Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER IV (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2744503 **Date:04/05/2016**

Subject Name: Electric Vehicles

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.**

Q.1	**(a)**	Explain the energies drawn from the energy storage and engine in the acceleration period for Parallel Hybrid electric drive train	**07**
	(b)	Explain architecture of the single-shaft torque combination parallel hybrid electric drive train for pre-transmission and post-transmission.	**07**
Q.2	**(a)**	Derive the equation for Isolated bidirectional DC–DC converter for heavy load condition with necessary waveforms.	**07**
	(b)	Explain the design of Z-converter for battery charging.	**07**
		OR	
	(b)	Derive the equation of non-isolated bidirectional DC-DC converter with neat circuit diagram and necessary waveforms.	**07**
Q.3	**(a)**	With Block diagram explain the torque control of the BLDC motor.	**07**
	(b)	With waveform explain low speed and high speed operation of switched reluctance motor.	**07**
		OR	
Q.3	**(a)**	With circuit diagram and waveform explain the class C two-quadrant chopper for DC motor drives.	**07**
	(b)	Explain the Torque-Speed profile with variable frequency but constant V/f ratio for induction motor drive.	**07**
Q.4	**(a)**	Explain various operation mode of Max. SOC-of- Peaking Power Source (Max. SOC-of-PPS) control strategy for Parallel Hybrid electric drive train with flow chart.	**07**
	(b)	With equation explain the design of Power Capacity and Energy Capacity of PPS for Series Hybrid electric drive train.	**07**
		OR	
Q.4	**(a)**	Explain Thermostat control strategy for Series Hybrid electric drive train.	**07**
	(b)	Discuss engine power required at constant speed on a flat road and a 5% grade road for Parallel Hybrid electric drive train.	**07**
Q.5	**(a)**	With equation and characteristic explain the acceleration being consumed constant with a short time period for electrical vehicle.	**07**
	(b)	Give the types of energy storage technologies suitable for Hybrid Electrical Vehicle. Explain the Lithium-Ion Battery in detail.	**07**
		OR	
Q.5	**(a)**	Explain the plot of Battery voltage and charging current Vs. State of charge (SOC) for a three stage charger.	**07**
	(b)	Give the types of Fuel Cells. Explain construction and operation PEMFC.	**07**

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