Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160914 Date: 20-05-2025

Subject Name: Microprocessors and Microcontrollers

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.**

			MARKS
Q.1	**(a)**	Define T-state, machine cycle and instruction cycle. Draw the timing diagram for the 8085 instruction IN AA h.	**03**
	(b)	What are Tri-state devices and why are they essential in a bus oriented system?	**04**
	(c)	Draw and Explain the functional block diagram 0f 8085.	**07**
Q.2	**(a)**	Explain following pins of 8085. (i) ALE (ii) SOD (iii) TRAP	**03**
	(b)	Differentiate between following instructions of 8051. (i) RET & RETI (ii) MOVX & MOVC	**04**
	(c)	Discuss the internal RAM structure of 8051. Explain SFR space in detail.	**07**
		OR	
	(c)	Write a 8051 C program to generate a delay of 1 ms using timer0 in Mode1. Utilize this delay routine to blink LED connected at pin number 0 of Port P_2 with a ON time of 1 sec and OFF time of 1 sec. Assume crystal frequency to be 11.0592 MHz.	**07**
Q.3	**(a)**	Differentiate between PUSH and POP operation for 8051.	**03**
	(b)	Explain the role of TCON & SCON registers in 8051.	**04**
	(c)	Write advantage of embedded C programming over assembly language. Discuss the data types used in 8051 embedded C language.	**07**
		OR	
Q.3	**(a)**	Draw & explain the physical port structure of port P_3 of 8051.	**03**
	(b)	List out the various interrupt in 8051 μc. How the default priority of an interrupt can be changed?	**04**
	(c)	Write 8051 assembly language program to exchange a number stored at external memory location 2000h with number stored at external memory location 2001h.	**07**
Q.4	**(a)**	Discuss the auto-reload Mode2 of timers in 8051. What are the advantages of this mode?	**03**
	(b)	Explain any two bit wise instructions of 8051 with suitable example.	**04**
	(c)	Define baud rate for serial communication in 8051 μc. Explain Mode0 and Mode1 for serial communication in 8051 μc.	**07**
		OR	
Q.4	**(a)**	Explain IE register in brief.	**03**
	(b)	Write the bit configuration of PCON register of 8051. Also explain function of each bit.	**04**
	(c)	Compare the difference between the ARM and 8051 μc. Also state various applications of ARM microcontroller.	**07**

Q.5	**(a)**	Draw and explain each bit of current program status register of ARM processor.	**03**
	(b)	Discuss how stepper motor can be interfaced with 8051 using detailed block diagram.	**04**
	(c)	Discuss the interfacing of ADC 0808 and 8051 with detailed schematic diagram.	**07**

OR

Q.5	**(a)**	Draw a diagram of 4*4 Matrix keyboard interfacing with 8051.	**03**
	(b)	Draw an interfacing of 8051 with 16 K of external RAM.	**04**
	(c)	Draw and explain an interfacing of 4 digit seven segment display with 8051.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160914 Date:15-05-2024

Subject Name:Microprocessors and Microcontrollers

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.**

			MARKS
Q.1	**(a)**	State the size of address and data bus in 8085. Explain how they are multiplexed?	**03**
	(b)	State the difference between Van Neumann and Harvard architecture	**04**
	(c)	Draw and discuss the timing diagram of MVI instruction of 8085 microprocessor	**07**
Q.2	**(a)**	Answer the following: (i) Which port in 8051 cannot be used for any dual function? (ii) Give the names of hardware and software interrupts of 8051. (iii) How much RAM and ROM is available internally in 8051?	**03**
	(b)	Give the function of the following pins of 8051. (i) TXD (ii) EA	**04**
	(c)	Draw and explain architectural block diagram of 8051	**07**
		OR	
	(c)	Write an ALP to separate out positive, negative and zero numbers in an array in external memory starting from 3000H. The array is 10 bytes long. Store the count of positive, negative and zero numbers in internal RAM location 30H, 31H and 32H	**07**
Q.3	**(a)**	It is required to select register bank 3 in 8051. Explain how it can be done?	**03**
	(b)	If A = $(17)_{10}$ and B = 3, what will be the data in registers A and B when the following instructions are executed (i) MUL AB (ii) DIV AB. What will be status of OV flag in both the cases?	**04**
	(c)	Draw and explain the internal structure of P0 and P1 in 8051	**07**
		OR	
Q.3	**(a)**	Draw the internal RAM structure of 8051	**03**
	(b)	Explain the following instructions of 8015 giving examples	**04**

(i) CJNE (ii) XRL

	(c)	Draw and explain the format of TCON and TMOD register. State the function of each and every bit	**07**

Q.4	**(a)**	Assume that Timer 1 is operating in mode 2 and the count loaded in timer is F3H. After how much time, timer overflow flag TF1 will get set? Assume XTAL = 10 MHz	**03**
	(b)	Write an 8051 C program to toggle all the pins of port 1 continuously with some delay	**04**
	(c)	Write an assembly language program to transmit the message "GTU" serially at 9600 baud, 8 bit data, 1 stop bit. Do this continuously	**07**

OR

Q.4	**(a)**	Explain SCON and SBUF registers of 8051	**03**
	(b)	Write an 8051 C program to toggle pin P1.5 every 50 ms. Use XTAL = 11.0592 MHz. Use Timer 0 in mode 1 to generate the delay	**04**
	(c)	Explain IE and IP registers of 8051. State the priorities of interrupts. If IP contains 08H, will the default priorities change? Discuss.	**07**

Q.5	**(a)**	How many general-purpose registers are available in ARM in user mode? Also explain the function of SP, PC and LR registers in ARM.	**03**
	(b)	Draw how 4 × 4 matrix keyboard is interfaced with 8051	**04**
	(c)	Explain how LCD can be interfaced with 8051? Discuss the commands that are required to be given to initialize the LCD. Write an ALP to display "YES" on first line of LCD	**07**

OR

Q.5	**(a)**	Explain the difference between RET and RETI instruction	**03**
	(b)	Explain CPSR format in ARM	**04**
	(c)	Explain how external 8K ROM can be interfaced with 8051? Draw the connection diagram. Also discuss the function of ALE signal.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160914 Date:04-07-2023

Subject Name:Microprocessors and Microcontrollers

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**

			MARKS
Q.1	**(a)**	Give answer to below questions (1) Which machine cycles are used to execute the instruction MOV B, M ? (2) The addressing mode of MOV A,@R_1 instruction is _____. (3) Which timer and mode are used for serial communication?	**03**
	(b)	List out differences between Microprocessor & Microcontroller.	**04**
	(c)	Draw the architecture block diagram of 8085 and explain flag register in detail.	**07**
Q.2	**(a)**	Describe the function of following pins of 8085 (1) INTA (2) ALE (3) Reset IN	**03**
	(b)	List out the differences between RISC & CISC architecture.	**04**
	(c)	Draw and explain the timing diagram of MOV M, D instruction of 8085.	**07**
		OR	
	(c)	What is multiplexing? Explain multiplexing for address and data bus for 8085 microprocessors with neat diagram.	**07**
Q.3	**(a)**	Explain the difference among MOV, MOVC and MOVX instructions.	**03**
	(b)	Draw the TMOD register and write down the steps to program one of the timers in mode1 for generating specific time delay.	**04**
	(c)	Write a program to generate 50Hz frequency signal on Pin 2.3 with the crystal frequency of 11.0592MHz using Timer 0.	**07**
		OR	
Q.3	**(a)**	Explain PSW register of 8051 in detail.	**03**
	(b)	List out different conditional jump instructions and explain any two with example.	**04**
	(c)	Write a program to find maximum number from a block of five, 8-bit numbers stored from the memory location 30h and store the result at 40h memory location..	**07**
Q.4	**(a)**	Explain the difference between RLC A & RRC A instruction.	**03**
	(b)	List out different assembler directives and explain any two in detail.	**04**
	(c)	Write an assembly language program to convert 8-bit two-digit BCD number system into hexadecimal number system.	**07**
		OR	
Q.4	**(a)**	What is the use of SMOD bit in PCON register?	**03**
	(b)	Draw and explain SCON register for serial communication.	**04**
	(c)	Write a C program to generate a ramp waveform at port P1 using software delay.	**07**

Q.5	**(a)**	What is the use of Interrupt priority (IP) register? How one can change the interrupt priority?	**03**
	(b)	What is the use of MAX232 IC in serial communication? Explain the difference between MAX232 and MAX233 IC.	**04**
	(c)	Draw and explain the interfacing of common anode 7 segment display with 8051.	**07**

OR

Q.5	**(a)**	Draw and explain each bit of Current program status register of ARM processor.	**03**
	(b)	Interface matrix keyboard with 8051.	**04**
	(c)	Write a program to transmit a message “Best of Luck” serially at 9600 baud rate continuously using serial communication. Crystal Frequency :-11.0952MHz.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160914 Date:01/06/2022

Subject Name:Microprocessors and Microcontrollers

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.**

			MARKS
Q.1	**(a)**	List various processing modes of ARM processors with classification.	**03**
	(b)	With diagram explain complete ARM register set.	**04**
	(c)	A 10 bytes of data string is stored at starting from memory location 40h. Write an assembly language program for 8051 microcontroller to transfer this data string to memory location starting from 50h in reverse order.	**07**
Q.2	**(a)**	Explain the function of following pins in 8085 µp: HLDA & HOLD	**03**
	(b)	Illustrate how address/data lines AD0-AD7 are de-multiplexed in 8085 µp?	**04**
	(c)	A byte is stored in external memory location 2005H. Write an 8051 µc assembly language program to count number of 0's and 1's in. Draw flowchart.	**07**
		OR	
	(c)	Draw and explain timing diagram of instruction STA 2000H of 8085 µp.	**07**
Q.3	**(a)**	Explain 8051 program status word (PSW) register in brief.	**03**
	(b)	Discuss various addressing modes of 8051 microcontroller assembly language programming.	**04**
	(c)	Write a 8051 assembly language program to generate a square wave of 1.5 kHz frequency at P2.0 using Timer 0 in Mode 1 with crystal frequency of 12 MHz.	**07**
		OR	
Q.3	**(a)**	Explain editor, assembler, compiler and linker	**03**
	(b)	Explain all the bits of TCON register**.**	**04**
	(c)	Explain the Interrupt facility of 8051 microcontroller using IE and IP register. Also mention the internal priority of Interrupt and their vector locations.	**07**
Q.4	**(a)**	Write C program to get bit P1.0 and send it to P2.1 after inverting it.	**03**
	(b)	Explain interfacing of DC motor using H-bridge circuit with 8051 microcontroller.	**04**
	(c)	Write an 8051 program in embedded C to blink the LED connected to pin P1.5 at a suitable delay interval.	**07**
		OR	
Q.4	**(a)**	C programming is more preferred over assembly programming for 8051 µc. Justify your answer with proper reason.	**03**
	(b)	Explain interfacing of 8051 with ADC 0808.	**04**
	(c)	What is an assembler directive? Give at least four examples of assembler directives and explain function of each in brief.	**07**

Q.5 **(a)** Explain basic differences (1) Van neuman and Harvard architecture (2) CISC and RISC. **03**

(b) How baud rate can be set in 8051 microcontroller for serial communication? **04**

(c) Explain and Differentiate between the following instructions of 8051 microcontroller. **07**

(i) SWAP and XCHG (ii) MOVX and MOVC

(iii) Bit level ANL and byte level ANL

OR

Q.5 **(a)** Explain advantages of IDE in program development. **03**

(b) Write a short note on available data types in embedded C. **04**

(c) Explain every step of the following program and also calculate the frequency of the square wave generated at the end of program execution. (assume crystal frequency = 11.0592MHz) **07**

```
        MOV TMOD, #20H
        MOV TH1, #4H
        SETB TR1
L1      : JNB TF1, L1
BACK: CPL P1.5
        CLR TF1
        SJMP BACK
```

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