

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2022
(Fourth Semester)

Branch – PHYSICS

CRYSTAL GROWTH, THIN FILMS AND PLASMA PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 x 1 = 10)

- 1 Nucleation in freezing is the _____.
(i) Process of gathering of molecules into tiny clusters
(ii) It is the final step in freezing
(iii) It is the step where nucleus is added
(iv) It is the sub category freezing
- 2 What is the disadvantage of using a solution growth method for the growth of the crystals?
(i) Rapid growth rates (ii) Simple apparatus
(iii) Slow growth rates (iv) Isothermal conditions
- 3 Which is the most common solvent used for crystallization?
(i) Water (ii) Syrup
(iii) Normal saline (iv) Sulphuric acid
- 4 Name the solvent melt that are often used in the precipitation method for the growth of the crystal.
often known as _____
(i) Electrolyte (ii) α -particle (iii) β -particle (iv) Fluxes
- 5 Mention the thickness range of the film used in thin film technology.
(i) 0.5-2.5 mils (ii) 0.02-8 mils (iii) 10-20 mils (iv) 0.05-0.07 mils
- 6 Which of the following deposition process is the most widely used for the deposition of thin films such as silicon nitride, silicon dioxide and polysilicon?
(i) Spin process (ii) Chemical vapor deposition
(iii) Physical vapor deposition (iv) Electroplating
- 7 What is the name given to the ability of the material to resist stress without failure?
(i) Strength (ii) Hardness (iii) stiffness (iv) toughness
- 8 Name the property of a material that resists penetration or indentation by means of abrasion or scratching.
(i) Strength (ii) Hardness (iii) Toughness (iv) Brittleness
- 9 Which of the following is a plasma process?
(i) Cathodic arc deposition (ii) Reactive ion plating
(iii) Ion beam deposition (iv) None of these

Cont...

- 10 Which among the following is the use of plasma in ion plating?
 (i) Sputtering the target for deposition
 (ii) Sputtering the substrate for deposition
 (iii) Sputtering the substrate for surface cleaning
 (iv) Sputtering the target for chemical reaction

SECTION - B (35 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 7 = 35)

- 11 a Outline the basic steps for growing single crystals.
OR
 b Discuss the classical theory of nucleation for vapour and solution.
- 12 a Explain the selection of solvent and solubility.
OR
 b Explain the Principle and various types of gel growth techniques.
- 13 a Explain the thickness uniformity and purity of the thin film.
OR
 b Discuss the evaporation process of thin film preparation and its applications.
- 14 a Outline the process of mechanical testing to measure the strength of thin films.
OR
 b Discuss the microstructure control in thin films technology.
- 15 a Explain the different types of plasmas and its physical variation.
OR
 b Explain the thermal plasma sources and their fields of applications.

SECTION - C (30 Marks)

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 Explain the Heterogeneous Nucleation formation of 3D nuclei.
- 17 Classify the different methods of crystallization by low temperature solution growth technique.
- 18 Explain the thermal CVD process and outline the issues occur based on materials.
- 19 Analyse the chemical characterization of surface of thin film and explain the mechanical testing procedure.
- 20 Discuss the Glow discharge and outline the applications of plasma.

Z-Z-Z

END