Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec– 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14PH2010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **VACUUM AND THIN FILM TECHNOLOGY** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | \_\_\_\_\_\_\_\_\_\_\_\_\_ is a device that reduces the pressure of gas in a container. | CO1 | 1 |
| b. | \_\_\_\_\_\_\_\_\_\_\_\_\_ pumps use no oil and operates like jet engines. | CO1 | 1 |
| c. | Mention the drawbacks of diffusion pump. | CO1 | 3 |
| d. | Explain with suitable diagram the principle, instrumentation and operation of cryogenic pump. | CO1 | 15 |
| (OR) | | | | |
| 2. | a. | \_\_\_\_\_\_\_\_\_\_\_ pump is based on the principle of displacement of gap. | CO1 | 1 |
| b. | \_\_\_\_\_\_\_\_\_\_\_ is a vacuum pump that traps gases and vapors by condensing them on a cold surface. | CO1 | 1 |
| c. | Define cryo trapping. | CO1 | 3 |
| d. | Explain with suitable diagram the principle, instrumentation and operation of turbo molecular pump. | CO1 | 15 |
|  |  |  |  |  |
| 3. | a. | \_\_\_\_\_\_\_\_\_\_\_ gauges measures the pressure-dependant heat flow. | CO1 | 1 |
|  | b. | \_\_\_\_\_\_\_\_\_\_\_ gauges incorporate the principle of energy transfer between a hot wire and a room temperature gauge wall. | CO1 | 1 |
|  | c. | Explain the basic operation of thermal conductivity gauges. | CO1 | 3 |
|  | d. | With suitable sketch, explain in detail, the construction and working principle of spinning rotor gauge. | CO1 | 15 |
| (OR) | | | | |
| 4. | a. | \_\_\_\_\_\_\_\_\_\_\_\_ gauge is also called ionization gauge. | CO1 | 1 |
|  | b. | The sensing element is a magnetically levitated ball in \_\_\_\_\_\_\_\_ gauge. | CO1 | 1 |
|  | c. | Differentiate hot and cold cathode gauge. | CO1 | 3 |
|  | d. | Mention the differences between direct reading gauges and indirect reading gauges. Explain the working of Diaphragm and Bourdon gauge. | CO1 | 15 |
|  |  |  |  |  |
| 5. | a. | Insulators can be deposited by \_\_\_\_\_\_\_\_\_ sputtering. | CO1 | 1 |
|  | b. | The type of adsorption due Van der walls forces is called \_\_\_\_\_\_\_\_\_. | CO1 | 1 |
|  | c. | Explain the process of LASER ablation. Mention its benefits? | CO1 | 3 |
|  | d. | With appropriate figures, explain in detail, the different types of lattice mismatch. | CO2 | 15 |
| (OR) | | | | |
| 6. | a. | \_\_\_\_\_\_\_\_\_\_ deposition results from the chemical reaction of gaseous precursor(s) at a heated substrate. | CO1 | 1 |
|  | b. | A \_\_\_\_\_\_\_\_ is a colloidal or molecular suspension of solid particle of ions in a solvent. | CO1 | 1 |
|  | c. | Mention the various steps involved in the growth of thin films. | CO1 | 3 |
|  | d. | With suitable diagram explain the construction and working of molecular beam epitaxy. | CO1 | 15 |
| 7. | a. | MEMS is the acronym for \_\_\_\_\_\_\_\_\_\_\_. | CO2 | 1 |
|  | b. | According to Bragg’s law nλ = \_\_\_\_\_\_\_\_\_\_. | CO3 | 1 |
|  | c. | Define Photoluminescence. | CO3 | 3 |
|  | d. | Describe how the structure of a material and the particle size are determined by X- ray diffraction studies. | CO3 | 15 |
| (OR) | | | | |
| 8. | a. | \_\_\_\_\_\_\_ coatings are used to avoid the incoming sunlight from being reflected back off the solar cell. | CO3 | 1 |
|  | b. | Mention the Debye Scherrer formula to determine the crystallite size. | CO3 | 1 |
|  | c. | Define epitaxy. Differentiate homo and hetero epitaxy. | CO2 | 3 |
|  | d. | Define Hall Effect and describe how this technique can be used to find the electrical properties of thin films. | CO3 | 15 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the basic steps in fabrication of MEMS device. | CO2 | 5 |
|  | b. | Discuss the various factors that should be considered during the design of thin film capacitors? | CO2 | 15 |

ALL THE BEST