

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3172414****Date:08-12-2023****Subject Name: Vehicular Power Electronics****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) Draw block diagram of a pure electric vehicle.	03
	(b) Compare Pure Electric and Hybrid vehicle.	04
	(c) State merits and demerits of series hybrid drive train.	07
Q.2	(a) State various electric motors used and relevant power electronics converter required for the same in electric vehicles.	03
	(b) Discuss tractive effort in an electric vehicle under normal running condition.	04
	(c) Explain Series Hybrid Drive Train configuration of HEV.	07
	OR	
	(c) State various forces acting on a vehicle under static and dynamic condition along with necessary figures and equations.	07
Q.3	(a) Compare DC drive and AC drive for electric vehicles like cars and buses.	03
	(b) State and explain in brief performance parameters of electric vehicles.	04
	(c) Considering designing an electric car, comment on the selection and design of motor and transmission. Give proper figures and equations wherever necessary.	07
	OR	
Q.3	(a) State various types of fuel cells.	03
	(b) Discuss regenerative braking in electric vehicles, elaborating its importance.	04
	(c) Draw only, the block diagram of torque coupled parallel hybrid electric drive train and discuss in brief its operation modes.	07
Q.4	(a) State the requirement and importance of cell balancing while charging EV batteries.	03
	(b) Discuss the design of Engine Power Capacity for parallel hybrid electric drive train.	04
	(c) Write a note on ultra-capacitors for EVs highlighting its features, principle of operation, feasibility, implementation challenges and advantages.	07
	OR	
Q.4	(a) State advantages and implementation challenges of transformer-less topology of power electronics converters for EV battery charging.	03
	(b) Draw block diagram and explain working of PMBLDC motor drive.	04
	(c) With neat diagram and equations, explain the construction and operation of a fuel cell.	07
Q.5	(a) State and explain in brief, battery parameters along with necessary equations.	03
	(b) Write a note on fast charging method for battery charging in EV.	04
	(c) Classify and compare energy management strategies for hybrid and electric vehicles.	07
	OR	
Q.5	(a) State the need of energy management strategy in electric and hybrid vehicles.	03
	(b) Discuss the implementation issues of energy management strategies in EVs & HEVs.	04
	(c) Describe working of Isolated Bidirectional DC-DC converter with waveforms.	07
