Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2021

Subject Code:2150306 Date:14/12/2021

Subject Name:Microcontroller & Interfacing (Biomedical)

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)**	List the applications of microcontrollers.	**03**
	(b)	Explain in detail the PSW (program status word) register of 8051.	**04**
	(c)	Discuss the differences between microprocessors and microcontrollers.	**07**
Q.2	**(a)**	Copy the contents of registers R0 to R7 into internal RAM addresses 40H to 47H respectively using PUSH instructions. Assume bank 0 is selected.	**03**
	(b)	Explain how contents of Accumulator and B registers can be stored and retrieved from the stack.	**04**
	(c)	What is meant by term "addressing mode"? List addressing modes supported by the 8051 with suitable examples.	**07**
		OR	
	(c)	Explain Serial Communication in microcontroller.	**07**
Q.3	**(a)**	Find the time required to execute (or delay generated by) the following instructions. Assume crystal frequency is 12 MHz. MOV R0, #249 THERE: NOP NOP DJNZ R0, THERE NOP NOP NOP	**03**
	(b)	Write a program to add three numbers stored at internal RAM address 10H, 11H and 12H and store the lower byte of result into internal RAM address 20H and upper bits into 21H	**04**
	(c)	Explain electromechanical relays. Discuss its interfacing with 8051 microcontrollers.	**07**
		OR	
Q.3	**(a)**	Explain the difference between RET and RETI instructions.	**03**
	(b)	Explain the difference between LCALL and ACALL for subroutine invocation? Which one is faster in execution and why?	**04**
	(c)	Write a program to multiply two 16 bit numbers and display the result at output PORT1 and PORT2.	**07**
Q.4	**(a)**	List out various data types for 8051 Microcontroller.	**03**
	(b)	Explain the different types of jumps supported by 8051 architecture. Which one is faster in execution and why?	**04**
	(c)	Write a subroutine to a convert 8-bit binary number stored in the Accumulator into an equivalent BCD number.	**07**
		OR	

Q.4	**(a)**	Assuming that 8 LEDs are connected to port 1, write a C program to flash LEDs 100 times.	**03**
	(b)	Assume that switch SW is connected to P1.7 and LED is connected to P1.0. Write a program that monitors switch SW and when it is pressed, it flashes the LED five times.	**04**
	(c)	Interface a unipolar stepper motor with the 8051 using a suitable driver circuit and write a program to rotate the stepper motor in clockwise direction using full-step sequence.	**07**
Q.5	**(a)**	Explain TMOD register in detail.	**03**
	(b)	Write a program to generate a square wave of 1 KHz frequency on P2.0. Assume crystal frequency = 11.0592 MHz.	**04**
	(c)	Interface 16 x 2 LCD module with the 89C51 and develop a program to display message 'GTU' at the beginning of the first line.	**07**

OR

Q.5	**(a)**	What are the ways to increase the baud rate of data transfer in 8051?	**03**
	(b)	Design counter for counting the pulses of an input signal. The pulses to be counted are fed to pin P3.4 assume XTAL = 12 MHz	**04**
	(c)	Assume that switch SW is connected to the pin P2.0 and P1.0 is connected to the input of half-bridge (Point A in Figure 20.11) and P1.1 is connected to the input of another half-bridge (Point B). Write a program to monitor the status of SW, if SW = 1, rotate the dc motor in a clockwise direction, or if SW = 0, reverse the direction of the motor.	**07**

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