

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE(Minor) - SEMESTER- V EXAMINATION – WINTER 2023****Subject Code:115AL01****Date:07-02-2024****Subject Name: Power Electronics for Electrical 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.
4. Simple and non-programmable scientific calculators are allowed.

Q.1	(a)	Explain in Brief , With complete diagram, working of Battery Operated Electric Vehicle (EV).	03
	(b)	Explain in Brief , With complete diagram, working of Hybrid Electric Vehicle (HEV).	04
	(c)	What is a difference between series HEV and Parallel HEV? Explain with Figure.	07
Q.2	(a)	Explain in brief structure of Power MOSFET. Draw its steady state V-I characteristics.	03
	(b)	Explain in brief structure of IGBT. Draw its steady state V-I characteristics.	04
	(c)	Give comparison between power MOSFET and IGBT with respect to their Operating frequency range, On state voltage drop range, Type of snubber circuit requirement, Maximum VI ratings, Static VI characteristics, Applications and Circuit symbol.	07
		OR	
	(c)	What are the major Components of Power Train And Drive Train of Electric Vehicle?	07
Q.3	(a)	Draw & Explain Torque-speed characteristics Of PMSM.	03
	(b)	Explain working of SRM Motor with its characteristics.	04
	(c)	Explain different types of forces acting on Vehicle going uphill.	07
		OR	
Q.3	(a)	Which types of qualities are required in Electric Motors for EV application?	03
	(b)	How power rating of Motor to be calculated for E.V.?	04
	(c)	Give comparison between Current source inverter and Voltage source inverter.	07
Q.4	(a)	Explain working of switching boost Convertor circuit.	03
	(b)	Explain difference between half controlled and full controlled Bridge rectifier.	04
	(c)	Explain Three phase half wave controlled rectifier with resistive load.	07
		OR	

Q.4	(a)	Explain the steps to find battery capacity for Electrical or Hybrid vehicles.	03
	(b)	Explain the difference between Ultra-capacitor and Battery as an Energy storage device for EV.	04
	(c)	Compare Lead-acid Battery, Nickel-cadmium Battery and Lithium-ion Battery for EV Application.	07
Q.5	(a)	What are the main issues with Fuel cell Use for EV?	03
	(b)	How Flywheel works as an Energy storage device?	04
	(c)	Explain Different Battery Management strategies used in Electric vehicles.	07
		OR	
Q.5	(a)	Write Classification of BMS for HEV.	03
	(b)	Write the Functions of the Control System in HEVs and EVs.	04
	(c)	Explain different types of charging modes & charging stations.	07
