

GUJARAT TECHNOLOGICAL UNIVERSITY**BE (Minor) - SEMESTER– VI EXAMINATION – WINTER 2023****Subject Code: 116AL01****Date: 07-02-2024****Subject Name: Data Communication and Embedded Systems in Electrical 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) Name the different requirements that need to be considered for bus systems in vehicular networks.	03
	(b) Describe the concept of coupling of networks in vehicular communication systems.	04
	(c) Compare and contrast different classifications of bus systems, highlighting their strengths and weaknesses in vehicular networks.	07
Q.2	(a) Define the basic layout of a network in the context of embedded systems.	03
	(b) Describe the communication requirements that embedded systems need to fulfill for effective operation.	04
	(c) Explain the key characteristics that make FlexRay suitable for high-performance automotive applications.	07
	OR	
	(c) Explain the specific scenarios where the LIN Bus is preferred over other bus systems in vehicles.	07
Q.3	(a) Describe the concept of VANET (Vehicular Ad Hoc Network).	03
	(b) Explain the effectiveness of V2V communication in reducing traffic accidents and congestion.	04
	(c) Define IEEE 802.11P. Explain it with neat diagram.	07
	OR	
Q.3	(a) Describe the role of the physical layer in vehicular communications.	03
	(b) Explain the standard CAN data frame.	04
	(c) Explain the routing strategies employed in VANETs and their impact on network performance.	07
Q.4	(a) Describe SAE J1939 standard.	03
	(b) Explain the role of TCP (Transmission Control Protocol) in data communication.	04
	(c) Explain the significance of time-triggered communication in the design of TTCAN.	07
	OR	
Q.4	(a) Explain the concept of bit stuffing in Controller Area Network (CAN).	03
	(b) Describe ITS. Give example of the same.	04
	(c) Explain the ARP (Address Resolution Protocol) and RARP (Reverse Address Resolution Protocol) in brief.	07
Q.5	(a) How does the architecture of ECUs affect their communication with bus interfaces?	03

- (b) Identify factors that contribute to a competitive advantage in the field of car networking. **04**
- (c) Describe the concept of media access control in the context of FlexRay communication. **07**

OR

- Q.5**
- (a) Define the basic elements of network topology in a FlexRay system. **03**
 - (b) Explain how specific car networking protocols work and their applications in modern vehicles. **04**
 - (c) Briefly explain the FlexRay frame format. **07**
