Question Paper

Exam Date & Time: 16-Jun-2022 (02:00 PM - 05:00 PM)

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

IV SEMESTER B. TECH (COMPUTER SCIENCE AND ENGINEERING)
END SEMESTER EXAMINATION, JUNE 2022
EMBEDDED SYSTEMS [CSE 2253]

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

Answer all the questions.

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

1)	A)	Demonstrate with appropriate figures, the store operation for the four types of stack in ARM. Assume that R1 holds the address 0x100; the address of the top of the stack. Store the contents of the registers R2 through R6.	(5)
	B)	Assume that two dates are stored in memory as follows: Date1 DCD mm, dd, yyyy Date2 DCD mm, dd, yyyy. Write an assembly language program to compare these two dates. If Datel comes after Date2, set register R0 to 1; else, set R0 to 0. Use sub-routine.	(3)
	C)	Write a program to set LOW the D0 bit of the SRAM location 0x20000005 using a) byte address b) the bit alias address 0x220000A0.	(2)
2)	A)	What should be the values stored in UART Fractional Divider Register (FDR), Divisor Latch LSB (UxDLL) and Divisor Latch MSB (UxDLM) registers to obtain a UART baudrate of 38400 at a peripheral clock frequency of 75 MHz? Write the Embedded C statements to configure FDR, DLL and DLM registers of UART0.	(5)
	B)	Discuss the relationship between Timer Counter (TC), Prescale Register (PR) and Prescale Counter (PC) registers for LPC1768 timer with a suitable example.	(3)
	C)	Discuss the two types of input lines to the LCD.	(2)
3)	A)	Identify the assembler directives in the following statements and explain with their attributes. RAM1_ADDR EQU 0x40000000 AREA mycode, CODE, READONLY SRC DCD 0xABC EXPORT Reset_Handler VAL1 RN R1 LONG_VAR SPACE.	(5)
	B)	Translate the following C code snippet into an assembly language program. The C code snippet finds the minimal value of three signed integers. Assume a, b, and c are stored in registers R0, Rl, and R3, respectively. The result min is saved in register R4.	(3)

```
if (a < =b && a < c) {

min = a;

} else if (b < a && b < c) {

min = b;

} else {

min = c;}
```

C) Draw and compare Von-Neumann and Harvard architecture. (2)

4) Write the steps for configuring the Analog to Digital Converter (ADC) in LPC1768. Write an Embedded C program to read the data in hex from the ADC channel 1 and store it in a variable. Note that this channel is connected to P0.24 with PINSEL_FUNC_1 configuration. The structure of ADCR and ADDR are as follows: (5)

A)

ADCR

31:28	27	26:24	23:22	21	20:17	16	15:8	7:0
Reserved	EDGE	START	Reserved	PDN	Reserved	BURST	CLCKDIV	SEL

ADDR

31	27	26:24	23:16	15:4	3:0
DONE	OVERRUN	Reserved	Reserved	RESULT	Reserved

B) Write an Embedded C program to toggle the LED connected to P2.0 with PINSEL_FUNC_1 configuration, using an external interrupt (EINT0) in edge triggered mode with falling edge polarity. (3)

C) Discuss the significance of the four command words sent to the LCD during initialization. (2)

5) Explain the role of Nested Vector Interrupt Control(NVIC) when the two ADC channels 4 and 5 are configured to convert the data simultaneously. Write an Embedded C program to read the conversion results in hex and store them in two variables using interrupt. Note that AD0.4 and AD0.5 are connected to P1.30 and P1.31 respectively. These port pins are configured with PINSEL_FUNC3. (5)

A)

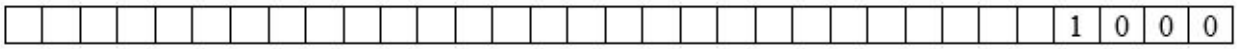
B) What should be the prescaler value needed to obtain a timer resolution of 12 ms at 25MHz PCLK? With the obtained prescaler value, write an Embedded C function to produce a delay of 2s using Timer Counter (TC) register of Timer 0 module. (3)

C) The configurations of registers used in external interrupts are given below: (2)

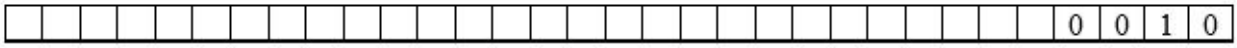
EXTINT

																									1	0	1	0

EXTMODE



EXTPOLAR



Based on the above configurations, answer the following questions.

a. Write an Embedded C instruction to configure the triggering of EINT1 and EINT3.

b. Write an Embedded C instruction to configure the polarity of EINT1 and EINT3.

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