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



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

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| **Code :** | **15EE2008** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BATTERY TECHNOLOGY FOR RENEWABLE ENERGY** | **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. | Classify the different types of electrochemical cells and batteries, and also give its applications. | CO1 | 10 |
| b. | Discuss the components that are required to build the cells and batteries. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | With a neat diagram and supporting equation, elucidate the cyclic voltammetry in electrochemical technique. | CO1 | 10 |
| b. | With help of an example, explain the minimum electrical performance of the battery specified in the standards by application and capacity testing. | CO2 | 10 |
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| 3. | a. | With help of graph(s), discuss the thermal devices used for protecting the battery from the temperature effect. | CO2 | 10 |
| b. | With a neat diagram, explain the construction, cell components and performance characteristics of Zinc-carbon batteries. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | With a neat diagram, explain the construction, cell components and performance characteristics of Silver Oxide-Zinc batteries. | CO2 | 10 |
| b. | Explicate the empirical based mathematical model for battery design. | CO1 | 10 |
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| 5. | a. | With a help of a neat sketch, explain the chemistry, construction, performance characteristics and applications of lithium primary battery. | CO2 | 10 |
| b. | Bring down the differences between the primary, secondary and reserve batteries. | CO1 | 10 |
| **(OR)** | | | | |
| 6. |  | Illustrate the following charging methods to charge the Lead Acid batteries:  (i) Constant-current, one-current rate.  (ii) Constant-current, multiple decreasing-current steps.  (iii) Constant Potential.  (iv) Float Charging. | CO3 | 20 |
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| 7. | a. | With a neat diagram, explain the construction and performance characteristics of Nickel- Cadmium batteries. | CO2 | 10 |
| b. | Write short notes on (i) Reserve military battery (ii) traction battery. | CO1 | 10 |
| **(OR)** | | | | |
| 8. | a. | Explain the chemical reaction happened in Lithium-Ion batteries and mention its applications. | CO2 | 10 |
| b. | Discuss the reason(s) for the failure of automobile battery and also discuss the preventive measures. | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | With a neat schematic representation and equations, elucidate the phosphoric acid fuel cell. | CO3 | 10 |
| b. | Discuss the Compressed and Indirect hydrogen storage system. | CO3 | 10 |