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

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

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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. |  | Explain the instrumentation and application of RHEED and LEED. | CO2 | 20 |
| (OR) | | | | |
| 2 | a | Discuss the working principle of Raman spectroscopy. | CO1 | 10 |
| b | Which technique is used to study the mechanical properties of the material ? | CO1 | 10 |
| 3 | a | Briefly explain the significance of TGA. | CO2 | 10 |
| b | Discuss in detail the basics, instrumentation and various factors involved in DTA. | CO2 | 10 |
|  |  | **(OR)** |  |  |
| 4 | a | Schematically explain the principle, instrumentation and advantages of FTIR. | CO1 | 10 |
|  | b. | What are the applications of FIB? | CO2 | 10 |
| 5. | a | Explain the basic principle, instrumentation, procedure and indexing of XRD in detail with a neat diagram. | CO1 | 10 |
| b | How the composition of the materials can be intereped using XPS. | CO1 | 10 |
|  |  | **(OR)** |  |  |
| 6 | a | How the composition of the materials can be intereped using UPS. | CO2 | 10 |
| b. | Explain the instrument which is used to determine the average size of the particles. | CO2 | 10 |
|  |  |  |  |  |
| 7 | a | Discuss the working mechanism of the microscope which works on principle of “Quantum mechanical tunnel-effect of electron”. | CO3 | 10 |
| b. | Which microscope is used to obtain internal details of the sample by allowing electrons to pass through it and explain its instrumenataion. | CO3 | 10 |
|  |  | **(OR)** |  |  |
| 8 | a | Discuss in detail the instrumentation of UV- visible spectroscopy. | CO2 | 10 |
| b. | What are the different electronic transistions in UV- visible spectroscopy. | CO2 | 10 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Draw the schematic diagram of SEM and explain the various components. | CO3 | 10 |
| b | What are various signals emitted from the sample in SEM | CO3 | 5 |
| c | Difference between SEM and TEM. | CO3 | 5 |