

**BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code 

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Fifth Semester B.E. Degree Examinations, April/May 2024

**ELECTRIC VEHICLE TECHNOLOGY**

Duration: 3 hrs

Max. Marks: 100

*Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.  
2. Missing data, if any, may be suitably assumed.*

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<b><u>Module-1</u></b>			
1.	a. Explain the block diagram of general electric vehicle components.	10	(2 :1: 1.3.1)
	b. Discuss the benefits and challenges of electric vehicles.	10	(2 :1: 1.3.1)
<b>(OR)</b>			
2.	a. Classify and explain the electric vehicles based on the electrification levels with respect to voltage, current, speed and charging time.	10	(2 :1: 1.3.1)
	b. Compare the performance of internal combustion engine vehicles with electric vehicles.	10	(2 :1: 1.3.1)
<b><u>Module-2</u></b>			
3.	a. Discuss the architectures of plugged in hybrid electric vehicle.	10	(2 :2: 1.3.1)
	b. Draw six different configurations of drive trains in electric vehicle and explain each configuration in brief.	10	(2 :2: 1.3.1)
<b>(OR)</b>			
4.	a. Explain the characteristics of a battery used in electric vehicles and compare the characteristics of any four battery types.	10	(2 :2: 1.3.1)
	b. List the different architectures of electric drive train and explain the series and parallel hybrid electric drive train.	10	(2 :2: 1.3.1)
<b><u>Module-3</u></b>			
5.	a. Explain the operating principle of a DC motor with diagram.	10	(2 :3: 1.3.1)
	b. Discuss the control strategies used for induction motor drives in electric vehicle propulsion.	10	(2 :3: 1.3.1)
<b>(OR)</b>			
6.	a. Explain the two-quadrant chopper operation of a DC motor drive with suitable waveforms for electric vehicle.	10	(2 :3: 1.3.1)
	b. Describe the general design strategy for the switch reluctance motor drive and write the advantages of it in electric vehicle.	10	(2 :3: 1.3.1)
<b><u>Module-4</u></b>			
7.	a. Classify and explain the energy storage system according to energy types used in electric vehicle.	10	(2 :4: 1.3.1)

**Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)**

- b. Explain the working principle of a battery used in EV with their charging and discharging characteristics. **10** (2 :4: 1.3.1)

(OR)

8. a. With neat diagrams explain about ultra-capacitor and fly wheel technology of energy storage systems used in electric vehicle. **10** (2 :4: 1.3.1)
- b. Explain with neat sketch, the working of fuel cell and state its limitations. **10** (2 :4: 1.3.1)

**Module-5**

9. a. Classify and explain the different energy management strategies used in electric vehicle. **10** (2 :5: 1.3.1)
- b. What is Genetic Algorithm (GA)? Explain the concept of the genetic algorithm. **10** (2 :5: 1.3.1)

(OR)

- 10 a. Explain the equivalent consumption minimization strategy (ECMS) for charge and discharge of a battery in hybrid electric vehicle. **10** (2 :5: 1.3.1)
- b. With block diagram, explain adaptive equivalent consumption minimization strategy (A-ECMS) used in electric vehicle. **10** (2 :5: 1.3.1)

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