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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

USN | | | | | | | | | | |

24CS44

Fourth Semester B.E. Degree Examination, May 2026
MICROCONTROLLER

TIME:3 hrs. Max.Marks:100

Note: 1. Answer **any FIVE** full questions, choosing **ONE** question from **each MODULE.**
2. M: Marks, L: Bloom's level,C: Course outcomes.
3. Assume missing data suitably.

		Module-1	M	L	C
Q.1	a	Differentiate between a microprocessor and a microcontroller.	5	L1	CO1
	b	Explain the structure of the Current Program Status Register (CPSR) with the help of a neat diagram.	8	L2	CO1
	c	Describe the AMBA bus protocol utilized in ARM processors.	7	L2	CO1
		OR			
Q.2	a	Differentiate between RISC and CISC architectures.	5	L1	CO1
	b	Explain the Harvard architecture with TCM, supported by a neat diagram.	8	L2	CO1
	c	Compare the ARM, Thumb, and Jazelle instruction sets with suitable examples.	7	L2	CO1
		Module–2			
Q.3	a	Explain the working of a barrel shifter with the help of a neat diagram.	6	L2	CO2
	b	Describe the single register transfer addressing modes using the LDR instruction, with suitable examples.	9	L2	CO2

	c	Given that register R0 contains 0x00000000 and R1 contains 0x00000005, determine the final values of R0 and R1 after the execution of an ADD instruction.
		`PRE r0 = 0x00000000`
		`r1 = 0x00000005`
		`ADD r0, r1, r1, LSL #1`
			5	L3	CO2

		OR			
Q.4	a	Explain how forward and backward branching are implemented in ARM Assembly Language Programs (ALP), with suitable examples.	6	L2	CO2
	b	Describe the following comparison instructions in the ARM processor with examples: (a) CMN (b) CMP (c) TEQ.	9	L2	CO2
	c	Write an ARM Assembly Language Program to perform multiplication of two 16-bit binary numbers.	5	L3	CO2
		Module–3			
Q.5	a	Write a C program for an ARM microcontroller using KEIL to sort a list of numbers in ascending order using the bubble sort technique.	6	L3	CO3

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	b	Explain the different types of structure arrangements in C and describe how the ARM compiler efficiently aligns data types.	8	L2	CO3
	c	Illustrate the concept of loop unrolling with an appropriate example program.	6	L2	CO3
		OR			

Q.6	a	Consider a function that increments two timer values by a specified step amount (pointer aliasing). Develop the corresponding ARM compiled code for this function.
		`void timers_v1(int *timer1, int *timer2, int *step)`
		`{`
		`*timer1 += *step;`
		`*timer2 += *step;`
		`}`
			6	L3	CO3

	b	Explain the portability issues encountered when migrating C programs to an ARM platform.	8	L2	CO3
	c	List and describe the basic C data types used in ARM architecture.	6	L2	CO3
		Module–4			
Q.7	a	Explain a 4KB, 64-way set-associative data cache (D-cache) using content-addressable memory (CAM), with a neat diagram.	9	L2	CO4
	b	Illustrate the relationship between the processor core, cache memory, and main memory.	5	L2	CO4
	c	Describe various cache replacement policies with suitable examples.	6	L2	CO4
		OR			
Q.8	a	Explain the concept of thrashing and how it occurs in a direct-mapped cache, with a neat diagram.	9	L2	CO4
	b	Describe logical cache and physical cache with the help of an appropriate diagram.	5	L2	CO4
	c	Explain the different write policies used in cache memory.	6	L2	CO4
		Module–5			
Q.9	a	Differentiate between transducers, sensors, and actuators by outlining their basic terminology.	5	L2	CO5
	b	Illustrate a typical IoT network ecosystem, including the various networking components from IoT nodes to the internet, with a suitable diagram.	8	L2	CO5
	c	Describe the different types of sensing commonly used in IoT systems.	7	L2	CO5
		OR			
Q.10	a	Explain the key characteristics of sensors used in IoT systems.	5	L2	CO5
	b	Describe the different address management classes utilized in IoT.	8	L2	CO5
	c	Explain the characteristics of actuators used in IoT applications.	7	L2	CO5

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