



**Enrollment No.....**

**Faculty of Engineering**  
**End Sem (Odd) Examination Dec-2022**  
**EE3EL12 / EX3EL12 Electric Vehicle**  
**Programme: B.Tech.                      Branch/Specialisation: EE/EX**

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. When was the first electric car invented? **1**  
 (a) 1830 (b) 1985 (c) 1832 (d) 1945
- ii. Electric vehicles are generally powered by \_\_\_\_\_. **1**  
 (a) Aluminium batteries (b) Lead-acid batteries  
 (c) Sodium batteries (d) Magnesium batteries
- iii. Which of the following vehicle produces zero emissions? **1**  
 (a) Gasoline vehicle (b) Electrical vehicle  
 (c) Hybrid vehicle (d) Diesel vehicle
- iv. The series parallel hybrid systems are classified into two categories \_\_\_\_\_ & the \_\_\_\_\_. **1**  
 (a) Fuel cell dominated; petrol engine dominated  
 (b) ICE dominated; electrical motor dominated  
 (c) Hydrogen cell dominated; petrol engine dominated  
 (d) Hydrogen cell dominated; gas engine dominated
- v. Electric motors are ideal for vehicular applications because of- **1**  
 (a) The torque speed characteristics  
 (b) The V I characteristics  
 (c) The Pd characteristics  
 (d) The alpha delta characteristics
- vi. The fuel cell provides \_\_\_\_\_ energy but \_\_\_\_\_ power. **1**  
 (a) High, low (b) Modest, modest  
 (c) Modest, low (d) Low, low
- vii. How the batteries of plug-in hybrid vehicles are charged? **1**  
 (a) By regenerative braking (b) By charging stations  
 (c) Both (a) and (b) (d) None of these
- viii. Which type of motor is widely used for electric vehicle? **1**  
 (a) Induction motor (b) DC shunt motor  
 (c) BLDC (d) Series motor

- ix. Which factors affect the range of electric vehicle? **1**  
 (a) Driving style (b) Battery capacity  
 (c) Vehicle loading (d) All of these
- x. A fuel cells converts \_\_\_\_\_ energy into electrical energy. **1**  
 (a) Mechanical (b) Magnetic  
 (c) Solar (d) Chemical

- Q.2 i. What is the need of electric vehicle in India? **2**  
 ii. What are the consumer related issues for association of electric vehicle in India? **3**  
 iii. Compare electric vehicle and IC engine, in terms of power train, engine efficiency, running cost, maintenance and braking system. **5**
- OR iv. What is the impact of electric vehicles on employment and economic growth? **5**
- Q.3 i. What are different types of architecture of EV? **2**  
 ii. Draw and explain the configurationally block diagram of EV. **8**
- OR iii. Draw the architecture of series and series -parallel hybrid electric drive train and explain any one of them. **8**
- Q.4 i. What are the different types of braking system used in electric vehicle? **3**  
 ii. What are the different charging methods used in EV? Elaborate on standards adopted for same worldwide. **7**
- OR iii. How regenerative braking works in electric vehicle? **7**
- Q.5 i. What are the different components in EV for propulsion? **4**  
 ii. Explain one of the configurations of electric vehicle power train. **6**
- OR iii. Explain torque-speed characteristics of electric vehicle. **6**
- Q.6 Attempt any two:  
 i. What is the role of sensors in electric motor systems used in EV? **5**  
 ii. What is the role of microcontroller in electric vehicle? Explain **5**  
 iii. What is OBD in electric vehicle? What does OBD-II do? **5**

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**Marking Scheme**  
**EE3EL12 / EX3EL12 Electric Vehicle**

Q.1	i.	(c) 1832	1 Mark	<b>1</b>
	ii.	(b) Lead-acid batteries	1 Mark	<b>1</b>
	iii.	(b) Electrical vehicle	1 Mark	<b>1</b>
	iv.	(b) ICE dominated; electrical motor dominated	1 Mark	<b>1</b>
	v.	(a) The torque speed characteristics	1 Mark	<b>1</b>
	vi.	(a) High, low	1 Mark	<b>1</b>
	vii.	(c) Both (a) and (b)	1 Mark	<b>1</b>
	viii.	(c) BLDC	1 Mark	<b>1</b>
	ix.	(d) All of these	1 Mark	<b>1</b>
	x.	(d) Chemical	1 Mark	<b>1</b>
Q.2	i.	Need of electric vehicle (4 points)	0.5 Mark each (0.5 Mark*4)	<b>2</b>
	ii.	Consumer related issues	1 Mark each (1 Mark*3)	<b>3</b>
	iii.	Comparison	1 Mark each (1 Mark*5)	<b>5</b>
OR	iv.	Impact of electric vehicles Economic growth	3 Marks 2 Marks	<b>5</b>
Q.3	i.	Types of architecture of EV	2 Marks	<b>2</b>
	ii.	Diagram of EV Description	3 Marks 5 Marks	<b>8</b>
OR	iii.	Diagram Explanation	4 Marks 4 Marks	<b>8</b>
Q.4	i.	Types of braking system used in electric vehicle	3 Marks	<b>3</b>
	ii.	Different methods Standards	5 Marks 2 Marks	<b>7</b>
OR	iii.	Explanation Diagram Constructional detail	3 Marks 2 Marks 2 Marks	<b>7</b>
Q.5	i.	At least 4 components	1 Mark each (1 Mark*4)	<b>4</b>
	ii.	As per the explanation	6 Marks	<b>6</b>
OR	iii.	Torque-speed explanation Graph	4 Marks 2 Marks	<b>6</b>

Q.6	Attempt any two:			
	i.	Role of sensors (5 points)	1 Mark each (1 Mark*5)	<b>5</b>
	ii.	Role of microcontroller (5 points)	1 Mark each (1 Mark*5)	<b>5</b>
	iii.	OBD definition OBD-II	3 Marks 2 Marks	<b>5</b>

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