for specifying, characterizing and comparing the performance of microsystem? [8]

OR

- Q2)** a) What is surface micromachining? Explain it with respect to, [8]
- i) Basic process sequence
 - ii) Materials & etching processes used
- b) Explain metal film thermoresistor and semi conducting thermoresistors with necessary expressions. [8]
- Q3)** a) Write a short note on. [10]
- i) Bulk micromachined pressure sensor
 - ii) Surface micromachined pressure sensor.
- b) Define Lorentz force. Explain Hall effect principle and its modes of operation. [8]

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OR

Q4) a) Explain the principle of piezoelectric transducer with respect to [9]

- i) Definition
- ii) Structure
- iii) Piezoelectric materials.
- iv) Crystal model showing charge generation.

b) Explain capacitive accelerometer with respect to [9]

- i) Working principle.
- ii) Fabrication aspects.
- iii) Packaging aspects.
- iv) Electronic readout ranges.

Q5) a) Explain the transduction principle and sensing characteristics of voltametric sensors and potentiometric sensors. [8]

b) What are the material requirements and fabrication techniques for biomedical microsystems ? [8]

OR

Q6) a) Explain any four of the following with respect to high aspect ratio micromachining. [16]

- i) Poros silicon
- ii) Deep reactive Ion etching
- iii) Lasor micromachining
- iv) Focused Ion beam micromachining
- v) Powder blasting.

SECTION-II

Q7) a) What are the applications of microsystems ? [8]

b) Enlist various packaging technologies and explain each in detail [10]

OR

Q8) a) Explain IC-fabrication technology in detail for, [9]

- i) Silicon bulk micromachining
- ii) Silicon surface micromachining.
- iii) LIGA.

- b) Explain 'Design and Testing of microsystem' with respect to. [9]
 i) Design methodology
 ii) CAD tools for microsystems.
 iii) Testing issues

- Q9)** a) What are the pros and cons of behavioural synthesis ? [8]
 b) Explain abstraction levels associated with synthesis tools. [8]

OR

- Q10)** a) Explain design flow with respect to generic methodology problems and alternative solution for layout synthesis. [8]
 b) How the standard cell approach is good solution for layout synthesis problem ? [8]

- Q11)** a) Explain any two of the following routing techniques [8]
 i) Path Search methods
 ii) Row based routing
 iii) The LEGAL algorithm.
 b) Explain various steps of Hardware/software codesign. [8]

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OR

- Q12)** Write a short note on [16]
 i) Design for Testability
 ii) Built in self Test

