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

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

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| **Code :** | **17CE3072** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ENVIRONMENTAL NANOTECHNOLOGY** | **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. | Elaborate about the four types of nanoscale materials used in water-purification. | CO1 | 8 |
| b. | Interpret hydrolysis and condensation in sol-gel method. | CO2 | 12 |
| (OR) | | | | |
| 2. | a. | Compare the Microemulsion method and Plasma techniques for synthesis of nano-particles. | CO2 | 10 |
| b. | Recall sintering of nano-particles and elaborate. | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | Compare and contrast SEM analysis and EDAX analysis for microstructure studies. | CO3 | 10 |
| b. | What are fictionalized metal nanoparticles? Describe the advantages of functionalized metal nanoparticles. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | Enumerate the process of determining zeta potential of a nano-particle. | CO1 | 8 |
| b. | Outline the procedure for characterization of microstructures of some important functional materials by employing scanning electron microscope (SEM). | CO3 | 12 |
|  |  |  |  |  |
| 5. | a. | Elaborate performance parameters and morphology parameters of membranes. | CO5 | 10 |
| b. | Recall the significance of solute transport in membrane process. | CO6 | 10 |
| (OR) | | | | |
| 6. | a. | Demarcate Reverse Osmosis and Nanofiltration for wastewater treatment. | CO6 | 10 |
| b. | Interpret the usage of nanomaterials in conjunction with membranes as a nanomaterial/membrane reactor for wastewater treatment. | CO4 | 10 |
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| 7. | a. | Evaluate the potential of molecularly imprinted (MIP) and non-imprinted (NIP) polymers as a treatment method for the removal of emerging contaminants from water and wastewater. | CO4 | 10 |
| b. | Clarify about the various synthesis methods for fullerenes and also give a note about the purification of fullerenes. | CO2 | 10 |
| (OR) | | | | |
| 8. | a. | Describe the mechanical, electrical and optical properties of carbon nanotubes. | CO4 | 8 |
| b. | Enumerate about the structure, morphology, and adsorption properties of carbon nanoadsorbents. | CO4 | 12 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Infer about particle shape, size, surface area and surface charge, as well as the adsorption properties of the material of manufactured Nanoparticles. | CO1 | 10 |
| b. | Highlight the method of disposal of nanoparticles and its effect on the physical and biochemical characteristics of the disposal location. | CO5 | 10 |