



**B.E DEGREE EXAMINATIONS: NOV/DEC 2024**

(Regulation 2018)

Sixth Semester

**ELECTRICAL AND ELECTRONICS ENGINEERING**

U18EEE0013: Electric Vehicle Technology

**COURSE OUTCOMES**

- CO1:** Gain the knowledge on the fundamentals and benefits of Electric vehicles.  
**CO2:** Understand the performance of various subsystems in Electric vehicles.  
**CO3:** Analyze the choice of Electric motor drive technologies used in Electric vehicles.  
**CO4:** Compare and Select the appropriate energy source for Electric vehicles.  
**CO5:** Acquire the concepts of grid connected technologies.

**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. What are the primary benefits of using electric vehicles?                               | CO1 | [K <sub>2</sub> ] |
| 2. Name one major government initiative to promote EVs in India.                           | CO1 | [K <sub>2</sub> ] |
| 3. Define acceleration resistance in the context of vehicle dynamics.                      | CO2 | [K <sub>2</sub> ] |
| 4. What is tractive effort?  | CO2 | [K <sub>2</sub> ] |
| 5. Mention the role of power converters in electric vehicles.                              | CO3 | [K <sub>4</sub> ] |
| 6. List the advantages of using permanent magnet motors in electric vehicles.              | CO3 | [K <sub>4</sub> ] |
| 7. Why are lithium-ion batteries preferred for electric vehicles over lead-acid batteries? | CO4 | [K <sub>3</sub> ] |
| 8. What are the main types of battery charging technologies used in electric vehicles?     | CO4 | [K <sub>3</sub> ] |
| 9. Name three key components of an electric vehicle charging station.                      | CO5 | [K <sub>2</sub> ] |
| 10. What is vehicle-to-grid (V2G) technology?  | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART B (5 x 16 = 80 Marks)**

**(Answer not more than 400 words)**

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|--|---|-----|-------------------|
| 11. a) Explain the key components of an electric vehicle and their functions.                            | 8 | CO1 | [K <sub>2</sub> ] |
| b) Give the classification of electric vehicles and the main features of each type.                      | 8 | CO1 | [K <sub>2</sub> ] |
| 12. a) Explain the different types of vehicle resistances that affect an electric vehicle's performance. | 8 | CO2 | [K <sub>2</sub> ] |
| b) Discuss the primary components of the powertrain in electric vehicles.                                | 8 | CO2 | [K <sub>2</sub> ] |

13.	a)	Describe the operational principles of Switched Reluctance Motors (SRMs) in electric vehicles.	8	CO3	[K <sub>4</sub> ]
	b)	Summarize the role of power converters in electric vehicles, and what are the main types used?	8	CO3	[K <sub>4</sub> ]
14.	a)	Compare lithium-ion and lead-acid batteries in terms of energy density, lifecycle, and applications in electric vehicles.	8	CO4	[K <sub>3</sub> ]
	b)	Elaborate on the benefits of regenerative braking in electric vehicles.	8	CO4	[K <sub>3</sub> ]
15.	a)	Detail a case study of electric bikes focusing on their impact on urban mobility and sustainability.	8	CO5	[K <sub>2</sub> ]
	b)	Describe any two types of electric vehicle charging stations.	8	CO5	[K <sub>2</sub> ]
16.	a)	Enumerate the challenges and opportunities associated with integrating electric vehicles into utility systems and charging infrastructure.	8	CO5	[K <sub>2</sub> ]
	b)	Describe the concepts of Vehicle-to-Grid (V2G), Grid-to-Vehicle (G2V) technologies.	8	CO5	[K <sub>2</sub> ]

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