PVP 23

Code: 23EE2601

III B.Tech – II Semester - Regular Examinations – APRIL 2026

FUNDAMENTALS OF ELECTRIC VEHICLES
(Common for ALL BRANCHES)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Why there is a need for electric vehicles?	L2	CO1
b)	What are the main factors affecting EV market growth?	L1	CO1
c)	What is the function of an inverter in EVs?	L1	CO2
d)	List the main components of an electric vehicle.	L1	CO2
e)	List any two advantages of induction motors in EVs.	L1	CO1
f)	What are the requirements of electric machines for electric vehicles?	L1	CO2
g)	What is the function of the internal combustion engine in HEVs?	L2	CO2
h)	What is regenerative braking in hybrid electric vehicles?	L1	CO2
i)	What is the basic principle of a fuel cell?	L1	CO1
j)	List the advantages of lead–acid batteries.	L1	CO1

PART – B

			BL	CO	Max. Marks
		UNIT-I			
2	a)	Discuss in detail the types of Electric Vehicles with block diagrams.	L2	CO2	5 M
	b)	Compare Electric Vehicles and Conventional Vehicles.	L3	CO2	5 M
		OR			
3	a)	Explain the fundamentals of vehicles and vehicle dynamics.	L2	CO1	5 M
	b)	Mention the limitations and drawbacks of conventional ICE vehicles.	L1	CO1	5 M
		UNIT-II			
4	a)	Articulate the operation of bidirectional DC–DC converters in EV battery systems.	L3	CO3	5 M
	b)	Explain the role of the controller in electric vehicle operation.	L2	CO2	5 M
		OR			
5	a)	Explain the power flow in electric vehicles during motoring and regenerative braking modes.	L2	CO2	5 M
	b)	Compare different power converters used in EVs.	L3	CO3	5 M

UNIT-III					
6	a)	Explain the characteristics of traction drives used in electric vehicles.	L2	CO3	5 M
	b)	Mention the advantages and limitations of induction motors in electric vehicles.	L2	CO3	5 M
OR					
7		Discuss the working principle and advantages of Brushless DC motors in EV applications.	L2	CO3	10 M
UNIT-IV					
8	a)	Compare Series, Parallel and Complex Hybrid Electric Vehicles.	L3	CO4	5 M
	b)	Discuss the advantages and disadvantages of Hybrid Electric Vehicles.	L2	CO4	5 M
OR					
9		Illustrate the operation of the Hybrid Electric Vehicle architecture in detail.	L4	CO4	10 M
UNIT-V					
10		Analyze the working and importance of a Battery Management System (BMS).	L5	CO5	10 M
OR					
11		Explain the construction and working of hydrogen fuel cells used in EVs.	L2	CO5	10 M