

SEMESTER - III

Paper - III : Thin Film and Vacuum Techniques

Max. Marks : 55

Time : 3 Hrs

Note : Nine questions will be set and students will attempt 5 questions. Question No. 1 will be compulsory consisting of 4 parts based on the conceptual aspects of the whole syllabus. The answers should not be in yes/no. In addition to Question No. 1 there will be four Units in the question-paper each containing two questions belonging to four Units in the syllabus. Students will select one question from each unit.

UNIT - I

Thin film deposition processes : Introduction to thin film deposition technology, Thermal evaporation methods : Resistive heating – thermal evaporation sources, multiple component evaporation, Sublimation, Flash evaporation, Arc evaporation, Exploding wire technique, Laser evaporation, RF heating Electron bombardment heating.

UNIT - II

Cathodic sputtering yields. Glow - Discharge sputtering, pressure, Deposite distribution Current and Voltage dependence, Cathode contamination problem, Deposition control, Ion Beam Sputtering Reactive Sputtering, Electro deposition, chemical vapour deposition (CVD) - Thermal decomposition, Hydrogen reduction, Halide disproportionation, Transfer reaction, polymerization. Techniques for the measurement of thin film thickness.

UNIT - III

Theories of gas flow, basic principles and process for production of vacuum, Construction and working of rotary, Absorption, Diffusion, Cryogenic, Turbomolecular, Getter and Ion pumps, Measurement of vacuum - Principle of vacuum gauges for different vacuum ranges up to UHV, Leak detection.

UNIT - IV

Materials for vacuum system and their characteristics, Vacuum system and their applications in Microelectronics, Optical, Instrumentation, Packaging, Drying, Impregnation, Metallurgy, Space, Pharmaceutical and Cryogenic industries.

References

1. Thin Film Phenomena - Kasturi L. Chopra, McGraw Hill Book Company.
2. Hand Book of Thin Film Technology - Leon
3. Handbook of Analytical Instrumentation - R.S. Khandpur
4. Vacuum Science and Technology - A. Roth.