B.TECH. SEM -VI BIO MEDICAL 2014 COURSE (CBCS) :
WINTER - 2017
SUBJCT: BIO MEMS

Day: **Tuesday** Time: **10.00 AM TO 01.00 PM**
Date: **21/11/2017** **W-2017-2241** Max. Marks: 60

N.B.:
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SAME** answer book.

Q.1 **a)** Describe MEMS. Explain microsystems and microelectronics. **[06]**

b) Describe following mechanical concepts: **[04]**

i) Stress ii) Strain

OR

Explain semiconductor scaling laws in miniaturization with the help of following terms: **[10]**

i) Scaling in Geometry
ii) Force
iii) Heat transfer

Q.2 Describe: Micro Total Analysis System (μ -TAS) with diagram. Also explain μ -TAS sample handling and μ -TAS separation. **[10]**

OR

a) Describe silicon as substrate material. Also write its importance. **[06]**

b) Describe the following: **[04]**

i) Gallium Arsenide
ii) Piezoelectric material

Q.3 Explain in detail micro needles, microsurgical tools and optical biosensors. **[10]**

OR

a) Describe in detail the piezo-resistive sensing and actuation. **[06]**

b) Explain thermal sensing and actuation with neat sketch. **[04]**

Q.4 With the help of neat diagram explain surface micromachining technique. **[10]**

OR

a) Explain in detail LIGA. **[04]**

b) Explain with neat diagram the lithography technique. **[06]**

Q.5 Describe various techniques for MEMS packaging. **[10]**

OR

a) Describe in detail MEMS metrology. **[06]**

b) Write importance of MEMS packaging. **[04]**

Q.6 Explain in detail any one methodology for MEMS. **[10]**

OR

a) Describe MEMS based capacitive accelerometer. **[06]**

b) Write note on: "MEMS based piezo-resistive pressure sensor". **[04]**