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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S, FE) / S2 (PT) (S) Examination January 2024 (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	Represent -7 & +6 in sign magnitude, 1's complement and 2's complement method.	3
2	What is the significance of stack pointer in processor architecture?	3
3	Specify the default register bank in 8051 microcontroller and how it is changed when needed?	3
4	What is the difference between MOV and MOVC instructions and ADD and ADDC instructions?	3
5	List any 6 datatypes for declaring variables in 8051 C programming.	3
6	List the features of 0804 ADC interfacing chip.	3
7	List the timers and features of its associated registers in 8051 microcontrollers.	3
8	With XTAL=11.0592 MHZ, find the TH1 value needed for the following baud rates a) 9600 b)2400 c)1200	3
9	Differentiate programmed I/O and interrupt driven I/O	3
10	Briefly explain Least recently used (LRU) 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)	Illustrate Booth's algorithm for multiplication of two numbers -5x6 in binary. Write the algorithm or draw the flowchart to explain the steps.	10
	b)	Explain the basic register set of a general processor.	4
12	a)	Explain Instruction fetch Cycle with a sample timing diagram	7

b) Explain IEEE754 format of binary single precision representation. What is biased exponent? Explain the method of construction and reconstruction of biased exponent using an example. 7

Module -2

13 a) Explain using a block diagram, the architecture of 8051 microcontroller chip. 8

b) Illustrate with examples the use of instructions CJNE, DJNZ and JNC for program control in 8051 microcontrollers. 6

14 a) Explain PSW register in SFR and explain the function of each bit. 6

b) Explain the addressing modes used in the instruction architecture of 8051 microcontroller with two examples each. (Use MOV instructions for illustration). 8

Module -3

15 a) Write an 8051 C program to toggle the bits of P1 ports continuously with a 250ms time delay.(Comment each line of the program.) 6

b) Write an assembly language program in 8051 to add an array of ten 8-bit numbers stored in the external memory. Draw the flowchart or write the algorithm also. 8

16 a) Using a block diagram explain the interfacing of 8051 with LCD module. Explain the functional pins of LCD module. 6

b) Write an assembly language program to interface a DAC to 8051 microcontroller and display a square waveform. (Choose 10v maximum and 0v minimum. Take data values accordingly). 8

Module -4

17 a) Explain the function of each bit of TMOD and TCON registers of 8051 microcontroller. 7

b) Write an 8051 assembly language program to generate a square wave of 50% duty cycle with 3ms pulse width on all pins of Port 0 using Timer 0. Assume an XTAL frequency of 22MHz. 7

18 a) Explain the significance of SBUF and SCON registers in 8051 serial communication. Explain how the baud rate can be doubled using PCON register. 8

b) Explain ARM7 programming model. 6

Module -5

19 a) What is DMA. Explain the role of DMA controller in data transfer using a block diagram. 8

b) Explain how program controlled I/O is performed using polling. 6

20 a) Explain direct 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 virtual memory address translation procedure with a diagram. 6

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