Integrated MCA I Semester 1

Subject Name: Fundamentals of Computer Organization **Subject Code:** IMCA13107

Type of course: Professional Core Course

Prerequisite: Basic knowledge of working with computers

Rationale: Gaining foundational knowledge of digital computers, encompassing number systems, logic gates, and combinational logic principles.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks		Practical Marks		Total
L	T	P	C	TEE	CAT	TEP	CAP	
3	1	0	4	60	40	-	-	100

CAT: Continuous Assessment Theory comprised of CA1 and CA2 **CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Introduction to Computer Architecture** Basic components of a digital computer, Working principles of peripheral devices (Keyboard, Mouse, Display Unit, Printer, Multimedia Projector, Scanner, USB Ports, Network Adapters)	03	10%
2.	**Number Systems and Arithmetic** Decimal and binary systems, Bistable devices, Binary addition and subtraction, Converting decimal numbers to binary, binary to decimal, Representing Negative Numbers and use of Complements to represent negative numbers, Octal and hexadecimal number systems, Converting decimal to octal and hexadecimal, converting hexadecimal and octal to binary. Direct conversion of binary to octal and hexadecimal	07	15%
3.	**Boolean Algebra and Gate Networks** Fundamental Concepts of Boolean Algebra, Logical Multiplication and Complementation, Complementation and Inverters, Evaluation of Logical Expression, Evaluation of an expression containing parentheses, Basic laws of boolean algebras, Proof by Perfect Induction Simplification of Expression, De Morgan's Theorems Basic Duality of Boolean Algebra, Derivation of a Boolean Expression, Interconnecting Gates, Sum of Products and Product of Sums, Derivation of POS, Derivation of three input variable expression, NAND gates and NOR gates, The Map method for simplifying Expressions, Subcubes and Covering, Design using NAND gates, Design using NOR gates	14	30%

4.	**Basics of Combinational Logic** Construction of Arithmetic Logic Unit (ALU), Integer Representation, Addition in 1's Complement System, Addition in 2's Complement System, Shift Operation, Logical Operations, Multiplexer	07	15%
5.	**Memory and Storage Devices** Random Access Memories (RAM), Basic Memory Cell, Static RAM (SRAM), Dynamic RAM (DRAM), Read-Only Memory (ROM), Magnetic Disk Memories, and Interfacing Buses.	07	15%
6.	**Control Units and Instruction Execution** Construction of Instruction Word, Instruction Cycle and Execution Cycle, Organization of Control Registers, Instruction Word Formats, Addressing Techniques - Direct, Immediate, Relative, Indirect, Indexed	07	15%
	Tutorial Topics: Introduction to Number Systems, Decimal and Binary System, Two-State Devices, Binary Addition and Subtraction, Converting Decimal Numbers to Binary, Negative Numbers and Complements, Octal and Hexadecimal Number Systems, Boolean Algebra and Logic Gates		

Suggested Specification table with Marks (Theory/Practical):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**25**	**20**	**15**	**10**	**10**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from the above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Digital Computer Fundamentals	Thomas C. Bartee	Tata McGraw Hill	2011	6th Edition.
2	Computer System Architecture	M. Morris Mano	PHI/Pearson Education	2007	3rd Edition

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Fundamental Understanding of Digital Computer Components	10%
CO-2	Proficiency in Number Systems and Binary Arithmetic	15%
CO-3	Mastery of Boolean Algebra and Logic Gates	30%
CO-4	Understanding of Memory and Storage Devices	15%
CO-5	Competence in Combinational Logic Design	15%
CO-6	Proficiency in Control Unit Operation and Instruction Set Architecture	15%

Mapping with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13
CO-1	3	1	1	1	1	1	0	1	0	0	0	0	0
CO-2	1	1	3	1	1	1	0	1	0	0	0	0	0
CO-3	1	1	1	1	3	1	0	1	0	0	0	0	0
CO-4	1	1	1	1	1	3	0	1	0	0	0	0	0
CO-5	1	1	1	1	1	1	0	3	0	0	0	0	0
CO-6	1	1	1	3	1	1	0	1	0	0	0	0	0
Rationale*													

Rationale*: Explaining why it is matching this particular program outcome