Registration No :

Total Number of Pages : 02 **B.Tech**

PEI7J005

7th Semester Regular Examination 2018-19

MEMS

BRANCH : AEIE, EIE, IEE

Time : 3 Hours

Max Marks : 100

Q.CODE : E164

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Short Answer Type Questions (Answer All-10) (2 x 10)

a) What do you mean by Micro-Electro-Mechanical Systems?

b) What is electrostatic actuation mechanism for RF MEMS devices?

c) Explain the working principle of optical switch.

d) Differentiate between wet and dry oxidation.

e) What types of magnetic materials are used in MEMS?

f) Enlist various application areas of MEMS devices.

g) Explain the working principle of RF-MEMS resonator.

h) Differentiate between pull-in voltage and pull-up voltage for MEMS switches

i) Enlist various limitation of photolithography.

j) Explain the process of sensing and detection using magnets.

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any EIGHT out of TWELVE) (6 x 8)

a) Explain the LIGA micro fabrication process for microstructures.

b) Enlist various micro-sensing mechanisms for MEMS devices.

c) What are the important advantages of using RF MEMS as compared to traditional units and systems?

d) Discuss the steps involve in dry and wet etching.

e) Explain different waferbonding techniques.

f) What are macro and micro fluids? Give some applications.

g) Write the working principle of fixed-fixed beam RF MEMS switch.

h) Explain the measurement of shear stress with micro opto electro mechanical systems.

i) Explain the working principle of bi-directional micro actuator.

j) What are micro mirrors? Explain their working and applications.

k) Discuss in detail about the failure mechanisms and power handling characteristics of MEMS devices.

l) Explain briefly about the Large force reluctance actuator.

Part-III

Long Answer Type Questions (Answer Any TWO out of FOUR)

Q3	List out various actuation methods used in MEMS. Describe the principles of any two methods with neat sketches.	**(16)**
Q4	Describe various steps in bulk micromachining and surface micromachining with neat sketch. Enlist advantages and disadvantages of each.	**(16)**
Q5	Describe a micro pump and explain its working with neat sketch.	**(16)**
Q6	Write short notes on following (a) MEMS capacitive accelerometer (b) Optical switch	**(16)**