

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII EXAMINATION – WINTER 2025

Subject Code:3170923

Date:13-11-2025

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) List the Economic and environmental impact of electric & hybrid vehicles.	03
	(b) Give a detailed classification of EVs used in the current Automobile market.	04
	(c) Give Comparisons of Hybrid Electric Vehicles and Conventional Vehicles.	07
Q.2	(a) Explain the series and parallel configuration of EHV.	03
	(b) Electric Vehicle (EV) is the future of transportation? Justify your answer.	04
	(c) Derive the vehicle dynamic equation and explain all acting forces on the vehicle with appropriate figures.	07
<b>OR</b>		
	(c) Explain power flow in Parallel Hybrid HEVs.	07
Q.3	(a) Explain DC motor speed control techniques.	03
	(b) Explain the classification of Electric Drives used in EVs.	04
	(c) Draw and explain a Hybrid Electric Vehicle (HEV) with an appropriate block diagram.	07
<b>OR</b>		
Q.3	(a) Explain regenerative braking in EV and HEV.	03
	(b) List major advantages of permanent magnet machines in Electrical Vehicles.	04
	(c) Draw and explain different driving cycles. How did it help in the modelling of EVs?	07
Q.4	(a) Classified different Energy Storage devices used in Hybrid and Electric Vehicles	03
	(b) Explain the History of EVs and HEVs.	04
	(c) Compare Lead-acid battery and nickel-cadmium battery.	07
<b>OR</b>		
Q.4	(a) Explain Flywheel in detail.	03
	(b) Explain different control techniques of Induction Motor drives	04
	(c) Explain Solar Powered EHV's.	07
Q.5	(a) Classified different energy management strategies.	03
	(b) Explain the energy-saving potential of hybrid drive trains.	04
	(c) Explain Metal Air Batteries in Details.	07
<b>OR</b>		
Q.5	(a) Explain the Fuel Cell EV.	03
	(b) Explain the Basic Principle of Super Capacitors.	04

- (c) Define following terms
- (1) Specific energy
  - (2) Specific power
  - (3) Energy density
  - (4) Ambient temperature
  - (5) Life cycle of battery
  - (6) Energy stored
  - (7) Charge capacity

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