Dr. Abhijeet Otha Deptl 30/11/202

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National Institute of Technology Hamirpur

B.Tech –Semester VII

End Semester Examination

MS-411: Thin Film Technology

Duration: 180 Minutes **Max. Marks: 50**

Instructions:

- *This question paper consists of 2 pages and 9 questions.*
- *Attempt all the questions.*
- *The diagram or flow chart drawn should be neat and properly labelled.*

1. Briefly explain the following terms with suitable diagram (wherever required):

   (a) Plasma plume

   (b) Pirani gauge

   (c) Knudsen cell

   (d) Spray pyrolysis **(14 Marks)**

   (e) Spin coating

   (f) Giant magnetoresistance

   (g) Molecular beam epitaxy (MBE)

2. State the difference between following *(any three)*:

   (a) Contact mode imaging and Non-contact mode imaging

   (b) Cryo-pumping and Cryo-trapping

   (c) DC sputtering and RF sputtering **(6 Marks)**

   (d) Evaporation and Sputtering

3. Briefly explain the 'Langmuir-Blodgett' method of thin film deposition using suitable diagram. **(3 Marks)**

(31)

4. Explain the dielectric properties of thin films. Mention some of the applications of these properties **(3 Marks)**

5. What is the key challenges one can face while using the target material of di-electric nature during the sputter deposition? How this problem can be addressed. Suggest the solution of this issue in detail. **(4 Marks)**

6. What is 'sputtering-yield'? State important factors affecting the sputtering yield. **(4 Marks)**

7. Explain Low energy electron diffraction (LEED) and Reflection high energy electron diffraction (RHEED) techniques in relevance to the thin film characterization. **(4 Marks)**

8. Describe nucleation and growth mechanism of thin films. Enlist various factors associated with thin film growth mechanism. In brief, explain different models of thin film growth. **(2+1+2= 5 Marks)**

9. Explain the Pulsed Laser Deposition (PLD) method of thin film deposition with a suitable diagram of its experimental setup. Mention important deposition parameters affecting the deposited thin film properties, advantages and drawbacks of this method. **(1+2+1+1+1+1 = 7 Marks)**

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