GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022-2023
COMPUTER ORGANIZATION AND ARCHITECTURE
MCA20-103

TIME ALLOTTED: 3 HOURS   **FULL MARKS : 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any *ten* from the following. choosing the correct alternative of each question: 10×1=10

		Marks	CO No.
1. i)	Convert $(33)_{10}$ to binary	1	CO1
	a. 100001		
	b. 100011		
	c. 110001		
	d. 100101		
ii)	The Excess-3 representation of decimal 59 is	1	CO1
	a. 01100010		
	b. 00111110		
	c. 10001100		
	d. none of these		
iii)	The SOP form of logical expression is most suitable for designing logic circuits using only	1	CO2
	a. XOR gates		
	b. NAND gates		
	c. AND gates		
	d. NOR gates		
iv)	Which of the following has the highest storage?	1	CO5
	a. Terabyte		
	b. Gigabyte		
	c. Megabyte		
	d. Kilobyte		
v)	Which gate is called equality detector?	1	CO2
	a. XOR		
	b. XNOR		
	c. OR		
	d. NOT		

vi) Flip-flop has   1   CO4
     a. two stable states
     b. one stable state
     c. three stable state
     d. none of these

vii) The number of selection inputs of a 16:1 MUX is   1   CO4
     a. 16
     b. 1
     c. 8
     d. 4

viii) A pipeline stage   1   CO4
     a. is a sequential circuit
     b. is a combinational circuit
     c. consists of both sequential and combinational circuit
     d. none of these

ix) A decoder with an enable input can be used as   1   CO2
     a. Encoder
     b. Parity generator
     c. Multiplexer
     d. De-multiplexer

x) The decoded instruction is stored in   1   CO5
     a. IR
     b. PC
     c. Registers
     d. MDR

xi) Permanent memory in a computer is known as   1   CO3
     a. ROM
     b. CD ROM
     c. RAM
     d. CPU

xii) Booth's algorithm is used for   1   CO5
     a. Addition
     b. Subtraction
     c. Multiplication
     d. Division

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following)

		3 x 5 = 15	
		Marks	CO No.
2.	Explain race around condition of J-K flip-flop. Show how this condition can be avoided.	5	CO3
3.	State and prove De Morgan's theorems.	5	CO2
4.	Convert (48.878)10 to its octal code.	5	CO1
5.	State the features of RISC Architecture.	5	CO5
6	Explain a 5-stage computer pipeline with timing diagram.	5	CO4

GROUP – C
(Long Answer Type Questions)
(Answer any three of the following)

		3 x 15 = 45	
		Marks	CO No.
7. a)	Design full adder circuit using two half adders (with truth table).	5	CO3
b)	Design a 3-line to 8-line decoder.	5	CO3
c)	Convert the Gray code 11011 to equivalent binary code.	5	CO1
8. a)	Design a 8:1 multiplxer.	5	CO3
b)	Take any two 5-bit binary numbers and perform subtraction by 2's complement method.	5	CO1
c)	State different computer addressing modes.	5	CO4
9. a)	Simplify the function f (A, B, C, D) = sum(0,2,4,7,12) using K-map.	5	CO2
b)	Implement your function obtained 'f' using logic gates.	5	CO2
c)	Show a truth table showing A, B, C, D as input and 'f' as output.	5	CO2
10. a)	Compare between RAM and ROM.	5	CO3
b)	Explain the memory hierarchy of a digital computer.	5	CO3
c)	Explain secondary memory with example	5	CO4
11.	Write short notes on any three of the following:	3x5=15	
a)	Demultiplexer	5	CO1
b)	Von Neumann Architecture	5	CO3
c)	D- flip flop	5	CO4
d)	Cache memory	5	CO3
e)	DMA	5	CO5