



Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025
Electric Vehicles

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With a neat sketch explain top-level perspective of an electric vehicle system. (10 Marks)
b. With equation, explain non-constant and constant F_{TR} on level road. (10 Marks)

OR

- 2 a. Explain force velocity characterization and maximum gradiability. (10 Marks)
b. Explain the dynamics of vehicle motion. Also explain tractive force. (10 Marks)

Module-2

- 3 a. With the sketch, explain traction motor characteristics. (10 Marks)
b. Explain the concept of tractive effort in normal driving. (10 Marks)

OR

- 4 a. List the different architecture of HEV's and explain the series hybrid drive trains with neat diagram. (10 Marks)
b. Discuss the variety of possible EV configuration due to variations in electric propulsion system and energy source with block diagram. (10 Marks)

Module-3

- 5 a. With a neat sketch, explain working principle of lead acid battery. (10 Marks)
b. List the fuel cell types. Write a short note on super capacitors. (10 Marks)

OR

- 6 a. Explain components and working principle of a battery cells with neat diagram. (10 Marks)
b. Explain the following battery parameters:
(i) Discharge rate (ii) State of discharge (iii) Depth of discharge (iv) SOC. (10 Marks)

Module-4

- 7 a. Explain the operation of Switched Reluctance motor drive system. (10 Marks)
b. Explain block diagram of the speed control of the BLDC motor. (10 Marks)

OR

- 8 a. Explain the functional block diagram of a typical electric propulsion motor. (10 Marks)
b. With a neat sketch explain VVVF control and characteristics of induction motor drives. (10 Marks)

Module-5

- 9 a. Explain the configuration of a typical series hybrid electric drive train. (10 Marks)
b. Explain Max-SOC of PPS control strategy. (10 Marks)

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- 10 a. Explain the configuration of the parallel torque – coupling hybrid drive train. (10 Marks)
b. Explain concept of power rating design of traction motor and engine/generator. (10 Marks)

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