Reg. No.															

Question Paper Code	14510

M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Second Semester

M.E. - Embedded Systems Technologies

24PESPC203 – RISC PROCESSOR ARCHITECTURE AND PROGRAMMING

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	UART is mainly used for a) Parallel communication b) Serial communication c) Wireless communication d) Optical communication	1	K1	CO1
2.	To respond immediately when a button is pressed, the programmer should use a) Polling only b) Interrupts c) EEPROM access d) UART transmission	1	K2	CO1
3.	A programmer wants to generate a 1-second delay. Which peripheral should be configured? a) ADC b) Timer c) EEPROM d) Interrupt vector	1	K3	CO1
4.	ARM is mainly based on a) CISC b) RISC c) DSP d) FPGA	1	K1	CO2
5.	Which register stores the return address in ARM? a) PC b) SP c) LR d) CPSR	1	K2	CO2
6.	An ARM-based device needs quick response to external sensors. Which feature is essential? a) Interrupt handling b) EEPROM access c) Polling delay d) Cache disabling	1	K3	CO2
7.	Coprocessors are useful in ARM systems for a) Specialized mathematical operations b) Power reduction only c) Memory formatting d) UART communication	1	K1	CO3
8.	Thumb instructions may slightly reduce performance because a) Some operations require additional instructions b) Cache memory is removed c) Interrupts are disabled d) EEPROM is slower	1	K2	CO3
9.	A programmer wants to reduce firmware size without changing hardware. Which approach is suitable? a) Use Thumb instructions b) Increase cache size c) Disable interrupts d) Remove pipeline	1	K3	CO3
10.	Bootloader is mainly used for a) Increasing RAM b) Loading firmware c) Deleting memory d) Power management	1	K1	CO4
11.	In a real-time traffic control system, delayed interrupt response may cause a) Improved efficiency b) System failure c) Increased EEPROM size d) Faster execution	1	K2	CO4

12.	An IoT device receives remote firmware updates. Which software module handles startup loading? a) Bootloader b) ADC c) Cache d) Register file	*1*	*K3*	*CO4*
13.	Cache memory is mainly used to a) Increase execution speed b) Reduce memory c) Disable processor d) Increase voltage	*1*	*K1*	*CO5*
14.	An embedded banking system requires secure memory access. Which component is essential? a) MPU b) ADC c) UART d) EEPROM	*1*	*K3*	*CO5*
15.	Lookup tables are preferred when a) Faster predefined value access is needed b) Analog conversion is required c) Interrupts are disabled d) Memory protection fails	*1*	*K2*	*CO6*
16.	An ARM assembly program repeatedly executes instructions until a condition becomes false. This demonstrates a) Looping b) Paging c) Caching d) Interrupt masking	*1*	*K3*	*CO6*

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Apply and explain the use of UART communication in interfacing AVR microcontrollers with a PC.	*3*	*K3*	*CO1*
18.	Illustrate how interrupts are handled in ARM processors.	*3*	*K3*	*CO2*
19.	Compare ARM mode and Thumb mode with suitable applications.	*3*	*K4*	*CO3*
20.	Apply and explain the RTOS concepts in real-time embedded ARM applications.	*3*	*K3*	*CO4*
21.	Examine how cache memory improves execution efficiency.	*3*	*K4*	*CO5*
22.	Analyze the importance of assembly language in embedded system design.	*3*	*K4*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Apply the AVR memory organization concept to design an embedded system interfacing SRAM, EEPROM, and I/O ports with neat diagrams.	*11*	*K3*	*CO1*
		OR			
	b)	Illustrate UART communication techniques for serial data transfer between AVR microcontroller and PC.	*11*	*K3*	*CO1*
24.	a)	Demonstrate the working of ARM processor registers and pipeline stages.	*11*	*K3*	*CO2*
		OR			
	b)	Apply and explain interrupt handling techniques in ARM processors for embedded applications.	*11*	*K3*	*CO2*
25.	a)	Use Thumb instruction set architecture in ARM processors and explain its advantages with suitable examples.	*11*	*K3*	*CO3*
		OR			
	b)	Apply and explain Thumb mode programming techniques for developing memory-efficient ARM embedded applications.	*11*	*K3*	*CO3*

26.	a)	Analyze the significance of RTOS in ARM-based embedded systems.	*11*	*K4*	*CO4*
		OR			
	b)	Examine how exception handling improves reliability in embedded systems.	*11*	*K4*	*CO4*
27.	a)	Asses the design of a secure ARM-based embedded system using MPU and memory access permissions.	*11*	*K5*	*CO5*
		OR			
	b)	Evaluate a virtual memory management model using MMU and page table mechanisms in ARM systems.	*11*	*K5*	*CO5*
28.	a)	Evaluate the implementation of Hamming code in an ARM assembly language program for reliable data communication.	*11*	*K5*	*CO6*
		OR			
	b)	Evaluate the efficiency of an ARM assembly program designed for block copy and memory manipulation operations.	*11*	*K5*	*CO6*