QP CODE: 25801369

25801369

Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, MARCH 2025

Sixth Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

ELECTIVE - IPH6ELA1 - PHYSICS OF NANO MATERIALS

2021 Admission Onwards

38432AA0

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. How did Feynman's 1959 lecture influence the field of nanoscience?
2. What are some of the key challenges in achieving uniformity and reproducibility in nanomaterial synthesis?
3. How does the choice of synthesis method impact the reproducibility of nanomaterial properties?
4. What is electronic magic number?
5. Describe the production of an exciton.
6. What role does carbon bonding play in the formation of different allotropes of carbon, such as graphite, diamond, and graphene?
7. What is superconductivity, and why is it significant in the context of fullerenes?
8. How are carbon nanotubes used in the development of transistors?
9. What is mean free path? Write an expression for mean free path?
10. What is Mott-Wunnier type of exciton?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. How might nanotechnology influence economic growth and industry innovation?
12. Discuss theoretical modelling of nanoparticles.
13. Briefly explain electronic structure.

14. What are the main fabrication methods for carbon nanotubes, and what are their specific challenges and how can the challenges in CNT fabrication methods be addressed?

15. What are the notable mechanical properties of carbon nanotubes, and how do they compare to those of other materialsand how do the mechanical properties of carbon nanotubes influence their use in composite materials and structural applications?

16. Distinguish between bulk, quantum well, quantum wire and quantum dot. Also discuss the preparation of quantum nanostructures.

17. Discuss about the conduction electrons and dimensionality of quantum nanostructures.

18. Discuss the partial confinement in nanostructures.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Explore the diversity of nanomaterials, focusing on their types, properties, and applications.

20. Explain the various methods of synthesis of nanoparticles in detail.

21. Discuss the discovery, structural characteristics, and properties of C_{60} and analyze its various applications.

22. What are the different nanostructures? Discuss their applications in detail.

(2×5=10 weightage)