Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE MINOR - SEMESTER–VI EXAMINATION – SUMMER 2024

Subject Code:116AL01 Date:27-05-2024

Subject Name:Data Communication and Embedded Systems in Electrical Vehicles

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)**	Explain the concept of data communication within the context of vehicular networks.	**03**
	(b)	Explain the concept of network coupling in vehicular communication systems.	**04**
	(c)	Describe two types of bus systems used in vehicular networks. Discuss one specific requirement for each type that ensures efficient functioning within the vehicle.	**07**
Q.2	**(a)**	Illustrate the basic network layout used in automotive embedded systems. What are the primary components that make up this layout?	**03**
	(b)	Identify and explain two critical communication requirements for embedded systems within the automotive industry.	**04**
	(c)	Discuss the functionalities and differences between the CAN (Controller Area Network) and CAN-FD (Flexible Data-rate) bus systems used in automotive applications.	**07**
		OR	
	(c)	Discuss the main features of FlexRay that make it ideal for high-performance automotive applications.	**07**
Q.3	**(a)**	Briefly describe the LIN (Local Interconnect Network) Bus system.	**03**
	(b)	Explain the role and importance of diagnostic interfaces in modern automotive systems.	**04**
	(c)	Explain the concepts of Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communications.	**07**
		OR	
Q.3	**(a)**	Define Dedicated Short-Range Communications (DSRC) and Wireless Access in Vehicular Environments (WAVE).	**03**
	(b)	Describe the key principles of routing protocols used in vehicular communications.	**04**
	(c)	Define IEEE 802.11p and illustrate its functionality using a clear diagram.	**07**
Q.4	**(a)**	Provide a brief overview of the LIN (Local Interconnect Network) standard. What are its primary applications in automotive systems?	**03**
	(b)	Discuss how Ethernet and TCP/IP protocols support data communication.	**04**
	(c)	Describe the CAN (Controller Area Network) protocol focusing on message transfer and frame types.	**07**
		OR	
Q.4	**(a)**	Explain the SAE J1939 standard.	**03**
	(b)	Explain the DeviceNet protocol.	**04**
	(c)	Discuss the importance of time-triggered communication in the architecture of TTCAN.	**07**
Q.5	**(a)**	Define the three types of data channels—control, synchronous, and asynchronous.	**03**
	(b)	Describe the functions of the controller host interface within automotive networks.	**04**

	(c)	Explain the role of Electronic Control Units (ECUs) and bus interfaces in vehicle communication systems.	**07**

OR

Q.5	**(a)**	What is network topology in the context of automotive networks?	**03**
	(b)	Discuss the function of media access control (MAC) in automotive communication systems.	**04**
	(c)	Discuss how particular automotive networking protocols function and their uses in contemporary vehicles	**07**

****