Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3171112 Date:23-05-2025

Subject Name:Automotive Electronics

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)**	Explain the purpose of electronics in automobiles.	**03**
	(b)	Define torque, power and fuel consumption.	**04**
	(c)	Create a diagram illustrating the major inputs and outputs between the engine and controller and explain their connections.	**07**
Q.2	**(a)**	Describe how air-fuel ratio affects engine performance.	**03**
	(b)	Explain the impact of spark timing on engine performance and the method used by the engine control system to control it.	**04**
	(c)	Create a diagram and describe the functioning of an electronic ignition control system.	**07**
		OR	
	(c)	Illustrate the different strokes involved in the four-stroke spark-ignition (SI) engine cycle, and explain their functions, supported by a suitable diagram.	**07**
Q.3	**(a)**	Define the term solenoid, and explain its application in automotive systems.	**03**
	(b)	Explain the functioning of electro-hydraulic valves and discuss the advantages they offer in automotive systems.	**04**
	(c)	List the various types of sensors used in automobiles. Describe the function of an airflow rate sensor in an engine and explain the principle behind its operation.	**07**
		OR	
Q.3	**(a)**	Explain the concept of piezoelectric force generators, and discuss the advantages they offer in actuator technology.	**03**
	(b)	Describe the role of airbag sensors in modern vehicles, and explain the principle behind their operation.	**04**
	(c)	Explain the significance of an engine crankshaft angular position sensor, and describe how the engine control system utilizes its data for engine operation.	**07**
Q.4	**(a)**	Define an electronic suspension system compared to traditional suspension systems.	**03**
	(b)	Describe the functioning of an antilock braking system (ABS), and analyze the advantages it offers over traditional braking systems.	**04**
	(c)	Explain the principle of digital cruise control and discuss the potential hardware implementation issues that can arise when designing a digital cruise control system for a vehicle.	**07**
		OR	

Q.4	**(a)**	Analyze the benefits of digital cruise control systems over traditional cruise control systems, and evaluate the factors that contribute to their increased accuracy and efficiency.	**03**
	(b)	Examine electronic suspension systems for enhanced vehicle handling and ride comfort.	**04**
	(c)	Explain the role of on-board diagnosis (OBD) systems in vehicles, and describe their functioning in detecting and reporting malfunctions in various vehicle systems.	**07**
Q.5	**(a)**	Define alternators in vehicles.	**03**
	(b)	Categorize and differentiate the various types of batteries commonly used in vehicles.	**04**
	(c)	Classify and compare the various types of electrical circuits and wiring used in vehicles, and analyze their design considerations in relation to the loads they are intended to handle.	**07**
		OR	
Q.5	**(a)**	Compare and contrast the differences between battery-operated electric vehicles and traditional gasoline-powered vehicles.	**03**
	(b)	Enumerate the various communication buses utilized in modern vehicle networks, and analyze the functionality of the Controller Area Network (CAN) bus.	**04**
	(c)	Identify and evaluate the typical problems that can arise in a vehicle's electrical system, and assess the diagnostic and repair procedures employed to address these issues.	**07**

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