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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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

Course Code: CST202

Course Name: Computer Organization and Architecture

Max. Marks: 100 Duration: 3 Hours

PART A

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

1		Describe auto increment and decrement addressing mode with help of example?	3
2		Name the registers which are connected to both external and internal bus? What are the signals associated with these registers?	3
3		Write the register transfer logic format for a conditional control statement, Give an example?	3
4		Discuss the logic used behind the booth multiplication algorithm	3
5		Draw a 3X2 array multiplier?	3
6		Discuss about pipeline hazards?	3
7		Write a note on micro-program control?	3
8		What are different types of control organization?	3
9		What are interrupts, List the sequence of steps following an interrupt request?	3
10		Which design feature of SRAM cells helps in value retention without refresh?	3

PART B

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

Module -1

11	a)	Compare and contrast single bus and multi-bus organization of CPU?	4
	b)	Write the three-address, two-address and one-address representations of the operation below with relevant assumptions, evaluate following: i, (A+B) * (C+D) ii, C<- [A] + [B]	10
12	a)	With the help of a neat figure, describe the data path inside the processor?	6
	b)	Draw the diagram of single bus organization, write the control sequence for the instruction ADD [R2],R3 for the above mentioned single bus organization.	8

Module -2

13	a)	Describe processor organization with diagram using i) scratchpad memory ii) Two-port memory iii) Accumulator register	10
	b)	Draw and explain about true/complement circuit?	4

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14 a) Give the structure of status register, which is connected to 8bit ALU . 8

b) Design 4-bit combinational logic shifter which will perform the operation given below with 2 control variable H1&H0? 6

i) Shrl
ii) clear
iii) Load all bits with 1

Module -3

15 a) Draw the flowchart and explain restoring division method with an example? 6

b) Describe in detail about data hazards and resolution techniques? 8

16 a) Draw the flowchart of Booth's multiplication algorithm and multiply -5 X -4 using booths algorithm? 8

b) Identify the various types of hazards occurring during the execution of the following program in a pipelined system. Where the pipeline consist of five stages, opcode fetch , instruction decode, operand fetch, execution, store the result. All stages take equal time duration 6

```
MOV [R1],[R2]
MOV R3,[R1]
SUB R2,R3
ADD R1,R3
CALL 5000
MOV R2,R3
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Module -4

17 a) With the help of a diagram explain the functioning of a micro-program sequencer in a micro-programmed controlled processor? 10

b) Compare instruction formats of horizontal and vertical microinstructions? 4

18 a) Explain the organization of micro-programmed computer with a block diagram? 8

b) Explain with an example one flip-flop per state method of control organization? 6

Module -5

19 a) Explain in detail about the mechanisms for accessing I/O devices? 9

b) Discuss about different types of read only memories? 5

20 a) Explain internal organization of 1 K X 8 memory chip with suitable diagram 5

b) How does the various mapping scheme present in cache memory differ from each other. 9

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