

8E 8023

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**B.Tech. VIII-Semester (Main & Back) Examination, April-2019**  
**Electronic Instrumentation & Control Engg.**  
**8EI4.2A MEMS and Nanotechnology**  
**(Common with EC, EI)**

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

**Instructions to Candidates:**

*Attempt any Five questions, selecting One question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly Units of quantities used/calculated must be stated clearly).*

**Unit - I**

1. a) Explain the top down and bottom up approach of nanotechnology with suitable diagrams. (8)
- b) Give the difference between metals, insulator and semiconductors with band structures. (8)

(OR)

1. a) What is the effect of size and dimensions on nanostructured crystal? Explain Quantum dot, wire and Quantum well. (10)
- b) Briefly explain the graphene and CNT. (6)

**Unit - II**

2. a) Briefly explain the physical vapour deposition techniques of thin films. (8)
- b) Classify the different CVD techniques of thin film deposition with their process parameters and explain any one. (8)

(OR)

2. a) Explain the different steps in lithographic process of pattern writing with suitable diagrams. (8)
- b) Compare the x-ray and e-beam litho process. (8)

**Unit - III**

3. a) Discuss the XRD technique of characterization of thin films with D-by Scherrer's formula. (8)
- b) Compare Raman spectroscopy with NMR spectroscopy technique. (8)

(OR)

3. Write the short notes on any Two :

- i) SEM
- ii) AFM
- iii) XPS
- iv) DLS

(2×8)

**Unit - IV**

- 4. a) What are Nano medicines? Which approach has been used for developing nano medicines? (8)
- b) Explain the application of nano technology in sensing with suitable examples. (8)

(OR)

- 4. a) Discuss the electrical, mechanical and optical properties of nano particles. (12)
- b) What do you mean by nano biology? (4)

**Unit - V**

- 5. a) Discuss the case study of pressure sensor with packaging. (8)
- b) Explain various types of MEMS packages. (8)

(OR)

- 5. a) Explain the applications of MEMS. (8)
- b) Discuss the following in brief.
  - i) Wafer.
  - ii) Substrate and active substrate. (8)