Question Paper

Exam Date & Time: 14-May-2022 (10:00 AM - 01:00 PM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY
VI SEMESTER B.TECH (COMPUTER AND COMMUNICATION ENGINEERING) END SEMESTER EXAMINATIONS, MAY 2022

EMBEDDED SYSTEMS DESIGN [ICT 3271]

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

Answer all the questions.

Missing data may be suitably assumed

1)		Explain the following ARM instructions with an example for each	(5)
	A)	a. RSCGT b. RRXS c. LDRH d. TEQ e. BMI	
	B)	Write an assembly language program to add ten 2-digit BCD numbers available in the code memory and store the BCD result in the RAM.	(3)
	C)	What is the role of Nested Vector Interrupt Controller in handling the interrupts.	(2)
2)		Assume that output of a square wave generator is connected to P1.29 (CAP 1.1, Function-3). Write an embedded C program to generate a square waveform on the P1.5 (MAT1.1, Function-3) with a frequency 1/12 of the frequency of the square wave input at P1.29.	(5)
	A)		
	B)	Explain with a neat diagram, how a stepper motor can be interfaced to a ARM controller. Write an embedded C program to rotate the stepper motor 100 steps in the anticlockwise direction.	(3)
	C)	List the features of CISC family of controllers.	(2)
3)		Explain the usage of the stack in a recursive function. Write an assembly language program to store the Fibonacci series up to "N" using recursion, where "N" is a two-digit hexadecimal number.	(5)
	A)		
	B)	Write an embedded C program using interrupts to generate a square wave of frequency 100 kHz with duty cycle of 60% on P0.0 using TIMER1 while simultaneously displaying the status of the switch connected to P2.3 on the LED connected to P0.2.	(3)
	C)	Identify the instructions used for implementing fully ascending stack and explain the role of each.	(2)
4)		Assume that columns of a 3x4 matrix keyboard are connected to P2.10 to P2.13 (Function- 3) and rows are connected to P1.0 to P1.2. Explain how this keyboard can be interfaced to ARM processor. Write an embedded C program using interrupts to display the key code of the key pressed on LEDs connected to P0.4 to P0.11.	(5)
	A)		
	B)	Exlain how to configure the LCD to 4-bit data line mode? .	(3)
	C)	Define	(2)

a. Software and Hardware mode of an Analog to Digital Converter

b. Resolution of an Analog to Digital Converter

5)	Define the term Addressing mode. Explain the various addressing modes of ARM microcontroller with an example for each.	(5)
A)		
B)	Explain various SFRs used in configuring external hardware interrupts.	(3)
C)	Write an assembly language program to check if the string stored in code segment is palindrome or not. Store 0xFF in the RAM if palindrome, else store 0x0	(2)

-----End-----