



B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Seventh Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U18EIE0021: Hybrid and Electric Vehicles

COURSE OUTCOMES

- CO1:** Identify the basic components of hybrid and electric vehicles.
CO2: Assess the characteristics and performance of the electric vehicle and select suitable electric propulsion and control systems for HEV
CO3: Choose proper energy storage systems for vehicle applications
CO4: Describe the operation of fuel cell and solar cell vehicles

Time: Three Hours

Maximum Marks: 100

Answer all the Questions: -

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|---|-----|-------------------|
| 1. Differentiate between squirrel cage and slip ring induction motor with the aid of a schematic. | CO1 | [K ₂] |
| 2. Classify power electronic converters for HEV. | CO1 | [K ₂] |
| 3. Define speed and torque control of induction motor. | CO2 | [K ₂] |
| 4. Compare the battery charging aspects for lead acid batteries, nickel-based batteries, and lithium-based batteries. | CO2 | [K ₁] |
| 5. Why are batteries rated in voltage? | CO2 | [K ₁] |
| 6. Differentiate Serial and parallel HEV with the aid of a schematic. | CO3 | [K ₁] |
| 7. Classify power flow control in electric drive train for HEV. | CO3 | [K ₂] |
| 8. Define Acceleration & Gradeability of HEV. | CO3 | [K ₂] |
| 9. Compare the fuel efficiency charging aspects for HEV and EV. | CO4 | [K ₂] |
| 10. Why tractive effort is applied in vehicle performance? | CO4 | [K ₂] |

Answer any FIVE Questions: -

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|---|----|-----|-------------------|
| 11. Analyze the environmental importance of EV and their social impact and List out the characteristic of hybrid electric drive | 16 | CO1 | [K ₃] |
| 12. a) What is the type of motor used in power windows of EV? | 8 | CO2 | [K ₂] |

- b) Explain the operation of power windows with necessary diagrams 8 CO2 [K₂]
13. Discuss in detail about the control of permanent magnet motor drives 16 CO3 [K₃]
14. Explain the social importance of electric mobility 16 CO3 [K₂]
15. Classify and explain the different type of solar cell and compare with its efficiency and cost effect. 16 CO4 [K₂]
16. Identify the tractive efforts used in the EV & HEV. Describe its limitations over its vehicle performance in large gear. 16 CO3 [K₃]


