Question Paper

Exam Date & Time: 30-Dec-2022 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH (IT) END SEMESTER MAKEUP EXAMINATIONS, DEC-JAN 2023

EMBEDDED SYSTEMS [ICT 3158]

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

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		With a neat diagram, explain how the stepper motor is interfaced with ARM microcontroller. Write an embedded C program to rotate the motor 20 steps in the anticlockwise direction.	(5)
	A)		
	B)	Illustrate the role of Shadow and Load Enable Registers in PWM.	(3)
	C)	Differentiate Software and Burst modes of ADC.	(2)
2)		Assume that output of a square wave generator with 50% duty cycle is connected to P2.12 (EINT2, Function-1). Write an embedded C program using external hardware interrupt to generate a square waveform at P0.4 with frequency one sixth of the frequency of the square waveform input at P2.12 and duty cycle 75%.	(5)
	A)		
	B)	Write an assembly language program to convert an 8-digit BCD number available in the data memory into hexadecimal and store result in the data memory.	(3)
	C)	Bring out the differences between Harvard and Von Neumann architecture.	(2)
3)		With a neat diagram, explain how a 16x2 LCD can be interfaced in 8-bit mode to the ARM microcontroller. Write an embedded C program to display the message "All is well" at the centre of the first line.	(5)
	A)		
	B)	Explain the following addressing modes of ARM microcontroller with an example for each. i. Post Indexed ii. Pre Indexed with writeback iii. Indirect	(3)
	C)	Write the assembly language statements to each of the following operations: i) To set the sign flag of the ARM microcontroller ii) To find the 2's complement of a 32-bit number available in register R0.	(2)
4)		With the aid of a neat diagram explain how 4 × 4 matrix keyboard can be interfaced to ARM microcontroller. Write an embedded C program to scan the keyboard for a key press and display the key code of the key pressed on the seven segment display.	(5)
	A)		
	B)	Write an embedded C program to simulate a 2-4 decoder assuming P.0-P0.3 as outputs and P0.4-	(3)

P0.5 as control inputs.

C) Given PCLK = 6 MHz and PR of Counter-0 is loaded with 5. The counter is configured to count at the positive edges of clock source connected to CAP0.1. What is the content of TC register of Counter-0 at the 32nd positive edge of clock input at CAP0.1 ? (2) (2)

5) Explain the following instructions with an example for each. (5)
i) SMLAL ii) LDM iii) RSCLT iv) TST v) STR

A)

B) Given the contents of registers R2= -4, R3= -9, R4= -12, R5= 25 and R13=0x10000030. Write the content of Stack Pointer after the execution of the instruction STMDB R13!, {R2-R5}. (3)

C) List and explain the role of various SFRs used in setting the baud for the serial communication. (2)

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