(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2023-24 ONLY)

SUB CODE: 23PPS3E5

REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS: NOVEMBER 2024

M.Sc. – PHYSICS **MAXIMUM MARKS: 75**

SEMESTER: III **TIME: 3 HOURS**

THIN FILMS AND NANO SCIENCE

SECTION – A (10 X 1 = 10)

ANSWER THE FOLLOWING QUESTIONS. (K1)

1. Which of the following parameter affects thin film formation in thermal evaporation?
   a) temperature b) concentration c) pH d) density

2,. The higher range of thickness of the film used in thin film technology is about

   a) 1μm b) 10 μm c) 100 μm d) 1000μm

3. An electron hole pair which is free to move through a non metallic crystal is called

   a) photon b) phonon c) positron d) exciton

4. The decomposition of a substance using heat energy is known as

   a) thermolysis b) thermodynamics c) thermal statics d) none of these

5. Which of the following are nano absorbant materials?

   a) graphene b) carbon nano tubes c) carbon nano fibres d) all of these

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

6. What is sputtering?
7. Define activation energy.
8. State Moore's law.
9. What is EDAX?
10. What is molecular switch?

(CONTD …. 2)

SECTION – B (5 X 5 = 25)

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

11. a) What is RF sputtering? Describe the process of sputter.

(OR)

b) Write note on impurities in thin films.

12. a) State and explain Hall Effect.

(OR)

b) Describe the construction and working of ellipsometer.

13 a) Classify the different types of nanostructures.

(OR)

b) What are known as metal nano clusters? Explain with example..

14. a) Explain Vapour liquid solid growth(VLS) mechanism with diagrams.

(OR)

b) Describe the method of characterization theory IR Spectroscopy.

15. a) How do nano materials used as photocatalysts? Explain..

(OR)

b) Write about nano sensors for pollutant detection .

SECTION – C (5 X 8 = 40)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K4/K5)

16. a) Describe the spray pyrolysis method of thin film deposition.

(OR)

b) Describe the chemical bath deposition of thin film? Draw the diagram for experimental set up and explain.

17. a) Explain the various properties of a semiconductor thin film.

(OR)

b) Discuss the interferometric techniques in Fringes of equal thickness (FET) and Fringes of equal chromatic order (FECO).

18. a) Discuss the structural, thermal and optical properties of nanomaterials.

(OR)

b) What are carbon nanostructures? Explain their features with examples.

19. a) Describe the method of preparation of thin film through Sol-gel method and discuss their advantages.

(OR)

b) Discuss SEM and TEM characterization techniques.

20. a) Describe the fabrication and applications of MEMS and NEMS.

(OR)

b) List some of the applications of nanotechnology in textile and medical industries and explain their advantages.

ETHICAL PAPER

****