Question Paper

Exam Date & Time: 01-Jul-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH. DEGREE EXAMINATIONS - JUNE/JULY 2023
SUBJECT: CSE 2253/CSE-2253 EMBEDDED SYSTEMS
(SPL: COMPUTER SCIENCE AND ENGINEERING - CYBER SECURITY/COMPUTER SCIENCE/COMPUTER SCIENCE AND ENGINEERING - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

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

Answer all the questions.

Missing data may be suitably assumed.

1A)	Write a assembly-level program to add two 32-bit numbers available in the code memory using ARM instructions. Store the result in the data memory.	(5)
1B)	With suitable example describe B, BL, BX and BCS instructions.	(3)
1C)	Write an assembly language program using ARM instructions to find the largest of two numbers.	(2)
2A)	i) The generic ARM chip has the following address assignments. Calculate the space and the amount of memory given to each region. a) Address range of 0x20000000-200FFFFF for SRAM bit-addressable region. b) Address range of 0x22000000-23FFFFFF for alias addresses of bit-addressable SRAM. ii) Write a program to set LOW the D0 bit of the SRAM location 0x20000005 using (a) byte address and (b) the bit alias address.	(5)
2B)	Explain the following logical instructions in ARM with suitable example. i) AND ii) ORR iii) EOR	(3)
2C)	Develop a program to configure and start an ADC conversion on channel 0, connected to pin P0.23, with a clock speed of 200kHz?	(2)
3A)	Explain the external match register of timer block in LPC1768. Estimate the resolution of the timer, if Prescaler register (PR) value is 59999 and the frequency of the peripheral clock (Pclk) is 50 MHz.	(5)
3B)	Write the appropriate C statements to perform the following operations: i) Configure port pins 2.25 to perform function1(first alternate function) and 2.13 to perform function2 (second alternate function). ii) Clear the port pins 1.10 to 1.13 after configuring their direction as output. iii) Hide the values at port pins 3.11 and 3.12 and set the values at 3.10 and 3.13.	(3)
3C)	Distinguish between von Neumann and Harvard architectures in the ARM.	(2)
4A)	Develop an embedded C program using LPC1768, to generate square waveform. The Aout pin is P0.26 which should be configured as function 2 (second alternate function).	(5)
4B)	Write an ARM assembly language code snippet to transfer ten 32-bit numbers from code memory to data memory using pre-indexed with write back addressing mode.	(3)
4C)	Write the Embedded C statements for LPC1768 to trigger an external interrupt EINT3 when an interrupt signal goes from low to high transition.	(2)
5A)	Calculate the values to be stored in UART Fractional Divider Register (FDR), Divisor Latch LSB (UxDLL) and Divisor Latch MSB (UxDLM) registers to obtain a UART baudrate of 2400 at a	(5)

peripheral clock frequency of 125 MHz in UART0 module of LPC1768. Explain with neat steps. Write down the C statements to configure the appropriate registers with the calculated values.

5B) Write an Embedded C program to convert two different analog signals ranging from 0 to 10 volts and 0 to +12 volts into digital signals using ADC channels 1 and 2. Store the analog values of the signal provided in two different strings. Configure the ADC in burst mode and use port pins P0.24 and P0.25 with function 1 (first alternate function) for ADC. (3)

5C) With respect to interrupts in LPC1768, highlight the importance of NVIC. (2)

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