

QP CODE: 26801771



Reg No :

Name :

INTEGRATED M.Sc. DEGREE EXAMINATION, APRIL 2026

Eight Semester

INTEGRATED M.Sc. BASIC SCIENCES-PHYSICS

ELECTIVE - IPH8ELB1 - CHARACTERISATION OF NANO MATERIALS

2021 Admission Onwards

28F585EF

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Write a short note on the bottom-up approach for nanomaterial synthesis.
2. Using schematic diagram explain the main steps involved in lithography.
3. What is magnetron sputtering and how does it improve efficiency? What is the role of vacuum in the sputtering process?
4. What are the disadvantages of AFM over SEM?
5. Explain Electron Energy Loss Spectroscopy.
6. Explain Dark field imaging mode of TEM.
7. Which region of the electromagnetic spectrum is commonly used in photoluminescence spectroscopy?
8. What type of recombination dominates in heavily doped semiconductors?
9. What is the role of angle variation in MALS?
10. What does "photonicallly aligned" refer to in nanoarrays?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Using schematic diagram explain molecular beam epitaxy method for epitaxial growth of materials.
12. Explain sol-gel dip coating with the help of schematic diagram.
13. With the help of schematic diagram explain the tunnelling process between the tip and sample in STM.





14. Explain how AFM can be used in biological applications.
15. What are the uses of electron microscopy?
16. Explain how free carrier concentration affects the photoluminescence spectra of semiconductors.
17. Explain the significance of zeta potential in determining colloidal stability.
18. Explain the principle and process of plasmon printing in nanofabrication.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Compare and contrast thermal evaporation and electron beam evaporation technique.
20. Explain in detail the working principle of Small Angle X-Ray Scattering (SAXS) technique.
21. How can photoluminescence spectroscopy be used for both compositional analysis and contaminant identification in nanomaterials.
22. Discuss in detail the principle, setup, and applications of two-photon lithography in fabricating 3D micro- and nano-structures.

(2×5=10 weightage)

