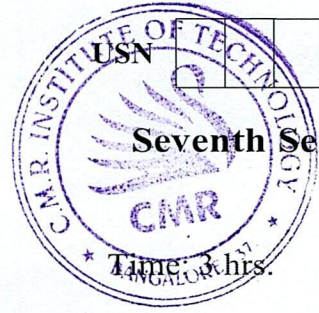


# CBCS SCHEME



Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

## Electric Vehicles

21EE752

Max. Marks: 100

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

### Module-1

- 1 a. Write brief note on Roadways fundamentals. (06 Marks)
- b. Explain Newtons second law of motion in vehicle mechanics. (07 Marks)
- c. Write short notes on propulsion power and maximum gradability. (07 Marks)

### OR

- 2 a. Explain in detail the constant FTR in level road condition with necessary equations. (10 Marks)
- b. Write detailed notes on vehicle kinetics with necessary graphs. (10 Marks)

### Module-2

- 3 a. With neat block diagram, explain the essential components of electric vehicles. (08 Marks)
- b. With neat graph, briefly explain the traction motor characteristics of EV. (05 Marks)
- c. Detail the concept of hybrid electric vehicles and its architecture. (07 Marks)

### OR

- 4 a. Explain series hybrid electric drive trains with neat sketch. (10 Marks)
- b. Explain parallel hybrid electric drive train with neat sketch. (10 Marks)

### Module-3

- 5 a. Define the following battery parameters: (08 Marks)
  - i) Discharge Rate
  - ii) State of charge
  - iii) State of discharge
  - iv) Depth of discharge
- b. Draw and explain the basic structure of battery and its major components. (06 Marks)
- c. Briefly explain Lithium ion battery with neat sketch. (06 Marks)

### OR

- 6 a. Write brief notes on fuel cell and explain its basic principle and operation. (08 Marks)
- b. List the types of fuel cells. Explain any two types with neat sketch. (06 Marks)
- c. Write short notes on super capacitor's (06 Marks)

### Module-4

- 7 a. Explain the principle and operation of DC motor with neat sketch. Brief the two types of speed control in DC motor. (10 Marks)
- b. Explain the operation of induction motor. Brief the concept of slip in induction motor. (10 Marks)

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### OR

- 8 a. List the advantages of BLDC motor. Explain the construction, working and principle of operation of BLDC motor with neat diagram. (10 Marks)
- b. Write detailed notes on sensor less control. Briefly explain the principle of regenerative braking. (10 Marks)

### Module-5

- 9 a. Explain the power rating design of series hybrid electric drive train in detail. (10 Marks)
- b. Elaborate the control strategies of series hybrid electric drive train in detail. (10 Marks)

### OR

- 10 a. Design the engine power capacity of parallel hybrid electric drive train. (10 Marks)
- b. Explain the control strategies of parallel hybrid electric drive train. (10 Marks)

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