

GUJARAT TECHNOLOGICAL UNIVERSITY

BE MINOR- SEMESTER-V EXAMINATION – WINTER 2025

Subject Code:115AL01

Date:06-12-2025

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.

MARKS

- Q.1**
- | | | |
|-----|---|-----------|
| (a) | List the Power Electronics devices used in Electrical Vehicle. | 03 |
| (b) | Explain Series hybrid electric drive train with diagram | 04 |
| (c) | Explain full wave-controlled rectifier with clear waveform
Write about Multi level Inverters | 07 |

- Q.2**
- | | | |
|-----|--|-----------|
| (a) | Explain buck converter with neat diagram. | 03 |
| (b) | Explain Torque speed characteristics of a Three-phase
Induction motor | 04 |
| (c) | List the Power Electronics devices used in Electrical Vehicle. | 07 |

OR

- | | | |
|-----|--|-----------|
| (c) | Explain switching states of two quadrant chopper | 07 |
|-----|--|-----------|
- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Name types of batteries used in Electric Vehicle. Explain any
one with
neat figures | 03 |
| (b) | Compare Series and Parallel Hybrid Drive train | 04 |
| (c) | What are the requirements of Electrical Machines for EV? | 07 |

OR

- Q.3**
- | | | |
|-----|--|-----------|
| (a) | Draw symbol of SCR, BJT and GTO. | 03 |
| (b) | Explain construction, working and characteristic of IGBT | 04 |
| (c) | Briefly classify hybrid electric vehicles. | 07 |
- Q.4**
- | | | |
|-----|---|-----------|
| (a) | Explain working principle of Induction motor. | 03 |
| (b) | What is AC charging method used for batteries of Electric
Vehicle? | 04 |
| (c) | Explain principle and construction of BLDC motor drives | 07 |

OR

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Give classification of electric motor drives for EV and HVE
applications | 03 |
| (b) | What is Ultra Capacitor? Compare it with normal capacitor. | 04 |
| (c) | Write a difference between Voltage source Inverter and
Current source Inverter? | 07 |

- | | | | |
|------------|------------|--|-----------|
| Q.5 | (a) | Define DC-DC converter with it's types. | 03 |
| | (b) | What is fuel cell? Explain basic principle of fuel cell. | 04 |
| | (c) | Explain battery management methods and devices. | 07 |

OR

- | | | | |
|------------|------------|---|-----------|
| Q.5 | (a) | Write about a type of chopper used for two-quadrant operation | 03 |
| | (b) | What is DC Charging method used for batteries of Electric Vehicle? | 04 |
| | (c) | What is Parallel Hybrid Drive Train? Draw neat figures and explain. | 07 |
