Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Examination July 2021 (2019 Scheme)

Course Code: ECT206

Course Name: COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Explain the significance of accumulator, program counter and stack pointer in processor operation.	3
2		List the difference between RISC and CISC processors.	3
3		Describe the function of Program status word (PSW) in 8051 microcontroller.	3
4		List the interrupts of 8051 and its ROM locations.	3
5		Write an 8051 C program to send values 00-FF to port P1.	3
6		Write an 8051assembly language program to add two 8bit numbers stored in external RAM memory.	3
7		Explain the procedure of doubling the baud rate of data transfer in 8051 serial communication.	3
8		Assume XTAL=11.0592. Compute the value to be loaded into TH0 and TL0 (mode 1) to incorporate a time delay of 5ms.	3
9		Explain 'Locality of reference' in Cache memory system.	3
10		Differentiate SRAM and DRAM memory cells.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Illustrate the algorithm for division of two 4 bit signed binary numbers, -6/4. Write the algorithm or draw the flowchart also.	8
	b)	Explain the basic operations of a general processor in executing an instruction.	6
12	a)	Write down the range of numbers that can be represented using IEEE 754 single precision floating point representation. How do we represent zero, infinity and 49 in IEEE 754 format.	8
	b)	Draw the internal architecture of a general processor and explain the various components.	6

Module -2

13	a)	Explain the RAM memory organization of 8051microcontroller using a schematic diagram. Also list the 8051 Special function registers and its functions.	9
	b)	What is stack? Explain the role of stack in program execution during a CALL instruction.	5
14	a)	Explain about the ports of 8051 and also illustrate the Port 0 circuit read and write operation.	8
	b)	Explain the 'Rotate' instructions used in 8051 microcontroller.	6

Module -3

15	a)	Write an 8051 assembly language program to sort the ten numbers stored in memory locations 30H to 39H in ascending order. Comment all lines of the program.	8
	b)	Write an 8051 C code to convert the analog input provided to ADC chip to the digital value and store the result in memory location.	6
16	a)	Write an 8051 C program to send letters 'M', 'D' to LCD using delays.	7
	b)	Using a schematic diagram explain the procedure of interfacing KEYBOARD to 8051 microcontroller.	7

Module -4

17	a)	Explain the characteristics and operations of mode 1 programming of Timers in 8051 microcontroller.	6
	b)	Explain the steps to transfer data serially in 8051. Write an 8051 assembly language program to transfer 'Y' serially at baud rate 9600 continuously through Port 0.	8
18	a)	Explain ARM 7 register architecture.	8
	b)	Explain the operation of a) Assembler b) compiler c) Debugger	6

Module -5

19	a)	Explain programmed I/O and interrupt driven I/O for data transfer in computers.	8
	b)	Explain RAM and ROM memory chips.	6
20	a)	Explain associative mapping of cache memory for a 4K cache with block size 128 and word size 16. Draw necessary figures. Specify the main memory address.	8
	b)	Explain the memory hierarchy model using a layout diagram.	6

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Examination June 2022 (2019 scheme)

Course Code: ECT206

Course Name: COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Differentiate between Von-Neumann and Harvard Architecture.	(3)
2		Define Address bus, Data bus and Control bus.	(3)
3		Draw and explain PSW of 8051 microcontroller.	(3)
4		Write down the function of following instructions (a) ANL A,@R_1 (b) RLC A (c) MOVX A,@R_0	(3)
5		What is constant in embedded C?	(3)
6		Write an ALP to copy a block of 8 bytes of data to RAM locations starting at 80H from RAM locations 20H.	(3)
7		What is the difference between a Timer and Counter?	(3)
8		Explain the format of SCON Special Function Register.	(3)
9		Define Virtual memory.	(3)
10		Why does dynamic RAM need constant refreshing? How is this done?	(3)

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Explain Non-restoring division algorithm with an example.	(8)
	b)	Explain Instruction Cycle with a sample timing diagram.	(6)
12	a)	Differentiate RISC and CISC Computer Architecture.	(7)
	b)	How does a computer go from a set of stored instructions to running them?	(7)

Module -2

13	a)	Draw and explain the architecture of 8051 microcontroller.	(9)
	b)	List the interrupts available in the 8051 microcontroller. Explain IE and IP Special Function register.	(5)

14 a) Explain different Addressing Modes of 8051 Microcontroller with examples. (8)

b) Explain TCON and TMOD special function register in 8051 Microcontroller. (6)

Module -3

15 a) Write an ALP to find the largest number in an array of 10 bytes, stored in the internal memory block starting with 21H. Store the result at 50H. (6)

b) Explain interfacing of stepper motor with microcontroller. Write an embedded C language program to rotate stepper motor in clockwise direction continuously in full step mode. (8)

16 a) Draw the block diagram to show how 8051 is connected to DAC 0808 at port P1. Write a program to generate Ramp signal. (8)

b) Write an 8051 C program to get a byte of data from Port P_1. If it is less than 100, send it to P_0; otherwise, send it to P_2. (6)

Module -4

17 a) Draw and explain ARM7 register architecture. (7)

b) Write an ALP to generate a square wave of frequency 100KHz on pin P1.0, using Timer 1 operating in mode 0. Assume Crystal frequency 11.0592 MHz (7)

18 a) Explain various System software. (8)

b) Write an embedded C program for the 8051 to transfer letter “A” serially at 9600 baud, continuously. (6)

Module -5

19 a) Explain different mapping techniques in cache memory. (8)

b) Explain the Asynchronous input/output transfer with proper timing diagram. (6)

20 a) Explain the address translation mechanism in Virtual Memory. (8)

b) Explain the working of DRAM and SRAM with neat diagram. (6)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Supplementary Examination June 2023 (2019 Scheme)

Course Code: ECT206

Course Name: COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Write short note about accumulator and program counter.	3
2		Write short note on instruction sequencing and execution.	3
3		Explain briefly about 8051 timers.	3
4		Explain the stack pointer (SP) using PUSH and POP instructions.	3
5		Write 8051 assembly language program to perform multiplication of two 8bit numbers using repeated addition method.	3
6		Write a 8051 C program code to toggle the bits of P0 continuously using a delay function.	3
7		Write a short note about serial transmission and reception baud rate in 8051.	3
8		Write a short note on ARM registers.	3
9		Briefly explain a static RAM cell.	3
10		Explain the basic structure of a Cache	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Explain Von Neumann and Harvard computer architecture with necessary diagrams. List the advantages and disadvantages.	9
	b)	With an example explain the multiplication operation of two 8-bit binary numbers using shift and add method.	5
12	a)	Explain the steps of opcode fetch cycle using a timing diagram.	10
	b)	Write a short note about program counter and stack pointer.	4

Module -2

13	a)	Write a short note about program status word (PSW) in 8051.	4
	b)	Explain in detail about various addressing modes of 8051 microcontroller.	10
14	a)	With examples briefly explain the instructions used in 8051 microcontrollers for Boolean operation and Rotate operation.	5

	b)	Explain in detail about 8051 interrupts using interrupt vector table. Explain the significance of Interrupt Enable (IE) register and Interrupt priority (IP) register.	9

Module -3

15	a)	Write 8051 assembly language program to toggle all the bits of Port 0 every 1ms using a subroutine. The crystal frequency used is 11MHz. Assume the machine cycle values as 1 or 2.	4
	b)	Draw a neat diagram to represent the interfacing of 8051 with LCD device. Write embedded C code to display 'H', 'E', 'L', 'L', 'O' continuously using delays.	10
16	a)	Write 8051 C program to convert ASCII digits of '5' and '8' to packed BCD and sent the value to port 2.	4
	b)	Explain the 8051 interfacing with ADC using a block diagram. Write embedded C code to convert the analog input to the digital value and store the result in R5.	10

Module -4

17	a)	Write a short note on Mode 2 programming of 8051 timer.	4
	b)	Explain the SBUF and SCON register of 8051. Write an embedded C program to check the status of pin P1.0 and if the pin is HIGH transfer the message " WELCOME" serially at 9600 baud, 8-bit,1 stop bit. If the pin is low exit the program.	10
18	a)	Explain the steps to create an executable file from an assembly language program.	4
	b)	Write the programming steps to transfer character bytes serially. Write 8051 assembly language program to read data through ports 0,1,2 one after the other and transfer the data serially, continuously. Assume 9600 baud, 8-bit,1 stop bit.	10

Module -5

19	a)	Explain the Set-Associative mapping of Cache memory with an example.	8
	b)	Write the importance on Translation Lookaside Buffer (TLB). How physical address is generated using associative-mapped TLB.	6
20	a)	Write a short note on virtual memory organisation.	5
	b)	Illustrate programmed I/O using a block diagram. Explain the steps to input a sequence of data bytes to be stored in memory.	9

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (R,S) / S2 (PT) (R,S) Examination June 2023 (2019 Scheme)

Course Code: ECT 206

Course Name: COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Show the binary representation of $(-54.035)_{10}$ in Single precision floating point format.	3
2		What are the functional units of a Computer?	3
3		Explain the memory organization of 8051 microcontroller.	3
4		Write down the function of following instructions (a) XRL A,@R1 (b) CLR A (c) XCH A,@R0	3
5		Write an assembly language program to copy a block of 8 bytes of data to RAM locations starting at 80H from RAM locations 20H.	3
6		What are the types of constants in embedded C?	3
7		Explain how the baud rate is configured in 8051 serial port.	3
8		Explain assembler, interpreter and compiler.	3
9		Write a short note on memory hierarchy.	3
10		Explain the replacement algorithm used in cache memory.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Explain "shift and add" algorithm for multiplying two numbers with an example.	(8)
	b)	Differentiate RISC and CISC Computer Architecture.	(6)
12	a)	Draw and explain the general internal architecture of a processor.	(8)
	b)	Explain processor operations Instruction fetch, decode and execute.	(6)

Module -2

13	a)	Explain different Addressing Modes of 8051 Microcontroller with examples.	(8)
	b)	Explain Read/Write operation of any one port of 8051 microcontroller using port diagram.	(6)

14 a) Explain the interrupts of 8051 microcontroller. (5)

b) Draw and explain the architecture of 8051 microcontroller. (9)

Module -3

15 a) Explain interfacing of stepper motor with microcontroller. Write an assembly language program to rotate stepper motor in clockwise direction continuously in full step mode. (9)

b) Write an 8051 assembly language program to find the sum of 25 data bytes stored in array of external RAM starting with address 3200H. Store the 16 bit sum at the end of array. (5)

16 a) Explain interfacing of DAC with 8051 using a diagram and also write an embedded C program to generate staircase waveform. (7)

b) Write an assembly language program to interface a 7 Segment LED display with 8051 microcontroller. (7)

Module -4

17 a) Explain 8051 timer mode 1 and mode 2 characteristics and operations using diagrams. (8)

b) Write an 8051 C program to transfer the message “FOLLOW THIS” serially at baud rate of 9600, 8bit data with 1 stop bit continuously. (6)

18 a) Write an 8051 assembly language program to generate a square wave of 1KHz frequency at pin P 0.1 using Timer 0. Explain how timer modes are selected using TMOD register. (8)

b) Draw and explain ARM7 register architecture. (6)

Module -5

19 a) Explain programmed I/O and interrupt driven I/O. (8)

b) What is the role of TLB (Translation Look aside Buffer) in virtual address to physical address translation? (6)

20 a) Explain about DMA data transfer methods. (4)

b) Explain set associative mapping technique used in cache memory. How it is different from direct mapping. (10)

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