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



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

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| **Code :** | **16NT3001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NANOMATERIALS CHARACTERIZATION METHODS** | **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. | State Brags Law with the diagram. | CO2 | 6 |
| b. | Demonstrate the working of X-ray diffractometer with a neat schematic. | CO2 | 10 |
| c. | Cite some applications of X-ray diffractometer. | CO2 | 4 |
| **(OR)** | | | | |
| 2 | a. | Differentiate between LEED and RHEED. | CO3 | 8 |
| b. | Justify how LEED helps in structural determination of Materials. | CO3 | 12 |
|  |  |  |  |  |
| 3 |  | State some salient features of RHEED and demonstrate the mechanism using neat schematic. | CO2 | 20 |
| **(OR)** | | | | |
| 4 | a. | Illustrate the principle of Dynamic Light scattering with a diagram. | CO3 | 6 |
| b. | Compare the results obtained by the DLS technique with other mechanism of particle size determination. | CO2 | 14 |
|  |  |  |  |  |
| 5. | a. | Draw the schematic ray diagram of TEM where the electron emission to detection and mention the stages. | CO2 | 6 |
| b. | Justify how the nanoscale materials are magnified using TEM and state its advantages. | CO2 | 14 |
| **(OR)** | | | | |
| 6 | a. | Demonstrate the working of Scanning Tunneling Microscope with a neat schematic representation. | CO3 | 10 |
| b.. | Apply Energy dispersive x-ray diffraction (EDAX) to identify the composition of materials. | CO2 | 10 |
|  |  |  |  |  |
| 7 | a. | Classify the atomic force microscopes based on the modes of operation. | CO1 | 6 |
| b. | Justify that AFM can identify the nanoscale surface defects in the topography of a metal sample. | CO1 | 14 |
| **(OR)** | | | | |
| 8 | a. | Mention some of the applications and salient features of XPS in materials identification. | CO3 | 8 |
| b. | Demonstrate the working principle of XPS with a scheme. | CO3 | 12 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Analyse the UV –Vis absorption Spectra for finding the blue shift and red Shift. | CO1 | 14 |
| b. | Illustrate the methods for the preparation and cautions followed in the sample prepation for mounting in SEM. | CO1 | 6 |