Question Paper

Exam Date & Time: 03-May-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION-MAY 2023
IV SEMESTER B.Sc.(APPLIED SCIENCES) IN ENGG.

EMBEDDED SYSTEMS [ICS 241]

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

Answer all the questions.

Missing data if any, may be suitably assumed.

1)		Explain the features of RISC architecture used in ARM microcontrollers.	(3)
	A)		
	B)	Write a descriptive note on the General Purpose Registers in the ARM with diagrams.	(3)
	C)	Explain various ARM CPSR (Current Program Status Register) fields with relevant diagrams. Show the status of C and Z flags after the addition of (a) 0x0000009C and 0xFFFFFF64 in the following instruction: ADDS R2, R1, R2 (b) 0x0000009C and 0xFFFFFF69 in the following instruction: ADDS R2, R1, R2 Show the steps clearly.	(4)
2)		Explain ARM Logical Shift instructions used for unsigned operations with diagrams and examples.	(3)
	A)		
	B)	Explain multiply and accumulate instruction in ARM with suitable example.	(3)
	C)	Write an ARM assembly language program to find the 2's complement of 64 bit data in R0 and R1 registers. The R0 holds the lower 32 bit.	(4)
3)		Write a flow chart and corresponding program to (a) clear R0, (b) add 9 to R0 a thousand times, and then (c) place the sum in R4. Use the zero flag and BNE instruction.	(3)
	A)		
	B)	How conditional execution of ARM instructions are designed? Explain various ARM condition code Mnemonic Extensions, its meaning and flags affected.	(3)
	C)	Show how a computer would represent -5 in 2's complement for	(4)