

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3170923****Date:17/12/2021****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
<b>Q.1</b>	(a) Give Comparisons of Hybrid Electric Vehicles and Conventional Vehicles?	<b>03</b>
	(b) Explain different types of forces acting on vehicle going uphill.	<b>04</b>
	(c) Explain historical development of automobile and development of interest and activity in the EV from 1890 to present day.	<b>07</b>
<b>Q.2</b>	(a) What is need of transformation from Rotating Axes ( $\alpha \beta, 0$ ) to Stationary Axes ( $d, q, 0$ ).	<b>03</b>
	(b) Draw and illustrate Equivalent 2 phase induction machine in $\alpha \beta$ , axis and d, q axis.	<b>04</b>
	(c) Compare series hybrid and parallel hybrid system with their merits and demerits.	<b>07</b>
OR		
<b>Q.3</b>	(c) Explain energy saving potential of hybrid drive trains.	<b>07</b>
	(a) List economic and environmental impact of electric hybrid vehicle.	<b>03</b>
	(b) Explain the steady state modelling of permanent magnet machines?	<b>04</b>
	(c) Explain closed loop induction motor drive with constant volts/Hz control strategy.	<b>07</b>
OR		
<b>Q.3</b>	(a) What type of operation is known as flux weakening in permanent magnet machines?	<b>03</b>
	(b) List major advantages of permanent magnet machines in Electrical Vehicles.	<b>04</b>
	(c) Draw and Explain typical CAN network for HEVs?	<b>07</b>
<b>Q.4</b>	(a) Define the term hybridness?	<b>03</b>
	(b) Explain the difference between ultracapacitor and battery as an energy storage device for EV.	<b>04</b>
	(c) Explain the need of drive cycle for EVs and HEVs and hence explain different drive cycles?	<b>07</b>
OR		
<b>Q.4</b>	(a) What are the main issues with fuel cells?	<b>03</b>
	(b) Explain the steps to find battery capacity for Electrical or Hybrid Electrical Vehicle.	<b>04</b>
	(c) Define the terms charge capacity, specific energy, energy density, specific power, charge efficiency, energy efficiency, C rate for batteries.	<b>07</b>
<b>Q.5</b>	(a) List the optimization based strategies in Hybrid Electrical Vehicles?	<b>03</b>
	(b) Explain about Lithium Based Batteries in Energy Storage System?	<b>04</b>
	(c) Explain the Basic Principle of Super Capacitors based Energy Storage System in Hybrid Electric Vehicles?	<b>07</b>

OR

- Q.5** (a) Explain the need of Antilock brake system (ABS) **03**  
(b) Explain about Fly Wheel Technologies in Hybrid Electric Vehicles? **04**  
(c) Explain Electronically controlled regenerative braking system functioning as an ABS. **07**

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