GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications
Level: Under Graduate
Course / Subject Code: BC01001011
Course / Subject Name: Fundamental of Computer Organization

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Core Course

Prerequisite:	A foundational understanding of mathematics including algebra and basic arithmetic is required. Additionally, familiarity with basic concepts in computer science such as data types, variables, and basic programming constructs would be beneficial.
Rationale:	The course on Computer Application is crucial for undergraduate students in Computer Science due to its foundational role in understanding essential computing principles and systems. Covering topics such as number systems, logic gates, computer architecture, arithmetic operations, and memory systems, the course provides students with fundamental knowledge that forms the basis for advanced studies and practical applications. By emphasizing logical thinking, analytical skills, and hands-on experience with computing components, the course prepares students to tackle real-world challenges in software development, system design, and IT management. It aligns with industry demands for proficient professionals who can innovate and adapt to the evolving technological landscape, ensuring graduates are well-equipped for diverse careers in computing and related fields.

Course Outcome:

After completion of the course, student will able to:

No	Course Outcomes	RBT Level
01	Perform conversions between various number systems, execute binary arithmetic operations, and utilize basic logic gates to evaluate logical expressions.	R, U, A
02	Identify different types of computers and their components, explain fundamental operational concepts, and assess factors influencing computer performance.	R, U
03	Describe the concepts of register transfer language and micro operations and analyze the instruction cycle and various instruction formats.	R, U, N
04	Perform arithmetic operations using different addition, subtraction, multiplication, and division algorithms, including floating-point arithmetic.	R, U, A
05	Explain the architecture and functioning of different memory systems, including RAM, ROM, cache, and virtual memory, and understand the basics of RAID systems.	R, U

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	**T**	**PR**	**C**	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	UNIT I: NUMBER SYSTEM AND LOGIC GATES Number System: Decimal System, Two-state Devices, Counting in Binary System, Binary Addition and Subtraction, Converting Decimal Number to Binary Numbers, Use of Complements to represent negative numbers in binary and other number systems, Octal and Hexadecimal Number System. Basic Logic Gates: Logic Gates, Logical Multiplication, AND Gate and OR Gate, Complementation and Inverts Evaluation of logical Expression, Evaluation of an Expression containing Parenthesis. NAND Gates and NOR Gates.	8	20
2.	UNIT II BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional units, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors, and multi-computers. Data Representation. Fixed Point Representation. Floating–Point Representation. Error Detection codes.	7	15
3.	UNIT III: REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro-operations, logic micro-operations, shift micro-operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt. Instruction formats. Addressing modes.	11	25
4.	UNIT IV: COMPUTER ARITHMETIC:	8	20

	Addition and subtraction, multiplication Algorithms, Division Algorithms, floating–point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.		
5.	UNIT V: THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.	8	20
	Total	**42**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
30	30	20	20	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Books:
1. Computer System Architecture by Morris Mano, Third Edition, Pearson Publications

2. Computer Fundamentals by P.K. Sinha, Sixth Edition, BPB Publications

3. Computer Installation and Servicing By D Balasubramanium, McGraw Hill Education Private Limited

4. Digital Principles and Applications by A P Malvino, and D P Leach, 8th Edition, McGraw-Hill Education

(b) Open source software and website:
1. Open source software Logisim is suggested for practical works and better theoretical understanding

Suggested Course Practical List:

1. Identify basic terms and components of the computer and make a summary report.

2. Study different slots on the motherboard with its working and the use of front & back panel connections of a computer.

3. Identify and understand the workings of various ports, such as sockets, connectors, cables, and

various types of expansion cards.

4. To study and verify the truth table of logic gates

5. To realize Half Adder, Full Adder, Half Subtractor, and Full Subtractor by using Basic gates and NAND gates

6. To simplify the given expression and to realize it using Basic gates and Universal gates

7. To design and set up the following circuit using IC 7483. i) A 4-bit binary parallel adder. ii) A 4-bit binary parallel subtractor.

8. Study physical and logical components of hard disk and SSD and their interfaces.

9. Study working of keyboard, mouse, scanner, monitor and printer with its interface types. Study the troubleshooting of motherboard, keyboard, and mouse.

10. Install Windows operating system and understand Control Panel.

11. Install Linux operating system

12. Understand working of SMPS.

CO- PO Mapping:

Semester 1	Fundamental of Computer Organization										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	1	-	2	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	1	-	2	-	-	-	-	-	-
CO5	2	1	-	-	-	-	-	-	-	-	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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