

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
IV B. Tech I Semester Regular/Supplementary Examinations OCT/NOV 2025
FUNDAMENTALS OF ELECTRIC VEHICLES
(OPEN ELECTIVE)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks

UNIT-I

1. a) Explain the major components of a conventional vehicle with a neat block diagram and discuss its drawbacks. [7M]
b) Discuss the advantages and applications of electric vehicles(EV) in different sectors. [7M]

(OR)

2. a) Describe the need for electric vehicles in the present transportation scenario. [7M]
b) Summarize the historical development and evolution of electric vehicles. [7M]

UNIT-II

3. a) Explain the function of a Voltage Source Inverter in EV applications. [7M]
b) Describe the working of single-phase and three-phase rectifiers used in EV charging systems. [7M]

(OR)

4. a) Describe the working principle of electric traction motors used in EVs. [7M]
b) Illustrate how a bidirectional DC–DC converter supports regenerative braking in EVs. [7M]

UNIT-III

5. a) Describe the major components of a typical Hybrid Electric Vehicle(HEV) and their functions. [7M]
b) Explain the operating principle of a Series Hybrid Electric Vehicle. [7M]

(OR)

6. a) Draw and explain the general architecture of a Hybrid Electric Vehicle. [7M]
b) Explain how a complex hybrid combines the advantages of series and parallel systems. [7M]

UNIT-IV

7. a) Explain the torque–speed characteristics required for electric vehicle traction applications. [7M]
b) Analyze the benefits and challenges of Switched Reluctance Motors (SRMs) for electric traction applications. [7M]

(OR)

8. a) Explain the construction and working principle of a Permanent Magnetic Synchronous Motors (PMSM). [7M]
b) Illustrate the torque–speed characteristics of a synchronous motor. [7M]

UNIT-V

9. a) Explain the working principle of a fuel cell with neat diagram. [7M]
b) Illustrate the working of a Battery Management System (BMS) with a neat block diagram. [7M]

(OR)

10. a) Explain the construction and working of a flywheel energy storage system. [7M]
b) Describe the construction and working of a lead-acid battery. [7M]
