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**UNIVERSITY**



Karunya Institute of Technology & Sciences (Declared under section-3 of the UGC Act, 1956)

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

**End Semester Examination – April/May – 2017**

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| **Code :** | **16CE3014** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NANOTECHNOLOGY FOR WATER AND WASTEWATER TREATMENT** | **Max. marks :** | **100** |

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| Q.  No. | Sub Div. | Question | Course Outcome | Marks allotted |
| 1 | a. | What are different kinds of materials in day today within the dimension of visible rays? List down different nanoscale materials. Give examples. | CO1 | 5 |
| b. | Investigate how the surface to volume ratio changes from macro to nanoparticles. Why is large surface area important? | CO1 | 5 |
| c. | Briefly explain the history of nanoscience and nanotechnology. | CO1 | 5 |
| d. | How will you analyse the given sample using XRD? | CO1 | 5 |
| (OR) | | | | |
| 2 | a. | Which is the best approach for synthesis for nanoparticles? Reason it out. | CO1 | 6 |
| b. | What is sol-gel? What are the different types of products that can be obtained from Sol-Gel method? Explain in detail how the nanoparticles can be synthesized using Sol-Gel method. | CO1 | 10 |
| c. | List down the importance of   1. Zeta potential. 2. Point of zero discharge during synthesis of nanomaterials. | CO2 | 4 |
| 3 | a. | Explain how the elemental composition can be determined using EDAX. | CO2 | 8 |
| b. | Explain the application of SEM in characterization of the sample. | CO1 | 8 |
| c. | Differentiate between adsorption and absorption. Explain with example. | CO2 | 4 |
| (OR) | | | | |
| 4 | a. | List down different configuration of membranes used in water purification and explain its advantages and disadvantages. | CO2 | 8 |
|  | b. | Explain how the qualitative and quantitative analysis of wastewater sample can be conducted using UV spectrophotometer. | CO2 | 8 |
|  | c. | Explain the mechanism of photo-oxidation in degradation of organic pollutants. | CO2 | 4 |
| 5 | a. | Write down the structure of nanoclay. Explain how it is applied in wastewater treatment. | CO2 | 8 |
| b. | Explain how silver nanoparticles are used for disinfection. | CO2 | 6 |
| c. | Explain the method of preparation of CNTs using Chemical Vapour Deposition Technique. | CO3 | 6 |
| (OR) | | | | |
| 6 | a. | How the carbon based nano adsorbents are applied in water treatment. Explain with an example. | CO3 | 10 |
|  | b. | Explain how thenanofibre materials are prepared using electrospinning process. How the characterization of membrane is carried out. | CO3 | 10 |
| (OR) | | | | |
| 7 | a. | List down the methods of desalination using nanotechnology. Explain any two methods in detail. | CO3 | 8 |
| b. | Write down the methods of removal of micropollutants. How the biomembranes are helpful in wastewater treatment? | CO3 | 8 |
| c. | What is the role of isotherms in adsorption? | CO1 | 4 |
| (OR) | | | | |
| 8 | a. | Explain any one of the methods used in removal of microorganisms in wastewater. | CO2 | 5 |
|  | b. | List down different nanocatalysts used for organic compounds degradation. | CO3 | 15 |
| **Compulsory:** | | | | |
| 9 | a. | Explain in detail about the processes involved in fate and transport of nanoparticles in the environment. | CO1 | 16 |
|  | b. | Write short on nanosensors. | CO3 | 4 |