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



**End Semester Examination – Nov / Dec – 2019**

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| **Sub. Code : 12PH326** |  | **Duration :** | **3hrs** |
| **Sub. Name : MATERIAL CHARACTERIZATION** |  | **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 optical microscopy in surface analysis of solid samples. | CO1 | 4 |
| b. | Describe the principle and working of scanning tunneling microscope in detail. | CO1 | 16 |
| **(OR)** | | | | |
| 2. |  | Discuss the determination of the crystal structure of a given sample using powder X-Ray diffraction method. | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | Describe the principle and instrumentation of Fourier Transform-Infrared spectroscopy in detail for analyzing the molecular vibrations. | CO2 | 20 |
| **(OR)** | | | | |
| 4. |  | Discuss the principle, instrumentation of Raman analysis in determining the crystallinity and molecular interactions. | CO2 | 20 |
|  |  |  |  |  |
| 5. | a. | Compare and contrast scanning with tunneling electron microscope in analyzing the surface features of the materials. | CO2 | 10 |
| b. | Discuss the instrumentation of Photoluminesence in detail. | CO2 | 10 |
| **(OR)** | | | | |
| 6. |  | Explain the EDAX measurement and its application in analyzing the presence of elements in a given material in detail. | CO3 | 20 |
|  |  |  |  |  |
| 7. | a. | Describe in brief the decomposition analysis of materials using Thermogravimetric analysis. | CO3 | 10 |
| b. | Describe the advantages and applications of liquid and gas chromatography. | CO3 | 10 |
| **(OR)** | | | | |
| 8. |  | Illustrate the instrumentation and working of a differential scanning calorimetry for analyzing various thermal properties of a material. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Briefly describe the effect of impurity concentration in semiconductors. | CO3 | 6 |
| b. | Discuss the instrumentation and working of vibrating sample magnetometer in analyzing the magnetic properties of a given material. | CO3 | 14 |