



QP CODE: 25024392



25024392

Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, APRIL 2025
Fourth Semester
M Sc PHYSICS
ELECTIVE - PH810403 - NANOSTRUCTURES AND MATERIALS
CHARACTERISATION
2019 ADMISSION ONWARDS
FD0B3B68

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. How do the size of the metal nano clusters used to tune the color of a material?
2. Briefly explain the principle of self assembly.
3. Differentiate between top -down and bottom-up approaches.
4. What are the different types of carbon nanotubes?
5. What is superhydrophobicity? Mention its applications.
6. Draw the Jablonski diagram showing different de-excitation processes.
7. What is static quenching?
8. Why ultra high vacuum is required in SEM?
9. What is electron-impact ionization? What is its disadvantage over other ionization methods?
10. What is potentiometry? Discuss its principle.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Explain the quantum confinement effect with suitable examples.
12. Discuss a method for the fabrication of an array of quantum dots.
13. Briefly discuss NEMS as an oscillator. What are the advantages of such an oscillator?
14. Give properties and applications ZnO and TiO₂ nano particles.





15. Calculate concentration of drug present in a sample that has shown absorbance of 0.82 in UV-visible spectrometer using a cell of 1nm at 280 nm. Also calculate weight of drug in 100 ml sample solution. Molar absorptivity of the sample is 1860 lit/mol-cm. Molecular weight = 153 gram/mole.
16. Differentiate between difference, differential and derivative spectroscopy.
17. With the help of a diagram, explain Bragg-Brentano geometry of a X- Ray diffractometer to find crystal structure.
18. Comment on various stress measurement techniques.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Explain the principle and application of nanolithography.
20. What is magnetoresistance? Explain the theory of GMR and CMR with their respective applications.
21. What is the principle behind the working of FT-IR spectrometer? Explain.
22. Briefly explain the principle, working and application of X-Ray fluorescence spectrometer.

(2×5=10 weightage)

