Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170923 Date: 21/06/2023

Subject Name: Electrical and Hybrid Vehicle

Time: 10:30 AM TO 01:00 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 main issues with fuel cells?	**03**
	(b)	What is drive system efficiency?	**04**
	(c)	Explain the Basic Principle of Super Capacitors based Energy Storage System in Hybrid Electric Vehicles.	**07**
Q.2	**(a)**	Classify of different energy management strategies.	**03**
	(b)	What is Driving Cycle?	**04**
	(c)	Explain the impact of modern drive-trains on energy supplies.	**07**
		OR	
	(c)	Define the terms charge capacity, energy density, charge efficiency, specific energy, specific power, energy efficiency, C rate for batteries.	**07**
Q.3	**(a)**	Define the term Hybridization?	**03**
	(b)	Explain about Lithium Based Batteries in Energy Storage System?	**04**
	(c)	Explain the need of drive cycle for EVs and HEVs and hence explain different drive cycles?	**07**
		OR	
Q.3	**(a)**	Explain different types of forces acting on vehicle going uphill.	**03**
	(b)	What are the steps to find battery capacity for Electrical or Hybrid Electrical Vehicle?	**04**
	(c)	Explain the configuration and control of Induction Motor drives in EV.	**07**
Q.4	**(a)**	Explain the need of Antilock brake system (ABS)	**03**
	(b)	Why permanent magnet machines advantageous in Electrical Vehicles?	**04**
	(c)	Explain power flow control in electric drive-train topologies.	**07**
		OR	
Q.4	**(a)**	How Hybrid Electric Vehicles differ from Conventional Vehicles?	**03**
	(b)	Explain the steady state modelling of permanent magnet machines.	**04**
	(c)	State various charging techniques with schematics of charging stations.	**07**

Q.5	**(a)**	What economic and environmental impact of electric hybrid vehicle?	**03**
	(b)	Explain about Fly Wheel Technologies in Hybrid Electric Vehicles?	**04**
	(c)	State the merits and demerits of series hybrid and parallel hybrid system.	**07**

OR

Q.5	**(a)**	What is flux weakening in permanent magnet machines?	**03**
	(b)	Differentiate between ultracapacitor and battery as an energy storage device for EV.	**04**
	(c)	Explain constant volts/Hz control strategy for closed loop induction motor drive.	**07**

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