

IV SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER EXAMINATIONS, MAY 2023

MICROCONTROLLERS [ELE 2254]

REVISED CREDIT SYSTEM

	REVISED GREDH STSTEIN						
Time: 3 H	Irs. Date: 29 MAY 2023	Max. Marks: 50					
Instructio	ns to Candidates:						
*	Answer ALL the questions.						
*	Missing data may be suitably assumed.						
1A.	Illustrate the bit pattern in the PSW register of 8051 after the	e (02)					
	addition of signed decimal numbers -/U and -8U.						
1B.	Analyze the given program and show the working of STACK and values stored in Stack and Program-Counter at each stage during its execution.	d g					
	PC Instruction						
	ORG 0000H						
	0000 MOV A,#55H						
	0002 MOV R4,#99H						
	0004 MOV P1,A						
	0006 MOV R5,#67H						
	0008 LCALL DELAY						
	0302 MOV R3 #0FFH						
	0304 RFT						
	END	(04)					
10	Illustrate how increment and decrement instructions modify th	2					
10.	apprende in the given 8051 accombly language program	e					
	ORG 0000H						
	MOV A.#0FFH						
	MOV R5,#10H						
	MOV R4,#10						
	MOV R0, #20H						
	MOV 20H, A						
	INC A						
	DEC R5						
	DEC R4						
		(03)					
		()					

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2A. Three different approaches to execute a part of a program to perform a specific task using 8051 instructions are as shown below.

Approach 1	Approach 2	Approach 3
MOV 0E0H,#08H	ORL PSW,#08H	CLR PSW.4
MOV PSW, 0E0H	ANL PSW,#0EFH	SETB PSW.3

Identify the task performed and suggest the most efficient program in terms of memory requirement and speed of execution.

(Hint: All bit manipulation instructions are of 2 bytes and other instructions are of 3 bytes)

(03)

2B. Determine the amount of delay in execution of following 8051 assembly language programs. (XTAL frequency of 12 MHz)

ORG 0000H

MOV R3,#78H NOP LOOP3:MOV R2,#0FH LOOP2:MOV R1,#99H LOOP1:NOP DJNZ R1,LOOP1 NOP DJNZ R2,LOOP2 DJNZ R3,LOOP3 END

2C. A manufacturing industry requires a setup to count and enable packaging a set of 100 devices passing through a conveyor belt of manufacturing assembly line as shown below. A delay of 10s is required between each such packaging process and then restart conveyor line to repeat the process continuously. write an 8051-assembly language program to implement the

process.



(03)

(04)

3A An ADC is connected to 8051 to capture digital equivalent of the analog signal connected to channel 5. The system is configured to operate the EOC of ADC to trigger an external interrupt to 8051 as shown in figure. Design and draw the necessary interfacing diagram and write an 8051 ALP to store 100 samples of digital data starting from RAM location 55H onwards using interrupt driven method.



- **3B** Interface a 16X2 LCD to 8051 and write an assembly language program to display "MC-EXAM" in middle positions of line 2.
- Discuss the significance of TI, RI flags, and SCON and SBUF **3C** register w.r.t multibyte data transfer using 8051.
- **4A** Interface a 2X3 matrix keyboard to 8051 and write an 8051 program to scan the keys, detect the key pressed and display the ASCII code of the key pressed at port '0'. Use software debouncing technique.

(Use P1.0, P1.1 for rows and P2.0, P2.1, P2.2 for column connections)

		KEY LAYOUT		DUT			
		А	В	С			
		D	Е	F		(05)	
4B	The bits D6 and D7 of CPSR register is cleared using a relevant instruction and the ARM7 microcontroller was interrupted to handle a critical situation. For the given scenario, draw the ARM register banking details for the corresponding mode of operation clearly indicating the visible and banked out registers. (0						
4C 5A	Write ARM instructions to extract uppermost byte of register R2 and put it as the lower most byte of register R3. Write an ARM ALP to multiply two 32-bit numbers available in memory locations 0X9004 – 0X9007 and 0X9008- 0X900B. Add the 64 bit product to another 64 bit number stored in 0X900C – 0X900F and 0X9010 – 0X9013. Store the 64-bit result in the next						
	eight locations.	!	I-			(04)	
5B	write an ARM ALP to ca $\overline{C.D}$ Assume that A,B,C,	D are	in R1,	, R2, F	Calculation of $F = A \cdot B + R^2$, R4 respectively.	(03)	
50	Write an ARM assembly	v prog	iram t	o con	npute the factorial of a		

write an ARM assembly program to compute **5C** positive number (>1) stored in register R0 and save the result in (03) register R1.

(04)

(04)

(02)