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



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

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| **Code :** | **17EE3026** | **Duration :** | **3hrs** |
| **Sub. Name :** | **EV ENERGY SOURCES AND ENERGY RECOVERY** | **Max. Marks :** | **100** |

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

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| **Q. No.** |  | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Compare the various energy storage technologies available for HEVs. Discuss about the merits and demerits of the same. | CO2 | 20 |
| **(OR)** | | | | |
| 2. |  | Discuss about the battery charging schemes available and map the charging schemes with the different types of batteries. | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | Explain the following performance comparison parameters of a battery.   1. Energy Density and Specific Energy 2. Charge and Discharge 3. Cycle Life 4. Temperature Operating Range. | CO2 | 20 |
| **(OR)** | | | | |
| 4. |  | With supporting sketches and equation, discuss about the constant current discharge approach of battery modeling. | CO3 | 20 |
|  |  |  |  |  |
| 5. |  | With a neat sketch, explain the operation of fuel cell. Discuss about the advantages and disadvantages. | CO1 | 20 |
| **(OR)** | | | | |
| 6. |  | Discuss about the ultra high speed flywheel concept of energy recovery. How this recovery concept influence the braking energy consumption. | CO4 | 20 |
|  |  |  |  |  |
| 7. |  | Discuss about the need of Battery Management System and the charging protocols adopted in BMS. | CO5 | 20 |
| **(OR)** | | | | |
| 8. |  | Discuss about the following SoC estimation :   1. SoC Modelling 2. Instantaneous SoC 3. Current counting method 4. Voltage look up method | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Discuss in detail the V2G concept. How the charge in the battery is utilized in the Grid? | CO6 | 20 |