

Seat No.: \_\_\_\_\_

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## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023**

**Subject Code:3161920**

**Date:14-07-2023**

**Subject Name:Automobile Engineering**

**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.**
- Simple and non-programmable scientific calculators are allowed**

- Q.1**
- |     |  |           |
|-----|--|-----------|
| (a) | Give a brief history of automobile development.  | <b>03</b> |
| (b) | Define and discuss the air resistance, rolling resistance and gradient resistance.             | <b>04</b> |
| (c) | What is equivalent weight of vehicle? Derive the equation for equivalent weight for a vehicle. | <b>07</b> |

- Q.2**
- |     |   |           |
|-----|---|-----------|
| (a) | What are the essential properties required for clutch facing materials?   | <b>03</b> |
| (b) | Why is a synchronizer ring sometimes used in gear-box? What are its merits and demerits compared to sliding mesh. | <b>04</b> |
| (c) | Why the differential is needed in automobile? Draw a neat diagram and explain its operation.                      | <b>07</b> |

**OR**

- |     |  |           |
|-----|--|-----------|
| (c) | Explain with neat sketch torque converter. | <b>07</b> |
|-----|--|-----------|

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | Draw neat sketch of rack and pinion type steering gear. | <b>03</b> |
| (b) | Write short note on camber angle and castor angle.      | <b>04</b> |
| (c) | With neat sketch explain telescopic type shock absorber | <b>07</b> |

**OR**

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | What is bleeding of brake? Why it is necessary? Explain the procedure used during bleeding. | <b>03</b> |
| (b) | Draw a neat diagram of disc type wheel and compare with wire type wheel.                    | <b>04</b> |
| (c) | What is electronic stability control? Explain in brief the working of ESC.                  | <b>07</b> |

- Q.4**
- |     |   |           |
|-----|---|-----------|
| (a) | What are the limitations of electrically operated vehicles compared to conventional vehicles?                                       | <b>03</b> |
| (b) | Explain hydrogen-oxygen fuel cell as a source of energy.  | <b>04</b> |
| (c) | Derive expressions for effective mean radius and torque transmitted in case of a single plate clutch assuming different conditions. | <b>07</b> |

**OR**

- Q.4** (a) Explain in detail – Double Declutching. **03**  
(b) Draw neat schematic diagram showing the layout of an air suspension system. **04**  
(c) What is perfect steering? Derive expression for the basic condition for a perfect steering mechanism. **07**
- Q.5** (a) Explain the working of night vision system in auto vehicle. **03**  
(b) Derive maximum possible velocity to avoid skidding for the vehicle moving on a level curved path. **04**  
(c) Explain in detail the necessity and principle of working of an antilock brake system. Describe its main components and discuss various types of such systems in use. **07**

**OR**

- Q.5** (a) Explain active and passive safety system in auto vehicle. **03**  
(b) With neat sketch explain leaf spring suspension system. **04**  
(c) What is a CVT? Describe its principle of working in detail with the help of simple diagrams. Discuss also its main advantages and limitations. **07**

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