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



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

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| **Code :** | **17PH3021** | **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. | Explain the instrumentation and working principle of STM with a suitable sketch. List out its applications. | CO3 | 12+3 |
| b. | Differentiate between bright and dark field optical microscopy. | CO3 | 5 |
| **(OR)** | | | | |
| 2. | a. | Describe the powder X-ray diffraction method with a suitable sketch explaining the Bragg’s law of diffraction. | CO3 | 12 |
| b. | Mention the formula used for calculating the crystallite size, dislocation density and micro strain from XRD results obtained. | CO3 | 5 |
| c. | Explain the effect due to tensile and compressive stress on the shape and position of X-ray diffraction peaks. | CO3 | 3 |
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| 3. | a. | Explain the instrumentation and working principle of UV-Vis-IR spectrophotometer. Mention its applications. | CO1 | 12+3 |
| b. | Explain the principle of FTIR spectroscopy. | CO1 | 5 |
| **(OR)** | | | | |
| 4. | a. | Describe the instrumentation and principle of XPS and list its applications. | CO1 | 12+3 |
| b. | Briefly explain the principle of working principle of Raman spectroscopy. | CO1 | 5 |
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| 5. | a. | Explain the instrumentation and working principle of transmission electron microscope with a suitable sketch. | CO3 | 15 |
| b. | Discuss the sample preparation for TEM analysis. | CO3 | 5 |
| **(OR)** | | | | |
| 6. | a. | Discuss in detail, the light matter interaction in photoluminescence and present a neat sketch of its instrumentation. | CO1 | 3+12 |
| b. | Define electroluminescence and mention its applications. | CO1 | 5 |
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| 7. | a. | Describe the instrumentation of DSC and explain the measurement of specific heat capacity and the determination of thermomechanical parameters. | CO6 | 15 |
| b. | Distinguish between liquid and gas chromatography. | CO4 | 5 |
| **(OR)** | | | | |
| 8. |  | Discuss the instrumentation and working principle of TGA and DTA. | CO6 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | What are the differences between two probe and four probe conductivity measurement methods? | CO2 | 15 |
| b. | Explain the working principle of vibrating sample magnetometer. | CO5 | 5 |