

# CBCS SCHEME

21AU52

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Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024

## Fundamentals of Electrical Vehicles

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. List and explain different fuels used for automobiles and also mention pollutants of automobiles. (10 Marks)  
b. What are the effects of automobile pollutants on environment, plants, animals and humans? (10 Marks)

OR

- 2 a. Explain with block diagram of series HEV. (10 Marks)  
b. Compare the IC engine vehicle and battery electric vehicle. (10 Marks)

### Module-2

- 3 a. Explain different forces of resistances to automobile propelling and movement. (10 Marks)  
b. Explain effect of auxillary loads on range, gradability, vehicle acceleration. (10 Marks)

OR

- 4 a. Explain regenerative braking of vehicle. (10 Marks)  
b. List and explain traction motor characteristics. (10 Marks)

### Module-3

- 5 a. List and explain the factors to consider while selection of battery pack. (10 Marks)  
b. Explain the construction and working of lead acid battery. (10 Marks)

OR

- 6 a. Explain the necessities and function of battery management system. (10 Marks)  
b. Define battery sizing and explain the following: (10 Marks)  
(i) BEV battery sizing  
(ii) PHEV battery sizing

### Module-4

- 7 a. Define following with respect to traction motors: (10 Marks)  
(i) Rated torque (ii) Rated speed (iii) Rated power  
(iv) Peak operation (v) Base speed (10 Marks)  
b. Differentiate between DC and AC machines for the usage of electric vehicle. (10 Marks)

OR

- 8 a. Explain characteristics curves of machine with following mode: (10 Marks)  
(i) Constant power mode  
(ii) Constant torque mode  
(iii) Constant speed mode  
b. Explain the factors to be considered while selecting traction motors for EV application. (10 Marks)

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**Module-5**

- 9 a. Explain working fuel cell vehicle with block diagram. (10 Marks)  
b. Explain following:  
(i) Hydrogen fuel advantages in fuel cell  
(ii) Hydrogen fuel disadvantages in fuel cell  
(iii) Hydrogen safety factors (10 Marks)

**OR**

- 10 a. Explain cell construction and working of basic fuel cell. (10 Marks)  
b. Briefly write a note on hybrid electric vehicle. (10 Marks)

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