

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024****Subject Code:3172414****Date:30-11-2024****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.

- Q.1** (a) Draw block diagram of EV. **03**
 (b) Compare Electric and Hybrid vehicles. **04**
 (c) State various limitations of Electric Vehicles. Also state remedies and solutions proposed over the limitations discussed. **07**
- Q.2** (a) Draw basic block diagram of a hybrid vehicle. **03**
 (b) Classify hybrid vehicles and draw block diagrams of the same. **04**
 (c) Discuss maximum cruising speed, gradeability, and acceleration w.r.t. EV. **07**
- OR**
- (c) State the equation for expressing the tractive effort of a vehicle. Discuss tractive effort with reference to vehicle performance. **07**
- Q.3** (a) Compare single and dual-motor configurations for EV propulsion. **03**
 (b) List various batteries. State which are used in EVs giving suitable reason. **04**
 (c) Describe the working of series hybrid electric drive train with diagrams. **07**
- OR**
- Q.3** (a) Compare fixed and variable gearing transmissions for EV propulsion. **03**
 (b) List advantages of Li-ion battery over Lead Acid batteries w.r.t. EVs. **04**
 (c) Discuss various requirements to be considered before selecting the preferred power devices for electric propulsion. **07**
- Q.4** (a) List advantages of regenerative braking in EV. **03**
 (b) List various types of fuel cells. **04**
 (c) Compare hard and soft switching for EV converters. **07**
- OR**
- Q.4** (a) Describe in brief the working principle of fuel cell. **03**
 (b) Discuss energy consumption in electric vehicles. **04**
 (c) Classify energy management strategies for HEVs. **07**
- Q.5** (a) Discuss the requirement and importance of cell balancing in batteries. **03**
 (b) Give detailed classification of EV motors. **04**
 (c) Discuss the design of Peaking Power Source (PPS), and comment on its power capacity and energy capacity. **07**
- OR**
- Q.5** (a) State and explain in brief, important battery parameters. **03**
 (b) Discuss Genetic Algorithm (GA) approach for implementation of offline EMS. **04**
 (c) Discuss various charging methods for battery charging. **07**
