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



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

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| **Code :** | **14CH3003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NANOTECHNOLOGY FOR ENERGY APPLICATIONS** | **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. | Explain the general principle and operation of a renewable energy source. | CO1 | 10 |
| b. | Write brief notes on different renewable energy sources. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Describe the operation principle of solar power system. Explain the role of nanotechnology in solar power system. | CO2 | 10 |
| b. | Illustrate the assembly and electrochemistry of lithium ion cell with a neat diagram. | CO2 | 10 |
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| 3. | a. | Explain the working principle of a simple Hydrogen – Oxygen fuel cell with a diagrm. | CO2 | 10 |
| b. | Illustrate the electrochemistry of proton exchange membrane fuel cell (PEMFC) with a diagram. Describe the role of nanotechnology in the development of electrode / electrolyte components in PEMFCs. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Illustrate the assembly of a bio fuel cell (BFC) with a clear diagram. | CO2 | 10 |
| b. | Explain the role of various micro organisms used in the development of bio fuel cells (BFCs). | CO2 | 10 |
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| 5. | a. | Describe the assembly and electrochemical reactions occured in a solid oxide fuel cell (SOFC) system. | CO2 | 10 |
|  | b. | Explain the different types of nanocrystalline materials used as electrolytes and electrodes in solid oxide fuel cells (SOFCs). | CO2 | 10 |
| **(OR)** | | | | |
| 6. | a. | Describe the importance of hydrogen storage materials. How do they store hydrogen? Explain. | CO2 | 10 |
| b. | Describe in detail any five metal hydrides used as hydrogen storage materials. | CO2 | 10 |
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| 7. | a. | Describe the operating principle of a nuclear power plant with a neat diagram. | CO2 | 10 |
| b. | How can nanotechnology be adopted in nuclear plant application? | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Describe the different methods used for the development of Ni-Cr-Mo alloys. How can it be used in nuclear engineering? | CO2 | 10 |
| b. | Define nanocatalysis. Illustrate its importance in energy applications. | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Write brief notes on radiation protection materials. | CO2 | 10 |
|  | b. | Explain the role of nanostructured boron steels in energy applications. | CO3 | 10 |