

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M.SC INTEGRATED - SEMESTER - IX EXAMINATION - WINTER 2025**

**Subject Code: 1390303**

**Date: 18-11-2025**

**Subject Name: Embedded System**

**Time: 10:30 AM TO 01:00 PM**

**Total Marks: 70**

**Instructions**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Use of simple and non-programmable scientific calculators are permitted.**

	<b>Marks</b>
<b>Q.1 (a)</b> Define an embedded system and list its key characteristics.	<b>03</b>
<b>(b)</b> Differentiate between microprocessor and microcontroller with examples.	<b>04</b>
<b>(c)</b> Explain the hardware and software components of an embedded system in detail.	<b>07</b>
<b>Q.2 (a)</b> Explain the embedded system design life cycle with neat diagram.	<b>03</b>
<b>(b)</b> Explain requirements analysis and specification in embedded system design.	<b>04</b>
<b>(c)</b> Discuss hardware–software co-design concept and its benefits.	<b>07</b>
<b>OR</b>	
<b>(c)</b> Describe embedded system design methodologies with suitable examples.	<b>07</b>
<b>Q.3 (a)</b> Write a short note on microcontroller architecture.	<b>03</b>
<b>(b)</b> Explain GPIO and UART interfacing in microcontrollers.	<b>04</b>
<b>(c)</b> Write and explain an Embedded C program for LED blinking using a push button.	<b>07</b>
<b>OR</b>	
<b>(a)</b> Explain SPI and I <sup>2</sup> C protocols used in microcontroller interfacing.	<b>03</b>
<b>(b)</b> Write a short note on assembly language programming in embedded systems.	<b>04</b>
<b>(c)</b> Design a microcontroller-based system for temperature monitoring and LCD display.	<b>07</b>
<b>Q.4 (a)</b> Define RTOS and explain its architecture.	<b>03</b>
<b>(b)</b> Explain task scheduling in RTOS with example.	<b>04</b>
<b>(c)</b> Discuss interrupt handling and management in real-time systems.	<b>07</b>
<b>OR</b>	
<b>(a)</b> List and explain key features of RTOS.	<b>03</b>
<b>(b)</b> Explain different scheduling algorithms in RTOS.	<b>04</b>
<b>(c)</b> Design a simple RTOS-based temperature monitoring system using sensors.	<b>07</b>
<b>Q.5 (a)</b> Explain TCP/IP protocol stack used in embedded systems.	<b>03</b>

- (b) Explain wireless communication protocols used in embedded systems (Wi-Fi, Bluetooth, Zigbee). **04**
- (c) Explain IoT and M2M communication architecture in embedded systems. **07**
- OR**
- (a) What is embedded system networking? Explain its importance. **03**
- (b) Discuss HTTP and FTP protocols in embedded systems. **04**
- (c) Explain design of a networked embedded system with suitable diagram. **07**

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