Reg. No.



VI SEMESTER B.TECH. (ELECTRICAL & ELECTRONICS ENGINEERING) MAKE UP EXAMINATIONS, JUNE 2019

SUBJECT: EMBEDDED SYSTEM DESIGN [ELE4001]

REVISED CREDIT SYSTEM

Time	: 3 Hours	Date:18, June 2019	Max. Marks: 50		
Instr	 Answer ALL the questions. Missing data may be suitable Support all your programs 	ly assumed. with relevant comments			
1A.	Describe the following with respect to improving the processing power of a processor				
	(i) Multi-processor system (i	i) Multicore processors	(04)		
1B.	Describe the following instruct example.	ions of PIC16f877 microcontrolle	r. Illustrate with suitable		
	(i) ADDWF f,d (ii) IORL	W K (iii) BTFSC f, b	(iv) COMF f,d (04)		
1C.	Write equivalent ARM7 assembly code for the following 'C' program. Use registers R0 to R4 for variables 'a' to 'e' respectively.				
	if (a>b && c <d)< th=""><th></th><th></th></d)<>				
	{				
	a =a-b;				
	<i>c</i> = <i>c</i> + <i>d</i> ;				
	<i>e=e*8;</i>		(02)		
	}				
2A.	With the help of description of relevant ARM7TDMI instructions for push and pop operation, explain empty ascending type of stack.				
2B.	Write an ARM7TDMI subroutine for unsigned '32' bit division. Assume that the dividend and divisor are passed to subroutine through R0 and R1 registers. Return the result through R2 (quotient) and R3 (remainder) registers. If there is an attempt to divide by zero, return back with 01 as error code in R4 register. If it is a case of 0 / 0, return back with 02 as error code in				
	R4 register.		(03)		
2C.	Explain the following with respect to pre fetch abort exception.				
	 i. When does this exce ii. What is the main rea iii. What is the expected iv. Mention and description handler. 	ption occur? son for having this exception in AR operation in pre fetch abort excep be the instruction used to return	M7TDMI? tion handler? rn from pre fetch abort		
	v. Discuss the reason fo	or using this instruction to return.	(04)		

3A.	Show the interfacing circuit to interface a common anode seven segment LED display device to pins 'p8 to p15' of mbedNXPLPC1768 microcontroller. Write a 'C' code to display the characters 'i', 'n', 't', 'e', 'r', 'e', 's', 't', continuously on the display device with a delay of 2.5 seconds. Also configure pin p22 as an interrupt pin and when falling edge is detected at p22 pin, write an ISR to turn on the LED connected to p23 pin for 5 seconds, turn it off and return back to main code.			
3B.	i. ii. iii.	In a system with '2' levels of cache, it is found that out of 8000 memory references, there are 1200 misses in L1 cache and 160 misses in L2 cache. If L1cache access time is 3 cycles, L2 access time is 6 cycles and main memory access time is 30 cycles, what is the average memory access time? What will be the average access time if L2 cache is not included in the system (only L1 cache included)? What is the minimum hit rate necessary to make cache implementation worthwhile,		
		with only L1 cache included?	(03)	
3C.	i. ii.	List the salient features and specifications of PCI parallel communication bus. Describe the arbitration scheme used in PCI to facilitate multi master configuration.	(03)	
4A.	Write a 'C' program for PIC16F877 microcontroller to configure the MSSP in SPI master mode to transmit data bytes AAH, BBH and CCH to slave device '1' connected to GPIO pin RA3 and then transmit data bytes 3CH and 6DH to slave device '2' connected to GPIO pin RA4 at 5 Mbps baud rate. Use idle state for clock as low level, transmit data on rising edge, sample input data at the middle of data output time. Take $F_{osc} = 20$ MHz.			
4B.	Describe the I2C serial communication protocol. Explain each field used in the protocol clearly.			
4C.	Explain in detail the role of all the fields of token packet in USB serial communication.		(03)	
5A.	i. ii.	With the help of a relevant diagram explain priority arbitration scheme for interrupt expansion. Three peripherals P1, P2 and P3 are to be connected to a processor in daisy chain arbitration scheme. P2 and P3 are daisy chain compatible, while P1 is not daisy chain aware. Design and describe a suitable logic circuit to make P1 daisy chain aware.	(04)	
5B.	i. ii.	Discuss the merits and demerits of IR and RF wireless communication. Describe in brief the IrDA wireless communication protocol.	(03)	
5C.	List an respec	d describe the various hardware and software development tools commonly used with t to embedded system design.	(03)	