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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: EEE, ECE, ETE, EIE, MDE **Duration: 3 hrs.**
Course Code: 23ES4PCAPP **Max Marks: 100**
Course: ARM Processor and Programming

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		MODULE - I	*CO*	*PO*	Marks
1	a)	Define the basic processing unit and its main components in an ARM processor.	*CO1*	*PO1*	**06**
	b)	Draw the ARM core data flow model and explain in brief	*CO1*	*PO1*	**08**
	c)	Assume that an opcode is generated for the instruction ADD R1, R2 is EA34BC23. Show with neat diagram how is it stored in the memory using (i) big endian mode (ii) little endian mode. Assume the starting address is 0x00000040	*CO1*	*PO1*	**06**
		MODULE - II			
2	a)	Explain the advantage of using Load /Store architecture? WITH EXAMPLE	*CO2*	*PO1*	**06**
	b)	Write a ALP to find the sum of first 10 natural numbers in ascending order	*CO2*	*PO1*	**08**

	c)	Intepret the Operation Performed by the following segments comment on branch instructions.
		a. CMP r3,#0
		BEQ skip
		ADD r0,r1,r2
		skip
		
		b. CMP r0, # 5
		BEQ BYPASS
		ADD r1, r1, r0
		SUB r1, r1, r2
		BYPASS
			CO2	*PO1*	**06**

		OR			
3	a)	List and explain any five assembler directives and mention their role in programming	*CO2*	*PO1*	**06**
	b)	How to switch between ARM mode and Thumb mode? Explain	*CO2*	*PO1*	**06**
	c)	The following code represents an ALP for an algebraic	*CO2*	*PO1*	**08**

			expression is a function of three variables x1, x2, and x3 in registers R0, R1, and R3 respectively. Debug the following code for syntax errors, correct the errors if any, and obtain the algebraic equation implemented in the code.
			
			AREA PGM , CODE, READWRITE
			ENTRY
			ADD R0, R0,R1, LSL, #2
			MOV R3, #5
			MLA R0, R2 R3, #R0
			SUBB R0, R0 #27
			MOV R0 R0, ASR 3
			B1 B B1
			END			

			MODULE - III			
4	a)		Explain how efficiently C datatypes are used in embedded C programming	*CO3*	*PO1*	**05**
	b)		Define compiler optimization. How is it generated through embedded C programming?	*CO3*	*PO1*	**05**
	c)		Develop an embedded C code for the calculation of checksums of a data packet containing 64 words to justify that use of "int" type local variables avoid unnecessary casts.	*CO3*	*PO1*	**10**
			OR			
5	a)		Interpret the benefits of loop unrolling with an example	*CO3*	*PO1*	**05**
	b)		What is the guidance for writing loops effectively	*CO3*	*PO1*	**05**
	c)		Using the checksum function written in C for N items of integer data, analyze with corresponding assembly code how the use of a DO-WHILE loop provides a more efficient implementation than a for-loop using a countdown counter.	*CO3*	*PO1*	**10**
			MODULE - IV			
6	a)		How does Stack get utilized during subroutine Call in ARM Assembly level programming with the help of PUSH and POP instruction? Explain	*CO4*	*PO2*	**06**
	b)		Interpret the steps involved in handling the exceptions	*CO4*	*PO2*	**06**
	c)		Develop the code to enable and disable IRQ interrupts with appropriate comments	*CO4*	*PO2*	**08**
			MODULE - V			
7	a)		Explain PINSELECT Register of LPC2148	*CO5*	*PO2*	**05**
	b)		Develop an Embedded C program to generate a square wave using the DAC available in the LPC2148 with appropriate comments	*CO5*	*PO2*	**07**
	c)		Elaborate on the system memory map of LPC 2148 ARM Microcontroller	*CO5*	*PO2*	**08**

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