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



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

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| **Code :** | **17NT3019** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SYNTHESIS AND APPLICATIONS OF NANOMATERIALS** | **Max. Marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Differentiate between the top down and bottom up approaches in the synthesis of nanomaterials with suitable examples. Mention the advantages and disadvantages in each approach. | CO1 | 20 |
| **(OR)** | | | | |
| 2. | a. | Differentiate between mechanical alloying and mechanochemical process. | CO2 | 10 |
| b. | Explain the inert gas condensation technique in the synthesis of nanomaterials. | CO3 | 10 |
|  |  |  |  |  |
| 3. | a. | Describe the different steps in sol gel synthesis of nanomaterials. | CO3 | 10 |
| b. | Define self-assembly and explain the process of depositing self- assembled mono layers. | CO3 | 10 |
| **(OR)** | | | | |
| 4. | a. | Explain the process of spray pyrolysis with a neat sketch. | CO3 | 10 |
| b. | Differentiate between solvothermal and hydrothermal processes in the synthesis of nanomaterials and explain the advantages and disadvantages of each process. | CO4 | 10 |
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| 5. | a. | With a neat sketch, explain the construction and working principle of molecular beam epitaxy for the deposition of thin films. | CO5 | 15 |
| b. | Explain the principle of pulsed laser deposition. | CO5 | 5 |
| **(OR)** | | | | |
| 6. | a. | Define lithography and explain the process of photolithography and dip pen nanolithography. | CO6 | 10 |
| b. | Define etching and differentiate between dry and wet etching with suitable examples. | CO6 | 10 |
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| 7. | a. | Explain in detail the synthesis of core shell nanomaterials and hybrid nanocomposites. | CO4 | 10 |
| b. | Define mesoporous materials and explain the synthesis process of these materials. | CO4 | 10 |
| **(OR)** | | | | |
| 8. |  | Explain the structure, properties and application of carbon nanotubes and graphene. | CO1 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Explain the application of nanomaterials in molecular electronics and nanoelectronics with suitable examples. | CO1 | 20 |