

8E8023

Roll No. _____

Total No of Pages: **3**

8E8023

B.Tech. VIII-Sem (Main & Back) Exam September 2020
Electronic Instrumentation & Control Engg.
8EI4.2AMEMS and Nanotechnology
EC,EI

Time: 2 Hours

Maximum Marks: 48
Min. Passing Marks: 16

Instructions to Candidates:

Attempt three questions, selecting one question each from any three 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.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

UNIT- I

Q.1 (a) How Band gap modify when sample size is reached to nano size in comparison to Bulk Sample? Explain with an example. [8]

(b) What is CNT? Explain its types. Also write its potential application. [8]

OR

Q.1 (a) What is single electron tunneling? Explain current voltage characteristics of such devices. [8]

(b) How Top down and Bottom up approach are different? Explain their difference with one example. [6]

(c) Draw density of quantum states for nano rod & nano dot. [2]

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[2560]

UNIT- II

[2×8=16]

Q.2 Explain any two processes in detail from the following-

- (a) PVD (Physical Vapor Deposition) .
- (b) Gettering
- (c) X – Ray Lithography (XRL)

OR

Q.2 Explain any two fabrication processes used for nano size structure in detail. [2×8=16]

UNIT- III

Q.3 (a) Explain Scherrer's equation for determine the size of a nano sample. Also explain the broadening of XRD peak from sharp to wide when sample decreases from Bulk to nano cluster. [8]

(b) Draw the schematic diagram of an Atomic Force Microscopy (AFM). Explain its working and order of resolution. [8]

OR

Q.3 (a) What is the working principle of "Raman Spectroscopy"? Write its potential application for material characterization. <http://www.rtuonline.com> [8]

(b) Find the order of resolution obtained in scanning electron microscopy when its working voltage is- [8]

- (i) 20 kV
- (ii) 20 MV

UNIT- IV

Q.4 (a) Explain the working of nano sensor with respect to their counter Bulk Sensor. Why these sensors are superior? [8]

(b) Explain the electronic properties of nano wire and nano dots. Also discuss the reliability issues of these structure. [8]

OR

Q.4 (a) Prove that the energy levels in a Quantum Dot is given by- [8]

$$E_{n_x, n_y, n_z} = \frac{h^2}{8mL^2} [n_x^2 + n_y^2 + n_z^2]$$

(b) Explain the working/functional difference of nano medicine. What is the present status of these medicine in real life? [8]

UNIT- V

Q.5 Write short note on any two- [2×8=16]

- (a) Micro electronics
 - (b) Applications of MEMS
 - (c) Fabrication Technology of MEMS
 - (d) Future of MEMS
 - (e) Present Status of MEMS Technology
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