CBCS SCHEME

USN | | | | | | | | | | |

21EE752

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.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 note (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)**

OR

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)**

* * * * *