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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EE3032** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Hybrid – Electric Vehicle Powertrains** | **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 with relevant diagram the operating characteristics and control of Brushed DC motor as a source of propulsion in an EV | C01 | 20 |
| (OR) | | | | |
| 2. | a. | With a neat flow diagram explain how the generated propulsion force is transferred to the wheels of a vehicle. | CO1 | 10 |
|  | b. | Compare and comment on the torque and speed characteristics of DC motor, Three Phase Induction motor, PMSM and SRM | C02 | 10 |
| 3. | a. | Comment on the various available control techniques applicable for electric vehicle propelled with anAC Induction motor drive. | CO3 | 20 |
| (OR) | | | | |
| 4. | a. | Discuss about the various factors that influence Motor Efficiency | CO2 | 10 |
|  | b. | Explain the function of clutch in transmission system | C01 | 10 |
| 5. | a. | Elaborate the technical methodology for achieving variable speed and tractive effort of an Induction Motor | CO2 | 20 |
| (OR) | | | | |
| 6. | a. | Explain the controlling strategy adopted to control the Switch Reluctance Motor under constant torque and constant power region in order achieve good starting acceleration and high speed during the course of run | CO3 | 20 |
| 7. | a. | Interpret the change in the traction motor rating (power and torque) for the cases mentioned in table below.   |  |  |  |  | | --- | --- | --- | --- | |  | Mass of the Vehicle | Aerodynamic drag | Rolling Coefficient | | Case 1 | 1500 kg | 0.23 | 0.013 | | Case 2 | 0.23 | 0.02 | | Case 3 | 0.5 | 0.013 | | Case 4 | 0.5 | 0.02 |   Other Specification: Af=1.85m2, ηt 90 %. Single gear ratio can be considered. X= 4. Air density 1.1204 kg/m3. *Performance speciation:*Acceleration time (from 0 to 150 km/h) 10±1 sec, Maximum gradeability >30% at low speed and >5 at100 km/h, Maximum speed 160 km/h. Nmax Motor = 4000rpm | CO2 CO3 | 20 |
| (OR) | | | | |
| 8. | a. | Interpret the shortcomings of EV usage in urban traffic scenario and scheme an electrical method of extending the range(distance covered) of EV | CO3 | 10 |
|  | b. | Discuss about the advancement in the HEV power train | C01 | 10 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Discuss about the operation, characteristics and different types of fuel cell vehicle. Also comment on the advantage of EV using battery and fuel cell | CO1 | 20 |

ALL THE BEST