

2031

M. Tech. (Material Science and Technology)

First Semester

MT-104: Synthesis of Materials

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.*

*x-x-x*

I. Attempt the following:-

- a) Explain properly the principle of selective solvent precipitation technique.
- b) What is Hall Effect? How will you get the information about the nature of charge carriers using Hall Effect?
- c) Write the basic principle involved in the Molecular Beam Epitaxy (MBE) technique.
- d) What are positive and negative photo-resist materials? Give two examples of both types of materials. (4x2½)

**UNIT – I**

- II. What are core-shell nanostructures? How will you fabricate such materials using the chemical routes? What are the advantages and disadvantages of these nanostructures? (10)
- III. Write short notes on the following:-
  - a) Size Exclusion Chromatography
  - b) Steric Stabilization (5,5)
- IV. Discuss about the suspension and emulsion techniques for the synthesis of the polymeric materials. What are the advantages and disadvantages of these techniques over the other techniques? (10)

**UNIT – II**

- V. How will you synthesize the thin films of ZnO using metal organic chemical deposition (MOCVD) technique? Discuss the working principle and instrumentation of this technique. What are the silent features of this technique? (10)

P.T.O.

(2)

- VI. a) How will you grow the thin films using pulsed laser technique? Discuss it briefly along with the advantage of this technique over others.
- b) For a class 100 clean room, find the number of dust particles per cubic meter with particle size (i) between 0.5 and 1  $\mu\text{m}$  (ii) between 1 and 2  $\mu\text{m}$  (iii) above 2  $\mu\text{m}$  (5,5)
- VII. Write briefly about the following:-
- a) Inert gas condensation Method
- b) Electro-deposition Technique (5,5)

x-x-x