

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- VII EXAMINATION – SUMMER 2026

Subject Code:3170923

Date:20-05-2026

Subject Name: Electrical and Hybrid Vehicle

Time: 02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What are the key differences and similarities between electric drive train and the internal combustion engine (ICE) vehicle drive train?	03
	(b) Explain the concept of a hybrid vehicle. How does it combine different power sources to improve fuel efficiency and reduce emissions?	04
	(c) Classify the electric vehicles in use today. Compare their advantages and disadvantages.	07
Q.2	(a) Describe the energy storage requirements in hybrid and electric vehicles.	03
	(b) How does electric drive train function in electric vehicles, and what are its main advantages over traditional drive trains?	04
	(c) Evaluate the feasibility of designing an electric vehicle without using gears. What are the potential benefits and challenges of such a design?	07
	OR	
	(c) Classify the different types of Hybrid Electric Vehicle (HEV). What are the different types of hybrid power trains?	07
Q.3	(a) Discuss the history and development of electric vehicles towards the 21st century	03
	(b) Compare hybrid vehicles with battery electric vehicles (BEVs).	04
	(c) Describe the motion and dynamic equations of electric vehicles. What are the various forces acting on the vehicle in static and dynamic conditions?	07
	OR	
Q.3	(a) Discuss various factors contribute to the efficiency of an electric drive train.	03
	(b) In Battery Electric Vehicle, what are the key factors influencing the performance and lifespan of batteries in EVs?	04
	(c) Discuss the configuration and control of induction motor drives in electric vehicles. Mention various induction motor control techniques.	07
Q.4	(a) Explain the concept of hybridization of different energy storage devices.	03
	(b) Explain the configuration and control of switched reluctance motor drives in electric vehicles.	04
	(c) Discuss the fuel cell-based energy storage systems. Compare it to other energy storage technologies.	07

OR

Q.4	(a)	Discuss in brief the implementation issues of energy management strategies in electric vehicles.	03
	(b)	Discuss the configuration and control of DC motor drives in electric vehicles.	04
	(c)	Analyze the role of super capacitors in energy storage for electric vehicles. What are the advantages and limitations of using super capacitors in EVs?	07
Q.5	(a)	Compare the various charging techniques used for electric vehicles.	03
	(b)	Explain the classification and comparison of different energy management strategies.	04
	(c)	Describe the different types of driving cycles used in range modelling for electric vehicles. How do these driving cycles impact the accuracy of range predictions?	07
OR			
Q.5	(a)	How does the integration of solar panels impact the range and performance of solar-powered vehicles?	03
	(b)	How do hybrid systems affect the overall range of the vehicle?	04
	(c)	Explain the schematic of charging stations for electric vehicles. What are the key components and considerations in designing an efficient charging station?	07
