Question Paper

Exam Date & Time: 09-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH. (INFORMATION TECHNOLOGY) DEGREE EXAMINATIONS - APRIL / MAY 2024
SUBJECT: ICT 2223/ICT_2223 - EMBEDDED SYSTEMS

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

Answer all the questions.

1A)	Illustrate the relationship between Timer Counter (TC), Prescale Register (PR) and Prescale Counter (PC) registers for LPC1768 timer with a suitable example. Calculate the Prescalar(PR) value for timer resolutions with 1 milli second resolution on a timer with 25 MHz PCLK.	(5)
1B)	WAP to simulate 4-digit BCD up counter on the multiplexed seven segment display.	(3)
1C)	With a suitable example explain BL and BX branch instructions.	(2)
2A)	Illustrate different external interrupts register with their functions.	(5)
2B)	What is "Double Buffering" in DAC? Explain the role of various Special Function Registers in double buffering.	(3)
2C)	Bring out the 4 differences between Harvard and Von Neumann architecture.	(2)
3A)	Write an embedded C program to display a 4-digit hexadecimal counter on the LCD. The port lines P0.23 to P0.28 are connected to the LCD.	(5)
3B)	Write an assembly language program to count the number of 1s and 0s in a 32-bit number given in the code memory, and store the result the data memory.	(3)
3C)	Considering only half word GPIO registers FIOMASK and FIOPIN, write two lines of code to send 0xB4 to P1.15-P1.8, without affecting the value of the other pins.	(2)
4A)	With illustration explain the pre-indexed and post indexed addressing modes. Considering R0=0x5, and R1= 0x200, determine the value of R1 after the execution of each line of code. i) STR R0, [R1, #12] ii) STR R0, [R1, #12]! iii) LDRH R0, [R1], #2	(5)
4B)	Write an embedded C program using serial interrupt to transfer the message "Inspired by life" serially on TxD0 (P0.2, function 2), at 9600 baud. Assume 1-start bit, 1- stop bit and 8-bit data. (PCLK=3 MHz)	(3)
4C)	Given the contents of registers R1= -1, R2= -4, R3= -9, R4= -29 and R13=0x10000020. Write the content of SP and R4 after the execution of the following block of code: STMDB R13!, {R1-R4} LDM R13, {R3-R6}	(2)
5A)	Write an assembly language program to add TWO 8-digit BCD numbers available in the code memory and store the BCD sum in the data memory.	(5)
5B)	What is PWM? What are the differences between single edge and double edge PWM? Explain the mechanism to control the intensity of an LED using PWM module.	(3)
5C)	Write a recursive function in assembly language to find the GCD of two, 2-digit hexadecimal numbers.	(2)

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