

2021
B.A./B.Sc.
Fifth Semester
Discipline Specific Elective – 2
PHYSICS
Course Code: PHD 5.21
(Nanomaterials & Applications)

Total Mark: 70

Pass Mark: 28

Time: 3 hours

Answer five questions, taking one from each unit.

UNIT-I

1. Derive an expression for the density of energy states and carrier concentration in 2-dimensional, 1-dimensional and 0-dimensional solid materials. 14
2. Show that the solution of Schrodinger's equation for a particle in an infinite potential well leads to the concept of quantization of energy. What is the difference between nanoscience and nanotechnology? 10+4=14

UNIT-II

3. Describe various techniques of physical vapour deposition. 14
4. Explain the working of atomic force microscopy (AFM) with a neat sketch. What are the differences between STM and AFM? 12+2=14

UNIT-III

5. What is optical absorption? Discuss the optical characterization methods for the study of optical properties of nanomaterials. 2+12=14
6. What are direct and indirect semiconductors? Explain in detail about exciton. 7+7=14

UNIT-IV

7. Write a detailed note on quantum transport and Coulomb blockade. 14
8. What are crystal defects? Explain the various point defects in a crystal. 2+12=14

UNIT-V

9. Discuss in detail about light emitting diode (LED). A light emitting diode is made of GaAsP having a band gap of 1.9 eV. Determine the wavelength. 12+2=14
10. Write a detailed note on nano electromechanical systems (NEMS) and micro electromechanical systems (MEMS). 7+7=14
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