Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3172001 **Date: 03/06/2026**

Subject Name: Microcontrollers and Embedded Systems

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.**

Q.1	**(a)**	Write applications of embedded systems. (At least 6 applications)	**03**
	(b)	Define checksum byte & explain its operation.	**04**
	(c)	Explain 8051 microcontroller architecture with suitable diagram.	**07**
Q.2	**(a)**	List the ports of 8051. Explain any one in brief.	**03**
	(b)	Explain Timers of microcontrollers.	**04**
	(c)	Give comparison between synchronous and asynchronous serial communication.	**07**
		OR	
Q.2	**(c)**	Write an embedded C program to generate a square wave on a PORT1.0 with frequency of 1 KHz using timer 0 or 1 of 8051 microcontroller.	**07**
Q.3	**(a)**	Explain basic differences of Von neuman and Harvard architecture.	**03**
	(b)	State and explain program status word (PSW) of 8051 microcontroller.	**04**
	(c)	Draw and explain general block diagram of an embedded system and explain each block in detail.	**07**
		OR	
Q.3	**(a)**	State types of an embedded system and explain them in brief.	**03**
	(b)	Explain external memory interfacing of microcontroller 8051.	**04**
	(c)	Using a conventional stages RISC pipeline as an example, describe the idea of pipelining in processor design.	**07**
Q.4	**(a)**	Give difference between microprocessor and microcontroller.	**03**
	(b)	How do you control DC motor using H-bridge concept? Explain.	**04**
	(c)	Explain memory organization in PIC18F4xx with suitable diagram.	**07**
		OR	
Q.4	**(a)**	State the different types of pipeline hazards that can occur during execution and suggest one method to mitigate each.	**03**
	(b)	By using PWM method in microcontroller control the speed of DC motor.	**04**
	(c)	State different types of addressing modes of PIC18F4xx microcontroller and explain each with suitable example.	**07**
Q.5	**(a)**	State different types of logical operators in embedded C.	**03**
	(b)	Discuss characteristics of an embedded system.	**04**

(c) Draw and explain interfacing of a seven segment display with microcontroller. **07**

OR

Q.5 **(a)** Which are the different serial communication protocols used in embedded systems. **03**

(b) What is interrupt and polling? Explain. **04**

(c) WAP in C to display a count of 0 to 9 on 7 segment display with delay of 0.5 Sec. Consider XTAL - 12 MHz. **07**

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