2023

B.A./B.Sc.

Fifth Semester

DISCIPLINE SPECIFIC ELECTIVE – 2

PHYSICS

Course Code: PHD 5.21(B)

(Nanomaterials & Applications)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. What are the induced effects due to increase in surface area of nanoparticles? Compare the difference between bulk and nanomaterials. 4+10=14

2. Derive the solution of Schrödinger's equation for a particle in a potential step. Explain the size dependence properties of nanomaterials. 8+6=14

UNIT –II

3. Discuss top down and bottom up approach citing the examples of lithography and molecular self assembly. Explain chemical vapor deposition of nanomaterials with a neat sketch. 10+4=14

4. Explain the working and advantages of Atomic Force Microscope (AFM) with a neat sketch. What are the advantages of AFM over SEM and TEM? 12+2=14

UNIT–III

5. What are photoluminescence and electroluminescence? Explain the formation of heterogeneous semiconductor photocatalyst with diagram. 4+10=14

6. Discuss Surface Plasmon Resonance (SPR) and quantum size effect. 7+7=14

UNIT–IV

7. Describe quantum conductance in detail. 14

8. What are the different classes of lattice imperfections? Calculate the energy required for the formation of Schottky defects in an ionic crystal. 4+10=14

UNIT–V

9. Give a detailed description about carbon nano tubes. 14

10. Write a short note on the following: 7×2=14
    (a) Solar photovoltaic cells & hydrogen storage
    (b) Nano electromechanical systems (NEMS)