

Roll No.

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Total No. of Pages : 02

Total No. of Questions : 8

M.Tech. (ECE) (2018 Batch) (Sem.-2)

NANO ELECTRONICS

Subject Code : MTEC-PE4A-18

M.Code : 76265

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.

2. Each question carries TWELVE marks.

1.
 - a) Explain the phenomenon of formation of energy- bands.
 - b) Explain top down and bottom up approaches.
 - c) How energy discreteness occur in nano materials?
2. When a semiconductor material can be treated as a bulk, quantum well, quantum wire, quantum dot or nano- particle? Discuss in terms of density of states, electronic properties, optical properties. energy level structures.
3.
 - a) Define any two characteristic lengths associated with nano-electronic devices.
 - b) Draw the energy vs. wave vector diagram for a parabolic quantum well and list the features.
 - c) MODFETs are High Electron Mobility Transistors. Justify.
 - d) List the merits of AFM over STM.
4.
 - a) Derive the expression for density of states function of a 2D semiconductor nano structure.
 - b) Compare and contrast the features of square, triangular and parabolic quantum wells.

5.
 - a) DC sputtering cannot be used for the coating of non-conducting materials. Justify.
 - b) Illustrate the working principle of Atomic Force Microscope.
6. Explain the principle, construction and working of :
 - a) Scanning electron microscopy
 - b) Infrared and Raman spectroscopy
7. Explain photoemission process and X-RD spectroscopy in detail. Also, discuss its limitations.
8.
 - a) Explain quantum interference transistor.
 - b) Explain basic operation of DNA and DNA computer.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.