B.TECH
(SEM VIII) THEORY EXAMINATION 2018-19
MICRO AND SMART SYSTEMS

Time: 3 Hours   *Total Marks: 100*
Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**
a.   What is the need of micro fabrication?
b.   What do you understand by miniaturization of systems?
c.   Briefly explain portable blood analyzer.
d.   Write short note on magnetic micro relay.
e.   Differentiate between positive photoresist and negative photoresist.
f.   What do you understand by micro machining?
g.   What is squeezed film effects in electro machines?
h.   Write short note on in-plane stresses.
i.   Mention the general considerations in packaging design.
j.   List the special issues in microsystem packaging.

SECTION B

2.   **Attempt any *three* of the following:**   **10x3=30**
a.   What is MEMS? Explain the principle of operation of electrostatic scratch drive actuator used in MEMS devices.
b.   With necessary sketches, explain the working principle of silicon capacitive accelerometer and mention its advantages and applications.
c.   Describe surface micromachining technique with the help of a suitable example.
d.   Differentiate Bar modeling from Beam modeling of solids in Micro system. What is Bimorph effect?
e.   Describe any four packaging technologies used in microsystem.

SECTION C

3.   **Attempt any *one* part of the following:**   **10X1=10**
a.   Discuss smart materials in details with their different types. Describe characteristics and properties of smart materials.
b.   Explain Integrated Microsystems. Write down applications of Microsystems in industry. Compare performance of Microsystems with MEMS.
4.   **Attempt any *one* part of the following:**   **10X1=10**
a.   Explain properties of a typical micro sensor. What is working principle of Piezoelectric Pressure sensor specifications?
b.   Explain the principle of operation of piezoelectric based inkjet printhead.
5.   **Attempt any *one* part of the following:**   **10X1=10**
a.   With neat sketches, explain the processes involved in photolithography processes.
b.   Explain with the help of neat diagram, the different process steps involved in the fabrication of micro system.
6.   **Attempt any *one* part of the following:**   **10X1=10**
a.   Explain phenomena of Poisson Effect. Find out related bending deflection equations for anticlastic curvature of beams.
b.   Describe in details scaling of electromagnetic forces and electrostatic forces.
7.   **Attempt any *one* part of the following:**   **10X1=10**
a.   What is mechanical domain scaling and electrostatic domain scaling in micro systems Also write the Difference between them.
b.   Explain the reliability and key mechanism that are essential in micro system.