Department of Electronics and Communication Engineering
GLA University, Mathura

Teaching cum Learning Delivery Plan

Course: B.Tech CS/DA/CSF/IIoT/AIML- II year

Subject Name & Code	Computer Organization (BCSC1005)

Name of Faculty: Dr. Shasanka.Sekhar Rout **Total teaching hour:** 43

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Lect No.	Module	Topic	Pre-Reading Material	No. of lectures required	Sub-Topic	Methodology	Learning Outcomes (Topic-wise)
1	Module-I	Basic Organzation	R1	1	Basic Organization of the computer and block level discription of the functional block.	Chalk & Board	**CO1:** Understand the basics of digital computer system. **CO2:** Demonstrate the principle of arithmetic operations on unsigned, signed integers and floating point numbers. **CO3:** Understand the concepts of Combinational and Sequential circuits and their applications.
2			R1	2	Signed number representation, arithmetic addition, and subtraction with overflow condition		
3							
4			R1	2	IEEE standard 32-bit and 64-bit floating point number representation		
5							
6			R1	1	Introduction to Combinational Circuit- half adder, full adder, half subtractor, and full subtractor		
7			R1	2	4-bit binary adder/subtractor, carry look ahead adder.		
8							
9			R1	1	Multiplexer, demultiplexer, and overview of a decoder		
10			https://www.cukashmir.ac.in/cukashmir/User_Files/imagefile/DIT/StudyMaterial/ComputerArch_Btech/Ch4_MorisMano.pdf	2	Register, bus, and memory transfer	Power-point presentation	
11							
12		Central Processing Unit	R2	2	Binary multiplication, Booth's algorithm	Chalk & Board	**CO4:** Understand the CPU architecture and organization.
13							
14			R2	1	General registers organization and stack organization	Power-point presentation	
15			R1	1	Prefix and postfix notation	Chalk & Board	
16			R2	2	Three, Two, One & Zero address instruction.		
17			https://www.digimat.in/nptel/courses/video/106105163/L07.html	2	Addressing modes, Micro-operations (Arithmetic, Logical & Shift) and its applications.		
18							

Introduction to Computer Organization

- Computer Organization defines the way; system is structured so that all those catalogued tools can be used.
- Computer Architecture is a set of rules and methods that describe the functionalities of computer systems.
- The significant components of Computer organization are ALU, CPU and Memory.
- Computer is of two types based on processing of information.
    - ➢ Analog computer
    - ➢ Digital computer

What is an analog computer?

➢ An analog computer is a programmable machine which makes processing of information in terms of analog signals.

What is a digital computer?

➢ A digital computer is a programmable machine which makes processing of information in terms of digital numbers.

Difference between Computer Architecture & Computer Organization:

Computer Architecture

- It explains what does a computer system contain ?
- It comes first.
- It acts as the interface between hardware and software.
- It defines logical aspect of computer.
- It deals with instruction set, instruction format, addressing mode and data type.
- It helps us to understand the functionalities of a system.

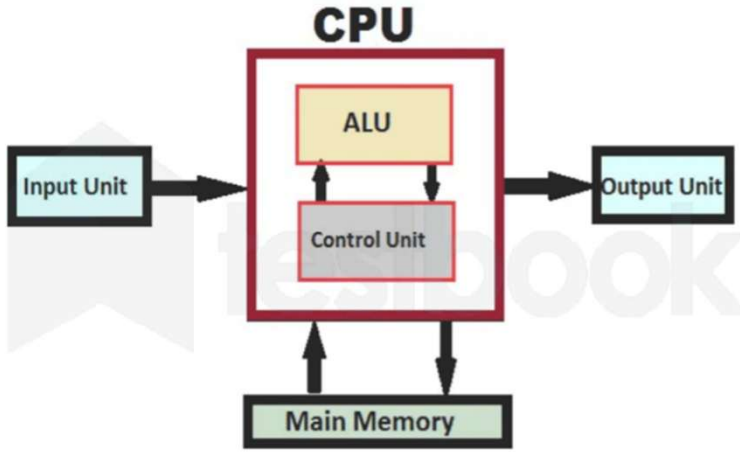
Computer Organization

- It explains how does a computer system work ?
- After architecture then it comes.
- It deals with the components of a connection in a system.
- It defines physical aspect of computer
- It deals with circuit design, memory type and control signals.
- It tells us how exactly all the units in the system are arranged and interconnected.

Von Neumann Architecture: Neumann architecture was first published by John von Neumann in 1945. It is also known as ISA (Instruction set architecture) computer.

His computer architecture design consists :

- CPU (Central processing Unit)
- Input device
- Memory
- Output Device



CPU (Central processing Unit): A central processing unit (CPU) is an important part of every computer and is used for execution of program. ALU performs mathematical calculations and takes logical decisions and Control unit controls the data flow from or to the processor.

Input device: The input device is used to provide programs and data to the computer.

Examples: Keyboard, Mouse, Scanner, Microphone, Bar Code Reader, Optical Mark Reader (OMR) etc.

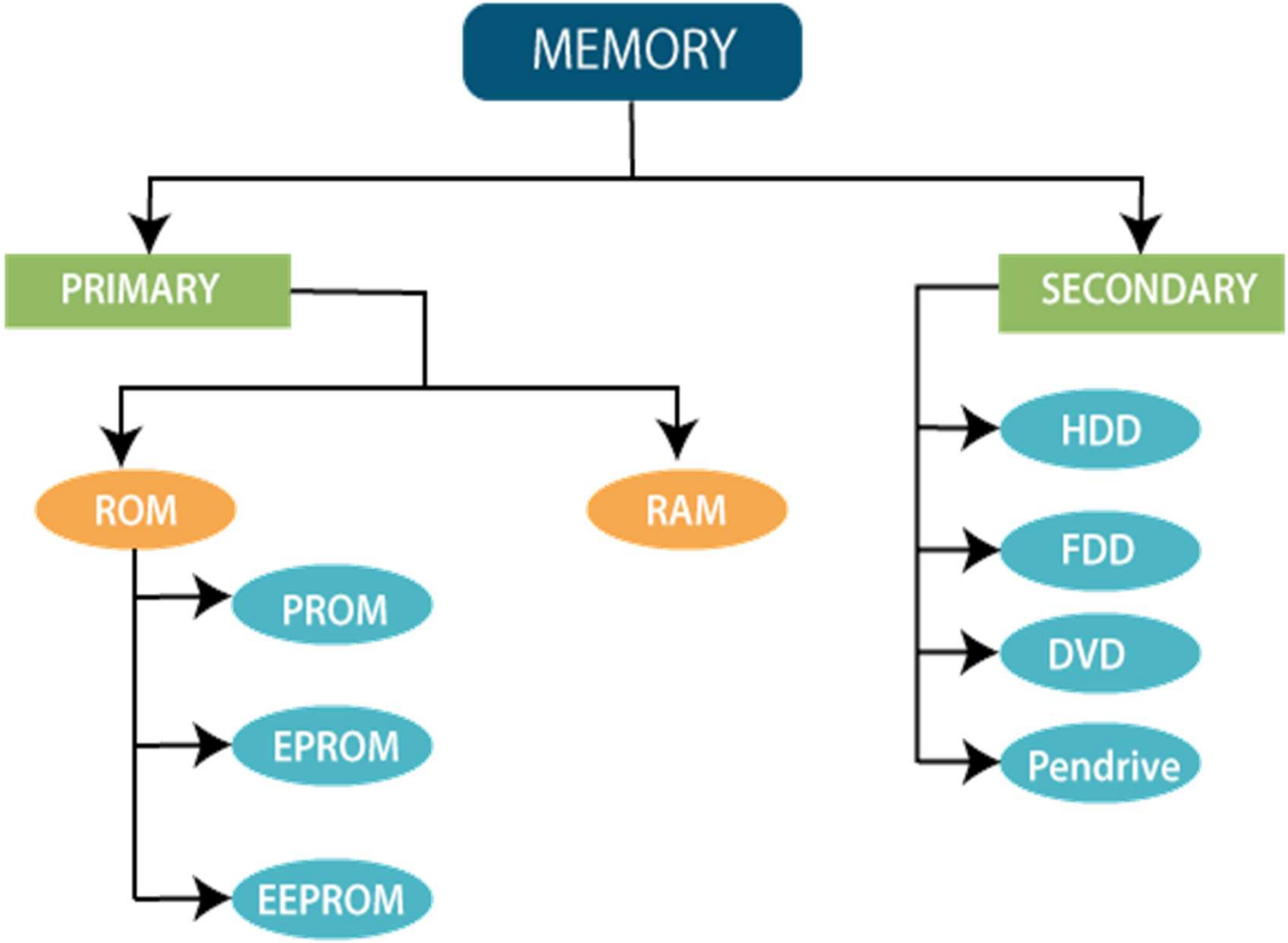
Memory: Memory is a storage device which is used to store programs, data and results.

Output Device: Output devices are used to display the results according to the instruction given to the computers.

Examples- Monitors, projectors, speakers, headphones and printers etc.

VON NEUMANN ARCHITECTURE	HARVARD ARCHITECTURE
It is ancient computer architecture based on stored program computer concept.	It is modern computer architecture based on Harvard Mark I relay based model.
Same physical memory address is used for instructions and data.	Separate physical memory address is used for instructions and data.
There is common bus for data and instruction transfer.	Separate buses are used for transferring data and instruction.
Two clock cycles are required to execute single instruction.	An instruction is executed in a single cycle.
It is cheaper in cost.	It is costly than Von Neumann Architecture.
CPU can not access instructions and read/write at the same time.	CPU can access instructions and read/write at the same time.
It is used in personal computers and small computers.	It is used in micro controllers and signal processing.

Main Memory: Memory is used for storage of data and instructions and is called internal memory. The internal memory is also called the Primary memory or Main memory or RAM.



Operations of a Computer:

Step-1: Accept information in the form of programs and data through an input unit and store it in the memory.

Step-2: Before execution, Fetch the information stored in the memory into an ALU, where the information is processed.

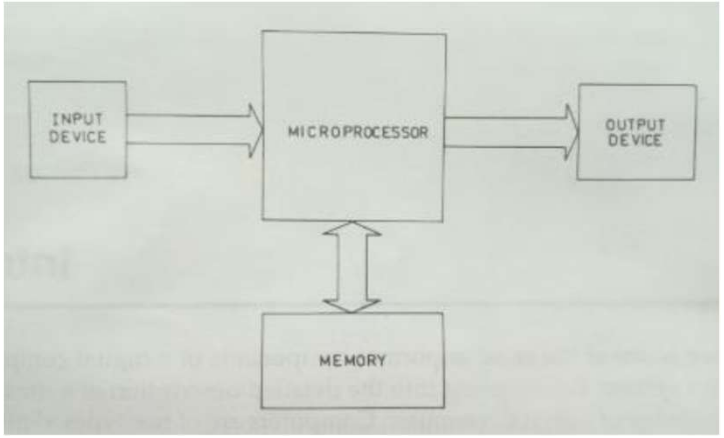
Step-3: Send or Output the processed information (result) through an output unit.

Note: Control all activities inside the machine through a control unit.

What is a microcomputer?

A digital computer in which one microprocessor has been provided to act as a CPU is called as microcomputer.

Examples: Desktop computers, Laptops, Notebook



What is a multiprocessor computer system?

A computer whose CPU contains more than one microprocessor is called a multiprocessor computer system.

Example: High-end powerful server, supercomputers

What is a microprocessor?

➢ When the central processing unit is fabricated on a single IC is called as microprocessor.

➢ Micro means very small, as the processor is very small in size so it is called as microprocessor.

Examples: 4004µP, 8085µP, 8086µP, 80286µP, 80386µP, 80486µP, Pentium etc.

Word length of a computer:

- A word length refers to the basic data size or bit size that can be processed by the processor.
- The word length of a computer or microprocessor is represented as n-bit. Where n may be 4, 8,16,32,64 etc.
- A processor of longer word length is more powerful and can process data at faster speed as compared to a processor of shorter word length.

Units of memory:

- The smallest unit of memory is bit which can store the binary digits 0/1.
- The combination of 4 bits is called as 1 nibble.
- The combination of 8 bits is called as 1 Byte=2 nibble.
- 1 KB=2^{10}Bytes=1024 bits
- 1MB=2^{20} Bytes=2^{10}KB=1024 KB
- 1GB=2^{30}Bytes=2^{10}MB=2^{20}KB
- 1TB=2^{40}Bytes=2^{10}GB=2^{20}MB=2^{30}KB

THANK YOU