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15EC551

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Nanoelectronics

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the classification of different nanostructures with examples. **(08 Marks)**

b. What are the effects of the nanometer length scale? Briefly explain any one of them. **(08 Marks)**

OR

2 a. Explain periodicity of crystal Lattices. **(08 Marks)**

b. With the help of schematic representation explain high-energy ball milling. **(08 Marks)**

Module-2

3 a. Discuss the different primary probes with examples used in characterization methods. **(06 Marks)**

b. Explain scanning tunneling microscopy and mention the two different modes to scan a sample. **(10 Marks)**

OR

4 a. Discuss PN-junction with band diagrams.
i) Under equilibrium condition
ii) With external voltage applied. **(06 Marks)**

b. Describe quantum confinement in two dimension quantum wire and three dimension quantum dot. **(10 Marks)**

Module-3

5 a. With the help of diagram, explain cleaved-edge overgrowth. **(08 Marks)**

b. Discuss the following:
i) The epitaxial growth of quantum wells.
ii) Lithography and etching. **(08 Marks)**

OR

6 a. Describe modulation doping in semiconductor nanostructures. **(08 Marks)**

b. Explain the phenomenon in quantum confined stark effect. **(08 Marks)**

Module-4

7 a. How are carbon clusters formed? Illustrate linear structure and closed structures. **(06 Marks)**

b. What are the different methods of fabricating carbon nano tubes? Explain laser evaporation method of fabricating carbon nano tubes. **(10 Marks)**

OR

8 a. List out few properties of carbon nanotubes and briefly explain any one of them. **(06 Marks)**

b. Mention the applications of carbon nanotubes. Explain any one application in detail. **(10 Marks)**

Module-5

9 a. Mention the different nanoscale organization for sensors. Explain self-assembly techniques. **(08 Marks)**

b. Describe nano sensors based on Quantum size effects. **(08 Marks)**

OR

10 a. Mention different applications of semiconductor nanostructures. Explain any one of them. **(08 Marks)**

b. Write a note on single photon sources. **(08 Marks)**

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