[80] No. of Printed Pages: 02

SARDAR PATEL UNIVERSITY
M. Sc. (Electronics) III Semester Examination
FRIday, 7th December, 2012 Time: 02:30 pm to 05:30 pm
PS03EELE01 – Thin Film Technology
Total Marks – 70

1. Figure to the right indicate maximum marks for the question

Q-1 Multiple Choice Question (One Mark for Each) **[8]**

1. Effusion cells are used in

a. Electron Beam Evaporation. b. Laser Beam Evaporation.
c. Sputtering d . Molecular Beam Evaporation.

2. Thin Films can be deposited by

a PVD Methods. b. CVD Methods.
c Both [a] and [b]. d None of these.

3. In which of the following method, a finely small grain powder of the alloy is vibrated on to a very hot tungsten boat?

a Direct Evaporation b Flash Evaporation
c MBE d Both [a] and [b]

4. At atmospheric pressure the mean free path of air molecule is about

a 70 nm. b 100 nm.
c 150 nm. d 200 nm.

5. The Bragg-Brenteno Diffractometer is used for the thin films with thickness

a >1000 A^0 b <1000 A^0
c both [a] and [b]. d None of the above

6. The sheet resistance of the material to be used for Thin Film Resistor should be

a High b Low
c Constant d very high

7. The capacitance density of Thin Film Capacitor can be increased by

a Reducing the Electrode Separation b Material with low dielectric constant
c Material with high dielectric constant d None of the above

8. Molecular beam epitaxy method deposit the thin film

a Single crystal b Polycrystalline
c Amorphous d Crystalline

Q-2 Answer **any seven**, in short.(Two marks each) **7X2=14** **[14]**

1. Classify different techniques used for deposition of thin films.
2. State the importance of heater watts in the diffusion pump.
3. Distinguish between Direct Evaporation and Flash evaporation methods.
4. Enlist the general characteristics of Thin Film and Thick Film.
5. Why the Turbo Molecular pump will fail to pump if exhausted directly to atmospheric pressure?
6. Draw the schematic of the likely realization of Thin Film Inductor.
7. What is the basic characteristic of Rotary pump oil?
8. Draw the figure of Image mode of Transmission Electron Microscope.
9. Why pirani gauge measure the vacuum up to 10^{-3} torr?

Q-3 [a] Discuss in detail Electron Beam Evaporation method with proper schematics. **[6]**

[b] What is Epitaxy? Describe the Molecular Beam Epitaxy (MBE) method for the deposition of thin films with necessary schematics. State its applications. **[6]**

OR

[b] Explain in detail about different types of evaporation sources used for deposition of thin films. **[6]**

Q–4[a] What is sputtering yield? Discuss Radio Frequency [RF] sputtering method for deposition of thin films. **[6]**

[b] State and explain various types of chemical reactions involved in chemical vapor deposition (CVD) method. **[6]**

OR

[b] Discuss Magnetron sputtering method for deposition of thin films. **[6]**

Q–5[a] Using proper schematic diagram, discuss in detail the working principle of Turbo Molecular pump. **[6]**

[b] Explain with neat sketches the constructional features and working principle of cold cathode gauge. **[6]**

OR

[b] Using the proper diagram, Describe the working principle of Diffusion pump. Explain the term Back streaming process and Traps. **[6]**

Q–6[a] Mention the Requirements for a Thin Film Resistor. **[6]**

[b] What is X-Ray diffractometer? Explain various types of XRDs used to measure the bulk properties of Thin Films. **[6]**

OR

[b] Describe the structure and typical evaporation sequence of thin film transistors. **[6]**