Q.P. Code : 35999

(3 Hours) Total Marks: 80

N.B.: (1) Question **no. 1 is compulsory.**
(2) Answer **any 3** out of remaining **5** questions.
(3) Figures on the right indicate full marks.
(4) Assume data wherever necessary.

1. (a) Explain scaling in fluid mechanics and electricity. 5
(b) Discuss DRIE with neat diagram. 5
(c) Justify silicon is ideal substrate material. 5
(d) Discuss thermal evaporation with neat diagram. 5

2. (a) Discuss drug delivery vehicles. Explain fabrication of solid microneedles with diagram at each step. 10

(b) With neat diagrams, discuss process steps of photolithography. 10

3. (a) Explain MEMS packaging in detail mentioning packaging materials. Compare it with IC packaging. 10

(b) Discuss fabrication of SiO_2 cantilever for antibody detection with neat diagrams. 10

4. (a) With the help of suitable diagram explain µTAS. Also explain any one detection technique. 10

(b) Classify biosensors based on detection technique. Discuss amperometric sensor. Explain immobilization techniques. 10

5. (a) Discuss need of surface characterization. Discuss profilometer in detail. 10
(b) Explain process steps of LIGA along with applications. 10

6. Write short notes on **(Any four)** 20
(a) Bulk Micromachining
(b) Softlithography
(c) Flow techniques in microfluidics
(d) Fabrication of Micropump
(e) Wet Etching
