



BHARATI VIDYAPEETH'S
INSTITUTE OF COMPUTER APPLICATIONS & MANAGEMENT (BVICAM)
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Lesson Plan Version 10.0

Course: MCA-107 - Computer Organization(CO)		
MCA - 1st Semester	No. of Theory Hours per Week: 04	No. of Practical Hours per Week: 2

Course Outcome (CO):

COs for Theory (MCA-107):	
CO1	Design and demonstrate various binary digital circuits like adder, incrementer, flip-flop, etc. and understand RTL & micro-operations. (BTL 3&6)
CO2	Understand and design the basic organizational and architectural issues of a digital computer. (BTL 2&6)
CO3	Understand the basic concepts of parallel processing, pipelining and I/O organization. (BTL 2)
CO4	Illustrate various memory organization and multiprocessor communication techniques. (BTL 3&4)

Recommended Books:

Books	S. N.	Details of the Books
Text Books	1.	“Computer System and Architecture”, Mano M, PHI. [Mano]
	2.	“Computer Organization & Architecture”, Stallings W, PHI [Stallings]
Reference Books	1.	“Digital Circuits & Design”, S Salivahanan S Arivazhagan, Vikas [SSV]
	2.	“Computer Architecture and Organization”, Hayes, J.P, McGraw Hill. [Hayes]
	3.	“Digital Computer Electronics: An Introduction to Microcomputers”, Malvino, McGraw Hill, 1993. [Malvino]

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
	UNIT - I	
1.	Introduction: Difference between Organization & Architecture in terms of various components, Importance of Computer Organization & basic	Chapter-1 [Mano] Chapter-12 [Stallings]

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
	components of system , Logic Gates, Overview of Boolean Laws & K-map	
2.	Circuit designing & its Analysis, Simplification of expression using K-map & Boolean Laws	Chapter-1 [Mano] Chapter-12 [Stallings]
3.	Combinational Circuit-Adders: Half-adder, Full adder with block diagram ,Circuit diagram & its analysis	Chapter-1 [Mano] Chapter-12 [Stallings]
4.	Combinational Circuit -Adders: Half-subtractor, Full subtractor, Binary adder with block diagram ,Circuit diagram & its analysis,	Chapter-1 [Mano] Chapter-12 [Stallings]
5.	Combinational Circuit-Adders: 4-bit Adder Subtractor, Carrylookahead circuit	Chapter-1 [Mano] Chapter-12 [Stallings]
6.	Combinational Circuit-Multiplexer: MUX Introduction, Implementation , MUX Application	Chapter-1 [Mano] Chapter-12 [Stallings]
7.	Combinational Circuit- DeMultiplexer & Decoder: DeMUX Introduction, Implementation ,De MUX Application & Decoder Introduction, Implementation ,Decoder Application	Chapter-1 [Mano] Chapter-12 [Stallings]
8.	Combinational Circuit- Encoder & Priority Encoder: Introduction, Implementation ,Application of both	Chapter-1 [Mano] Chapter-12 [Stallings]
9.	Sequential Circuit- Flip-Flop: SR & JK Flip flop, Circuit & block diagram, Truth Table, Characteristic table .	Chapter-1 [Mano] Chapter-12 [Stallings]
10.	Sequential Circuit- Flip-Flop: D,T,Master slave JK Flip flop, Circuit & block diagram, Truth Table, Characteristic table ,edge-triggered	Chapter-1 [Mano] Chapter-12 [Stallings]
11.	Registers ,Shift Registers ,Bidirectional shift registers	Chapter-2 [Mano] Chapter-12 [Stallings]
12.	RTL Introduction with example, Bus overview & its designing	Chapter-4 [Mano]
13.	Microoperation-Arithmetic Microoperation, Logic Microoperation with its complete circuit designing	Chapter-4 [Mano]
14.	Shift Microoperation, its implementation, ALU Designing & Circuit	Chapter-4 [Mano]
15.	Buffer Reserved For Revision	
	UNIT-II	
16.	Basic Computer Organization & Design:	Chapter-5 [Mano]

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
	Instruction Codes, Computer Registers, Computer Instruction	
17.	Timing & Control, Instruction Cycle	Chapter-5 [Mano] Chapter-13 [Stallings]
18.	Interrupt Cycle with all RTL Notations	Chapter-5 [Mano] Chapter-13 [Stallings]
19.	Various Instruction format- Memory reference instruction, Register-reference Instruction, Input-output reference instruction	Chapter-5 [Mano] Chapter-13 [Stallings]
20.	Design of Basic Computer	Chapter-5 [Mano] Chapter-13 [Stallings]
21.	Design of Accumulator Logic	Chapter-5 [Mano] Chapter-13 [Stallings]
22.	Microprogrammed Control Unit: Control Memory	Chapter-7 [Mano] Chapter-19 [Stallings]
23.	Microprogrammed Control Unit: Address sequencing	Chapter-7 [Mano] Chapter-14 [Stallings]
24.	Central Processing Unit: Introduction, General Register Organization	Chapter-8 [Mano] Chapter-19 [Stallings]
25.	Central Processing Unit: Stack Organization,, RTL notation of Push & Pop operation	Chapter-8 [Mano] Chapter-15 [Stallings]
26.	Central Processing Unit: Instruction Format- zero-byte, one-byte, two-byte, three byte address instruction	Chapter-8 [Mano] Chapter-15 [Stallings]
27.	Central Processing Unit: Addressing modes Introduction, types of addressing modes with example	Chapter-8 [Mano] Chapter-15 [Stallings]
28.	Buffer Reserved For Revision	
	UNIT-III	
29.	Pipeline and Vector Processing: Parallel processing, ,Different types of parallel processing, Introduction to pipeline	Chapter-9 [Mano] Chapter-17 [Stallings]
30.	Different types of Pipeline- Arithmetic Pipeline, Instruction Pipeline	Chapter-9 [Mano] Chapter-17 [Stallings]

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
31.	RISC Vs CISC,RISC & CISC Instruction Pipeline	Chapter-9 [Mano] Chapter-17 [Stallings]
32.	Vector Processor	Chapter-9 [Mano] Chapter-17 [Stallings]
33.	Array Processor	Chapter-9 [Mano] Chapter-17 [Stallings]
34.	Numerical Questions on Pipeline	Chapter-9 [Mano] Chapter-17 [Stallings]
35.	Input-Output Organization: Peripheral devices, Input-output interface	Chapter-11 [Mano] Chapter-8 [Stallings]
36.	Asynchronous data transfer, Modes of transfer, Priority Interrupt	Chapter-11 [Mano] Chapter-8 [Stallings]
37.	Direct Memory access, Input-output processor	Chapter-11 [Mano] Chapter-8 [Stallings]
38.	Daisy Chaining Priority Interrupt, Parallel Priority Interrupt	Chapter-11 [Mano] Chapter-8 [Stallings]
39.	Buffer Reserved for Revision	
	UNIT-IV	
40.	Memory Organization: Memory hierarchy, Main memory	Chapter-12 [Mano] Chapter-4 [Stallings]
41.	Auxiliary Memory, its working in detail	Chapter-12 [Mano] Chapter-4 [Stallings]
42.	Associative memory, its Architecture & Working	Chapter-12 [Mano] Chapter-4 [Stallings]
43.	Cache Memory, Different Types of Mapping	Chapter-12 [Mano] Chapter-5 [Stallings]
44.	Virtual Memory, Memory Management hardware	Chapter-12 [Mano] Chapter-4 [Stallings]
45.	Numerical Questions on Cache Memory, Main Memory & different type of Mapping	
46.	Multiprocessors: Introduction, Characteristics of Multiprocessor	Chapter-13 [Mano]
47.	Different types of Interconnection structure between Multiprocessors	Chapter-13 [Mano]
48.	Interprocessor Communication: Overview	Chapter-13 [Mano]
49.	Interprocessor Synchronization	Chapter-13 [Mano]

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
50.	Buffer Reserved for Revision	

Lesson Plan for Practical

Course: MCA-155- Computer Organization(CO)	
MCA - 1 st Semester	No. of Practical Hours per Week: 2

COs for Practical (MCA-155):	
CO1	Work with digital kit and Logism simulator. (BTL 6)
CO2	Implement complex combinational and sequential circuits using both digital kit and Logism simulator. (BTL 3)
CO3	Troubleshoot complex circuits using both digital kit and Logism simulator.(BTL 6)
CO4	Implement arithmetic, shift and logic microoperations using digital kit/simulator. (BTL 3)
CO5	Translate digital logic aspects into real world circuits like Traffic Light simulator and LED lights.(BTL 2)

Week No.	Lab No.	Topics / Concepts to be Covered	Reference of Lab Manual
1.	1.	Familiarize with IC Chips, Connecting Wires and Digital Kit. Demonstration of IC chips working on Digital Kit. Identification and Verification of various IC chips on Digital Kit. Implement and Verify Basic Circuits using logic gates.	Assignment A (Problem AP ₁ To AP ₅)
2.	2.	Implementation and Verification of Basic Combinational Circuits.	Assignment B (Problem BP ₁ To BP ₆)
3.	3.	Designing and Verification of Larger Size Combinational Circuit using smaller size C.C.	Assignment B (Problem BA ₁ To BA ₃)
4.	4.	Learn to handle Multiple Inputs for given Combinational circuits on Digital Kit and Logism.	Assignment B (Problem BA ₄ To BA ₅)
5.	5.	Implementation and Verification of Basic Sequential Circuits.	Assignment C (Problem CP ₁ To CP ₄)
6.	6.	Designing and Verification of other components of system using combinational circuit & sequential	Assignment C (Problem CA ₁ To CA ₃)

Week No.	Lab No.	Topics / Concepts to be Covered	Reference of Lab Manual
		circuit.	
7.	7.	Buffer Reserved for Revision	
8.	8.	Designing and Verification of Arithmetic Circuit of system.	Assignment D (Problem DP ₂)
9.	9.	Designing and Verification of Logic Circuit of system.	Assignment D (Problem DP ₁)
10.	10.	Buffer Reserved for Revision	Assignment D (Problem DA ₁ ,DA ₂)
11.	11.	Designing and Verification of Shift circuit of system.	Assignment D (Problem DP ₃)
12.	12.	Learn to handle and Design any no. of bits for complex circuits like ALU, Tri-state buffer etc.	Assignment D (Problem DA ₃ ,DA ₄)
13.	13.	Buffer Reserved for Revision	Assignment D

Testing Schedule:

Nature of Test	August	September	October	November
Surprise Test (ST)	ST in any of the Weeks	-	-	-
Mid Term Test (MT)	-	MT in 2nd / 3rd Week	-	-
Class Test (CT)	CT1 in any of the Weeks	-	CT2 in any of the Weeks	-
Supplementary Test (Sp.T)	-	-	-	Sp. T in 1 st week
Assignment Submission Schedule	Assignment-1 is to be submitted One Week after completion of Unit-1 and Unit-2. Assignment-2 is to be submitted One Week after completion of Unit-3. Assignment-3 is to be submitted One Week after completion of Unit-4.			

Suggested Topics for Presentation:

S. No.	Suggested Topics for Presentation
1.	Instruction Pipeline and Performance

S. No.	Suggested Topics for Presentation
2.	Superscalar Processing
3.	Pipeline Scheduling Techniques
4.	Cache Memory Optimizations
5.	Chip Core Multiprocessors
6.	Processor Memory Interaction
7.	DRAM Memory system

Suggested Topics for Group Discussion:

S. No.	Suggested Topics for Group Discussion
1.	Role of Circuits in Smart Homes
2.	Role of Circuits in Weather Forecasting
3.	Application in High Precision Security Devices
4.	Utilization of Circuits in Transportation System
5.	Identification & working of electronics devices in Smart Farming
6.	Identification & working of electronics devices in Smart Health Care
7.	Applications and handheld devices used in daily life
8.	Multicore Processors