Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3163207 **Date: 22/05/2026**

Subject Name: Microprocessor and Microcontroller

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)**	Define machine cycle, instruction cycle, and T-state.	**03**
	(b)	What is the role of assembler directive? Explain .SET and .EQU assembler directives with example.	**04**
	(c)	Explain the architecture of an AVR microcontroller. How does it differ from other micro-controller architectures like PIC and ARM?	**07**
Q.2	**(a)**	Explain the significance of the program counter (PC) and the status register (SREG) in an AVR microcontroller.	**03**
	(b)	What are the main functional blocks of an AVR microcontroller? Briefly explain the purpose of each block.	**04**
	(c)	Write the codes in assembly language programming for stepper motor interfacing separately with microcontroller.	**07**
		OR	
Q.2	**(c)**	Explain TCCR0 register, CALL, IJMP and RET Instruction with example for the AVR controller.	**07**
Q.3	**(a)**	How does the microprocessor differentiate among positive number, a negative number and a bit pattern?	**03**
	(b)	Tabulate the differences among Hardware, Software, Vectored and Non- Vectored interrupt.	**04**
	(c)	List the advantages and limitations of the I2C communication/ interface in detail.	**07**
		OR	
Q.3	**(a)**	How the 8085 processor differentiates a memory access (read/write) and 1/0 access (read/write)?	**03**
	(b)	What will be the contents of accumulator after the execution of following instructions: MVI A, B7H ORA A RAL	**04**
	(c)	Explain the operation and frame of I2C protocol.	**07**
Q.4	**(a)**	Describe the different memory types used in an AVR micro-controller (such as Flash, SRAM, EEPROM) and their respective usage.	**03**
	(b)	Differentiate between serial and parallel data transfer.	**04**

	(c)	Summarize the different blocks and their roles in architecture of 8085 Microprocessor.	**07**

OR

Q.4	**(a)**	List the flags of 8085 and after executing the below instructions which flags in the Flag Register will get affected? MVI A,00 MVI B,0F ADI 0C	**03**
	(b)	What is I2C clock stretching, bus arbitration and clock synchronization?	**04**
	(c)	Explain the various modes of operation in 8051 Micro-controller.	**07**
Q.5	**(a)**	With suitable examples explain the addressing modes and instruction sets of 8051.	**03**
	(b)	What are the different types of addressing modes available in assembly language?	**04**
	(c)	Draw and explain internal architecture of AVR ATmega32 micro-controller.	**07**

OR

Q.5	**(a)**	How many bits need to be set for a Timer/Counter 1 Overflow interrupt to be triggered and What triggers a Timer/Counter 1 Overflow Interrupt?	**03**
	(b)	After a byte is written to the SPI Data Register, we can poll the SPI interrupt flag (bit) in the SPI status register (SPSR) to find out when the byte has been transmitted. Write a subroutine to wait for the end of transmission.	**04**
	(c)	With suitable diagram explain the LCD interfacing with 8051 micro-controller.	**07**

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