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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2022 ONLY)

SUBJECT CODE 22PPS3E5

REG.NO.

N.G.M. COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: NOVEMBER – 2023

M.Sc – PHYSICS **MAXIMUM MARKS: 50**

SEMESTER III **TIME : 3 HOURS**

THIN FILM AND NANO SCIENCE

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS (k1)

1. Which CVD technique is good for depositing epitaxial thin film?

   (a) LPCVD (b) LECVD (c) PECVD (d) HTCVD

2. Thickness of thin film is in the range of_____

   (a) several nm to several cm (b) several nm to several mm
   (c) several nm to several μm (d) None of the above

3. The examples of 2-dimensional nano materials are_____

   (a) Clusters, rings (b) Needles, pillars
   (c) Powders, grains (d) Nanofilms, nanocoatings

4. From the following, which technique is used for formation of carbon nano tubes?

   (a) Ball milling (b) Sol-gel (c) Co-precipitation (d) Laser ablation

5. Quantum cascade lasers find application in

   (a) Medical (b) Military (c) Remote sensing (d) All of the above

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. Distinguish between PVD and CVD.
7. What is Giant magneto0resistance?
8. Is fullerene a good conductor of electricity?
9. Define a nano particle.
10. What is the difference between NEMS and MEMS?

SECTION – 'B' (5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Mention the various parameters in thin film deposition.

(OR)

b) Write a short note on RF sputtering.

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12. a) What is Hall effect? Explain with experimental details.

(OR)

b) Write a note on interferometric technique used for the thickness measurement of thin films.

13. a) Mention some chemical properties that change with change of size of particles.

(OR)

b) Write a short note on semiconducting nanoparticles.

14. a) What is meant by top-down approach in nano particle synthesis?

(OR)

b) Mention the importance of XRD analysis in nanomaterial characterization.

15. a) What are the special features of quantum dot lasers?

(OR)

b) Write down the principle of nano-drug delivery.

SECTION – C (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Explain the fundamental processes in thin film growth.

(OR)

b) Explain the chemical vapour deposition technique for synthesis of thin films.

17. a) Discuss the variation of reflectance with optical thickness with necessary theory.

(OR)

b) Discuss the conducting properties of semiconductor and insulator films.

18. a) Discuss the variation of density of states with respect to the dimension of nanomaterials.

(OR)

b) Explain the structure and physical properties of carbon nano tubes.

19. a) Explain in detail about the laser induced evaporation technique for the synthesis of nano particles.

(OR)

b) Describe the principle and applications of photo luminescence spectroscopy.

20. a) Explain the working principle, properties and applications of quantum dot sensitized solar cells.

(OR)

b) Explain in detail the silicon nanowire biosensor system with suitable illustration.

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ETHICAL PAPER