Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022**

**Subject Code:3170216 Date:10/06/2022**

**Subject Name:Electric, Hybrid and Fuel Cell Vehicles**

**Time:02:30 PM TO 05:00 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)** | What is the environmental and social importance of electric vehicle? | **03** |
| | **(b)** | Explain basic concept of electric traction. | **04** |
| | **(c)** | Explain power flow control in electric drive-train topologies with neat sketch. | **07** |
| **Q.2** | **(a)** | Give short history of electric vehicle. | **03** |
| | **(b)** | Basic concept of Hybrid traction. | **04** |
| | **(c)** | Explain various hybrid drive-train topologies. | **07** |
| | | **OR** | |
| | **(c)** | Explain various fuel cell drive-train topologies. | **07** |
| **Q.3** | **(a)** | What is the limitation of series motor? | **03** |
| | **(b)** | Describe the control of permanent magnet motor. | **04** |
| | **(c)** | What is the Battery parameters and also explain any one battery measurement with neat sketch. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Enlist types of fuel cells. | **03** |
| | **(b)** | Purpose of electric motors and power electronics used in electric propulsion. | **04** |
| | **(c)** | Explain construction and working of lead acid battery and also write down the chemical reaction while battery is charging and discharging. | **07** |
| **Q.4** | **(a)** | Explain Sizing the propulsion motor. | **03** |
| | **(b)** | Explain Battery characteristics. | **04** |
| | **(c)** | Explain Configuration and control of BLDC Motor drives. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain working of ultra-capacitor. | **03** |
| | **(b)** | Explain working of high-speed flywheels. | **04** |
| | **(c)** | Explain control of DC motor. | **07** |
| **Q.5** | **(a)** | Explain power steering units. | **03** |
| | **(b)** | Describe Hydrogen storage system. | **04** |
| | **(c)** | Explain alkaline fuel cell and proton exchange membrane fuel cell with neat sketch. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Classification of different energy management strategies | **03** |
| | **(b)** | Short note : Regenerative braking systems | **04** |
| | **(c)** | Explain temperature control unit in lithium batteries. | **07** |

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