



QP CODE: 26019125



26019125

Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, MARCH 2026

Fourth Semester

M Sc PHYSICS

ELECTIVE - PH810403 - NANOSTRUCTURES AND MATERIALS

CHARACTERISATION

2019 Admission Onwards

D0C42B69

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Differentiate between weak confinement and strong confinement regimes.
2. Mention some properties and experiments which depends on density of states of electrons in nanomaterials.
3. Differentiate between top -down and bottom-up approaches.
4. What are the basic mechanisms in magnetization reversal of single domain particles?
5. What is a molecular switch? Explain with an example?
6. What is the working principle of photomultiplier tube?
7. Write an account on effect of temperature in atomic spectroscopy.
8. Differentiate between the X- Ray sources used for the X-Ray diffraction and X-Ray photoelectron spectroscopy.
9. In the mass spectrum of 1, 2-Dichloroethane, find the ratio of peaks at M/Z values 98, 100 and 102. The natural abundance of Cl^{35} is 75% and the natural abundance of Cl^{37} is 35%.
10. What is DTA? What is the use of furnace in a DTA?

(8×1=8 weightage)





Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Discuss the theoretical modeling of metal nano clusters.
12. Describe the general steps involved in electron beam lithography for the fabrication of nanostructures.
13. Explain the working principle of a nanostructured thermo electric devices.
14. What are MEMS? Explain the working of MEMS accelerometer.
15. Discuss on photothermal spectroscopy. What are their advantages?
16. Write notes on quenching and its applications.
17. What are the information derived from X-Ray diffraction pattern?
18. Compare the principal features of SEM and TEM.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Explain the role and significance of catalysis in nanoscience. Discuss the dependence of surface area on the catalytic properties of nanostructure. Briefly discuss the ways in which surface area can be enhanced.
20. What are carbon nanotubes? Explain the different structure of CNT and its unique properties. Briefly explain any two applications of CNTs.
21. Write an account on photoacoustic and thermolens spectroscopic techniques.
22. Discuss in detail about the analysis of surface chemical composition with Auger Emission Spectroscopy method.

(2×5=10 weightage)

