

19001440



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Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, APRIL 2019

Fourth Semester

Faculty of Science

Branch II : Physics—A—Pure Physics—Open Elective Bunch

Paper IV—PH4OE3—THIN FILM AND NANOSCIENCE

(Common With Branch D—Material Science)

[2012 Admission onwards]

Time : Three Hours

Maximum Weight : 30

Part A (Short Answer Questions)

Answer any six questions.

Weight 1 each.

1. Why it is telling that “thin film growth is not an equilibrium process” ?
2. Write a note on the effect of void contents on properties of nanomaterials.
3. Compare the properties of SWNT and MWNT.
4. What is critical radius of nucleus ?
5. What is self-assembly ? What are the important parameters behind self-assembly ?
6. Explain the role of nano materials in medicine.
7. Explain the effect of Nucleation rate on the size of a particle growth.
8. Why we need two vacuum pumps in thermal evaporation technique ?
9. Differentiate between pirani and penning gauge.
10. Write any *four* advantages of layer by layer assembly.

(6 × 1 = 6)

Part B (Short Essay/Problems)

Answer any four questions.

Weight 2 each.

11. What do you mean by epitaxial growth ? What is its importance ?
12. Explain the crystal oscillator method to measure thickness of the film.
13. Write the monolayer theory and nucleation theory on epitaxial growth.





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14. Explain the substrate effect on film growth technology.
15. Explain the top-down approach for nano materials.
16. Explain the different steps involved in ion-beam lithography.

(4 × 2 = 8)

Part C (Essay Type Questions)

Answer all questions.

Weight 4 each.

17. Explain the various stages of thin film growth and the incorporation of defects in thin film.

Or

Discuss in detail, the different methods to create vacuum and the mechanism for monitoring vacuum.

18. Name the four different chemical vapour deposition methods and explain it.

Or

With the help of a neat diagram discuss the thickness of film by interferometry method.

19. What are carbon nano tubes ? How are they fabricated. Explain their structure and properties.

Or

Discuss the synthesis and purification of nano tubes.

20. Explain and compare the particle beam lithography and probe lithography.

Or

Explain different pattern replication technique used in the synthesis of nano materials.

(4 × 4 = 16)

