Registration No :

8th Semester Regular / Back Examination 2017-18
MICRO ELECTRO MECHANICAL SYSTEMS
BRANCH : AEIE, BIOMED, CSE, ECE,
EIE, ETC, IEE, IT, ITE, MANUFAC, MANUTECH, MECH
Time : 3 Hours
Max Marks : 70
Q.CODE : C296
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1.   **Answer the following questions :**   **(2 x 10)**

a) What is SOC?

b) List the type of microsystem packages.

c) What are the relative merits of MEMS varactors over its semiconductor counterpart?

d) What do you mean by LPCVD?

e) State the Castiglione's first energy theorem.

f) It takes a force of 20 millinewtons to hold a spring stretched to a distance of 40 micrometer. What is the elastic potential energy of the spring at this position?

g) What is Lab-on-a-chip?

h) What is Coriolis force?

i) Will the gain of a MEMS RF Resonator Oscillator improve if it operates under partial vacuum? Explain your answer in brief.

j) What is the working principle of capacitive accelerometer?

Q2. a) What is the primary reason of designing solenoid type MEMS inductor? Write down the diminutions and specifications of a typical MEMS solenoid inductor.   **(5)**

b) Write down the relationship between the contact angle and the applied voltage in case of electro wetting based fluid flow. Define the terms.   **(5)**

Q3. a) Explain the design considerations of peezoresistive pressure sensors.   **(5)**

b) How many types of MEMS microlense do you know? Explain their design features.   **(5)**

Q4. a) Compare surface and bulk micromachining techniques in MEMS.   **(5)**

b) Explain the wet etching process with suitable diagram.   **(5)**

Q5. a) Explain the special issues in microsystem packaging.   **(5)**

b) Explain the basic mechanical building blocks of MEMS system briefly.   **(5)**

Q6. **a)** Calculate the strain energy for a typical bar and beam. **(5)**

b) Narrate the process steps involved in photolithography. **(5)**

Q7. How does an MEMS gyroscope work? Define coriolis force and coriolis acceleration. Discuss the compensation techniques used in process of fabricating the gyroscope. Also explain the meaning of DSA. **(10)**

Q8. **Write Short Notes any TWO :** **(5 x 2)**

a) Dry etching

b) Pull-in voltage

c) Mechanical actuators

d) LIGA