Question Paper

Exam Date & Time: 18-Jun-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JUNE 2024

EMBEDDED SYSTEMS DESIGN [ICT 3271]

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

Answer all the questions.

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

1)		What is an addressing mode? Explain different addressing modes of ARM with an example for each.	(5)
	A)		
	B)	What is the role of NIVC controller? Write a C program to read the status of the switch connected to P2.10 (function 1) and display LED connected at P2.1 using external interrupt.	(3)
	C)	Identify and explain the branch instructions used in the operation of signed numbers.	(2)
2)		Show how to create 2's complement of a 64-bit data in R0 and R1 register, with lower 32 bit stored in R0. With illustrations in register values explain indexed addressing modes with an offset of 8.	(5)
	A)		
	B)	Differentiate between software and hardware mode of ADC operation. Write a C program to enable AD0.2 (P0.5 function 3) in burst mode and display the digital result on LEDs connected to port pins P1.0 to P1.11 .	(3)
	C)	With an explanation discuss the special function operation of R14 and R15 in ARM.	(2)
3)		Interface a 3x3 keyboard with rows connected to pins P2.10-P2.12 and columns connected to pins 1.23-1.25 of a LPC1768 and display the row index (0-2) and column index (0-2) on two multiplexed seven-segment displays?.	(5)
	A)		
	B)	With an illustration explain Universal Asynchronous Transmitter and Receiver (UART), and pins used for transmission and reception.	(3)
	C)	Assume the content of the register R0=-2 and R1=5. What is the content of all the registers after the execution of an instruction SMULL R3, R4, R0, R1.	(2)
4)		Write a program to generate a sawtooth waveform of frequency 1KHz and peak to peak amplitude of 3V using DAC.	(5)
	A)		
	B)	Illustrate, with a clear diagram, the process of interfacing a stepper motor with an ARM controller. Additionally, write an embedded C program that rotates the stepper motor 80 steps in the anti-clockwise direction.	(3)
	C)	Explain the following instructions with example for each i. ASR ii. RRX .	(2)

5) Explain the following registers used in Timers (5)

A)

1. External Match Registers
2. Capture Control Registers
3. Match Control Registers
4. Counter/Timer control registers
5. Timer Control Register.

B) Consider R1= 0x100, with memory map illustration show the position of R1 after the execution of LDMDB R1!,{R2, R3}. Additionally, describe the working of ascending stack (3)

C) With a neat diagram explain actuator interfacing to the IoT Network (2)

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