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

Autonomous Institute Affiliated to VTU

## December 2023 Supplementary Examinations

**Programme: B.E.**

**Branch: EEE/ECE/EIE/ETE/MD**

**Course Code: 22ES4PCAPP**

**Course: Arm Processor and Programming**

**Semester: IV**

**Duration: 3 hrs.**

**Max Marks: 100**

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

<b>MODULE - I</b>			<b>CO</b>	<b>PO</b>	<b>Marks</b>	
<b>Important Note:</b> Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.	1	a)	With a neat block diagram, interpret the functional units of a computer	CO1	PO1	<b>06</b>
		b)	Analyze the bus structure of a computer system with a neat diagram, indicating the significance of each bus and the direction of dataflow	CO2	PO2	<b>06</b>
		c)	The table below shows the address and values of memory locations to store a 32 bit number 0x78563412. What are the minimum address lines required for generating these addresses? Realize the table given below and illustrate communication between processor and memory for Read/Write operation.	CO2	PO2	<b>08</b>
<b>MODULE - II</b>						
<b>Important Note:</b> Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.	2	a)	With the help of ARM data flow model, elaborate on the working of ARM core.	CO2	PO2	<b>06</b>
		b)	How three stage pipelining of RISC is implemented in ARM processor? Explain with an example.	CO2	PO2	<b>07</b>
		c)	Analyze the following instructions and write appropriate addressing mode and output after the execution of the instruction Given: r0 = 0x00004000, r1 = 0x00080000, mem32[0x00080000] = 0x02020202 mem32[0x00008004] = 0x03030303. a) LDR r0, [r1] b) LDR r0, [r1, #4] c) LDR r0, [r1, #4]! d) STR r0,[r1,#12]	CO2	PO2	<b>07</b>

<b>OR</b>					
3	a)	Identify the addressing mode and differentiate operation of the following instructions with an example each. a) LDR R1, [R0, #0x4] b) STR R1, [R0], #0x4	CO2	PO2	<b>06</b>
	b)	Develop an Assembly Language program to compute the sum of two 32 bit numbers 0x12345678 and 0x3456abcd and save the sum in memory location. Assume that the two numbers are stored in consecutive memory locations starting from 0x40000000. Use Load/Store instructions.	CO2	PO2	<b>06</b>
	c)	Develop an Assembly Language program to compute Addition of first 10 integers starting from 1. Use conditional Loop to perform addition.	CO2	PO3	<b>08</b>
<b>MODULE - III</b>					
4	a)	List Embedded ‘C’ data types. What is the significance of data type ‘short’ in Embedded ‘C’ programming?	CO3	PO3	<b>06</b>
	b)	Following ‘C’ code segment illustrates loop with incrementing count. Generate equivalent Assembly Language code and comment on the loop counter being an up-counter.  int checksum(int *data) { unsigned int I; int sum=0; for(i=0;i<64;i++) { sum+=*(data++); } return sum; }	CO3	PO3	<b>07</b>
	c)	How compiler does allocate register in Embedded ‘C’ programming during procedure call? Explain	CO3	PO2	<b>07</b>
<b>OR</b>					
5	a)	What do you mean by compiler optimization? How is it attempted through Embedded ‘C’ programing?	CO3	PO3	<b>06</b>
	b)	Develop an Embedded ‘C’ program to illustrate loop with pointer by considering addition of five 16 bit numbers	CO3	PO3	<b>08</b>
	c)	Develop an Embedded’ program to implement function call. Also comment on passing the parameters to function.	CO3	PO3	<b>06</b>

<b>MODULE - IV</b>					
6	a)	What is stack? How do you access Stack using LDM and STM instructions? Explain Stack Operation in general	CO4	PO4	<b>06</b>
	b)	How are subroutines different from Interrupt service routines? Explain the sequence of operations whenever any of the Exceptions are activated in ARM processor?	CO4	PO4	<b>07</b>
	c)	How many external interrupt lines does the ARMTDMI have? If you have eight interrupting devices , how would you handle this?	CO4	PO4	<b>07</b>
<b>MODULE - V</b>					
7	a)	With the help of a block diagram, bring out the significance of any three peripheral modules of the LPC2148 Embedded controller	CO5	PO3	<b>07</b>
	b)	What do you mean by memory mapped peripherals? Configure different registers of UART to transmit a character continuously using LPC2148 controller.	CO	PO	<b>06</b>
	c)	Using a D/A converter, develop an Embedded ‘C’ program to generate a square wave with LPC2148 controller.	CO	PO	<b>07</b>

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