

**PAPER – II (PHYSICS)****CW 02: SYNTHESIS & CHARACTERIZATION OF MATERIALS****UNIT – I**

**Purification of Materials & Crystal growth** – General principle of purification, Methods of purification, Different methods for detection of impurities in a sample. Crystal growth from melt, solution and by changing temperature.

**UNIT – II**

**Thin film & Synthesis of Phosphors** – General idea of preparation of thin film by thermal evaporation, sputtering, CVD, LPCVD, spin coating, molecular beam epitaxy. Synthesis of phosphor by solid state reaction/ diffusion method, combustion method, microwave processes etc.

**UNIT – III**

**Characterization techniques** – Basics, principle, working and applications of XRD, SEM, TEM, STEM, STM, AFM, FTIR, Raman spectroscopy, ESR, photoluminescence.

**UNIT – IV**

**Environmental radiation & Health Physics Fundamentals** – Sources of Environmental radiations, Interactions of radiation with matter, Dosimetric quantities, units, Measurement techniques, Biological effects of ionizing radiations, Effects of non ionizing EM radiations.

**UNIT – V**

**Nanotechnology** – Origin of nanotechnology, Nanomaterials, Types of nanomaterials, Surface area to volume ratio, Quantum confinement effect, band theory of nanomaterials, Physical and Chemical properties of nanomaterials, Synthesis of nanomaterials; Inert gas condensation, Arc discharge, Laser ablation, Ball milling, Sol-gel technique, Combustion synthesis, Ultrasonic precipitation process. Chemical vapor deposition.

**Books suggested –**

1. Methods of Experimental Physics, Vol. 6 Solid State Physics, Part A, Edited by K Lork-Horovitz and Vivian A. Johnson, Academic Press
2. Material Science and Engineering, V. Raghvan, Prentice Hall, India 5<sup>th</sup> edition, 2009.
3. Crystal Growth, Pimplin, Pergamon Press
4. Characterization of Materials, J B Watchman (Butterworth-Heinemann)
5. Luminescence of Solids, D R Vij (Plenum Press)
6. Thin Film deposition: Principle & Practice, Donald L. Smith, McGraw Hill Professional
7. Thin Film Phenomenon, K L Chopra McGraw Hill, New York
8. Nano: The Essentials: Understanding Nano Science and Technology, T Pradeep, TMH, Nw Delhi
9. Nanoscale Science and Technology, Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan, John Wiley & Sons., Ltd., UK, 2005
10. Nanomaterials, A K Bandhopadhyay, New Age International, Nw Delhi
11. Nuclear Radiation Physics, R E Lapp
12. Experimental Nuclear Physics, E Serge

➤ *Any other books suggested by Course coordinator/ Course Teacher/ Supervisor concerned may be applied.*