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

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**End Semester Examination – Nov/Dec – 2018**

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

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Mention the importance of vacuum in thin film technology. | CO1 | 2 |
| b. | List the advantages and disadvantages of diffusion pump. | CO1 | 3 |
| c. | Explain with suitable diagram the instrumentation, working principle, advantages and drawbacks of turbo molecular pump. | CO1 | 15 |
| (OR) | | | | |
| 2. | a. | Differentiate direct and indirect vacuum gauges. Give examples. | CO1 | 2 |
| b. | Discuss the role of magnetic field in penning gauge. | CO1 | 3 |
| c. | With a neat sketch explain in detail the construction and working of pirani gauge. | CO1 | 15 |
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| 3. | a. | Mention the benefits of laser ablation. | CO1 | 2 |
| b. | Briefly discuss the different steps involved in sol-gel process. | CO1 | 3 |
| c. | With suitable diagram explain the construction and working of RF sputtering. Mention its advantages. | CO1 | 15 |
| (OR) | | | | |
| 4. | a. | Schematically sketch the setup of a basic electroplating process. | CO1 | 2 |
| b. | Differentiate Magnetron DC sputtering and DC sputtering. | CO1 | 3 |
| c. | With suitable diagram explain the construction and working of molecular beam epitaxy. | CO1 | 15 |
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| 5. | a. | Differentiate physisorption and chemisorption. | CO1 | 2 |
| b. | Define lattice mismatch and list the different types of lattice mismatch. | CO1 | 3 |
| c. | Describe with suitable sketch, the process of adsorption, surface diffusion, nucleation and structure development in the growth of thin film. | CO1 | 15 |
| (OR) | | | | |
| 6. | a. | Define texturing. | CO1 | 2 |
| b. | Define diffusion length and mention the impact of temperature on diffusion length. | CO1 | 3 |
| c. | With appropriate figures, explain in detail, the different types of interfaces. | CO1 | 15 |
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| 7. | a. | Mention the formula to determine the crystallite size in XRD. | CO3 | 2 |
| b. | Define Bragg’s law. | CO3 | 3 |
| c. | Describe in detail the basic parts and working of UV-Visible spectrophotometer. Explain how to determine the transmittance and absorbance of thin films with suitable equations. | CO2 | 15 |
| (OR) | | | | |
| 8. | a. | Define photoluminescence. | CO2 | 2 |
| b. | List the possible intensity dependant properties that could be determined from PL spectra. | CO2 | 3 |
| c. | Define Hall Effect and describe how this technique can be used to find the electrical properties of thin films.   . | CO3 | 15 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Mention the different layers in thin film solar cells. | CO2 | 2 |
| b. | Sketch the basic structures of thin film diode. | CO2 | 3 |
| c. | Describe in detail the various steps involved in fabrication of thin film transistor and sketch the different types of transistors. | CO2 | 15 |