Question Paper

Exam Date & Time: 06-Dec-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH. DEGREE EXAMINATIONS - NOVEMBER / DECEMBER 2023
SUBJECT: ECE 3153- MICROPROCESSORS

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

1A)	With a neat bit format diagram of program status register explain the condition flags.	(4)
1B)	Elaborate on the interrupts/exceptions available in the vector table. Also mention the address of each interrupt.	(3)
1C)	What are the advantages of using subroutine? Elaborate the ways to pass a parameter to a subroutine.	(3)
2A)	Describe all the addressing modes used by LDM/STM instructions with relevant example. Trace the content of memory locations after executions of following instructions: i) STMIA R0!, {R1-R2} ii) STMIB R0!, {R1-R2} iii) STMDA R0!, {R1-R2} iv) STMDB R0!, {R1-R2} Assume the following same PRE conditions for all the instructions: R0=0x40001000, R1=0xABCDEF89 R2=0x1A2B3C4D	(4)

2B)	What will be the final content of the affected registers and memory, after the execution of each of the following sequence of ARM 7 instructions? Show all the calculations and mention the status of the flags wherever applicable.
	
	LDR R1, [R0], #0x4
	LDR R2, [R0]
	LDR R3, =0x87655678
	LDR R4, =0x12344321
	RSBS R5, R1, R2
	SBC R6, R3, R4
	Given pre-conditions:
	R0 = 0x00004000 R7 = 0x00004004
	0x00004000: 0xAB120000
	0x00004004: 0x31C80000
	0x00004008: 0x53907123
		(3)

2C)	Write an embedded C program instruction equivalent to the ARM7 code given below:
	`MOV R4, #100`
	`MOV R5, #1`
	`REPT SUB R4, R4, R5`
	`CMP R4, #0`
	`BNE REPT`
		(3)

3A)	Write an algorithm and Assembly Language Program in ARM 7 to find the largest number in an array of 32-bit numbers. Store the result in memory location.	(4)

3B)	Write an assembly language program in ARM 7 to evaluate the following logical expression: $F = (A \cdot \overline{B \oplus C}) \cdot D + E$ Assume that A-E are 16-bit binary numbers stored in the memory. Store the result in the memory location. Also compute and write the result after the execution of each instructions.	(3)
3C)	What are the differences between MACROs and Procedure? Explain the MACRO and PROC directive with proper syntax and example.	(3)
4A)	A 2x16 LCD is interfaced to LPC2148 through the PORT 0 lines. Write an embedded C program with comments to explain the logic for displaying the message "ALLTHE BEST". Draw the interface diagram.	(4)
4B)	Outline the architectural features of LPC 2148 with major specifications.	(3)
4C)	What are the registers available in LPC2148 for selection of port pins functionality? Discuss their role with suitable example to select the pin functionality with the help of a diagram and a function table.	(3)
5A)	When handling interrupts, why the link register must be adjusted before returning from the exception? Describe the same for IRQ interrupt processing in ARM 7 pipeline with timing diagram.	(4)
5B)	Draw the block diagram of Cortex-M3 and explain the function of each block.	(3)
5C)	Calculate the bit-band alias address of 5th bit of the bit-band byte present at the address 0x20002233, in Cortex M3. Write the ARM7 instructions to make the specified bit '0' and '1' separately.	(3)

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