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ACADEMY ACADEMINING CREATBOMIN	Topics	No of Questions	Mark/s per Question	Maximum Marks	Total Marks
	English Language Reading Comprehension include passages with questions based on their contents, grammar, vocabulary, sentence completion, synonyms, antonyms, comprehension of passages etc. choice of appropriate words, plurases, expressions and similar language skills etc.	40	1	40	100
	Reasoning (Verbal and Arithmetic) This shall include the questions to measure how quickly and logically you can think. This section will cover logical situations and questions based on the facts given in the passage. This test shall check the problem solving capability of the candidate.	30	1	30	
	General Knowledge & Awareness including questions on current national, international affairs, culture, trade & commerce, sports, scientific inventions and discoveries,	15	1	15	
	Computer Basics : Organization of a computer, Central Processing Unit (CPU), Structure of instructions in CPU, input / output devices, computer memory, memory organization, back-up devices, System software and Application Software, Basics of Internet	15	1	15	
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What is CPU ?

CPU stands for Central Processing Unit, and it's the main component of a computer that controls the flow of data and instructions.

It also called as brain of a computer that is responsible for executing instructions and performing calculations.





Computer Instruction

A computer instruction is a binary code that determines the microoperations in a sequence for a computer.

They are saved in the memory along with the information. Each computer has its specific group of instructions.

They can be categorized into two elements as Operation codes (Opcodes) and Address.

Pre metion







Basic Format of Instruction in CPU

The general size of an instruction is 16 bits

First 12 bits (0-11) are required to define the address Next 3 bits (12-14) specify operation code (OPCODE) Last and the leftmost bit defines the addressing mode (I)

If $I = 0 \rightarrow$ Direct address

If $I = 1 \rightarrow$ Indirect address

5 14 B 12 11 10 9 9 7 6 5 4 3 2 1 0



Binary -> D,1



Components of instructions in a CPU

1. Opcode (Operation Code) 🦯 2. Operand(s) 3. Address </ 4. Addressing Mode 5. Instruction Length (X) 6. Flags 6. Flags (x)
7. Control Signals (x)



Opcode (Operation Code)

- The opcode is a binary code that represents the operation to be executed by the CPU.
- It specifies the type of operation, such as arithmetic, logic, data transfer, or control operation.
- Each opcode corresponds to a specific instruction or operation supported by the CPU architecture.



Operand(s):

- An operand is a value or data item that is operated on by an instruction.
- Operands can be constants, variables, register values, or memory addresses.
- Some instructions may have one or more operands, which provide the data to be operated on or specify the memory locations where data is stored.
- Operands can be immediate values (constants embedded within the instruction), register values, or memory addresses.



Address:



- An address refers to a specific location in memory where data or instructions are stored.
- Addresses are typically numerical values that uniquely identify each memory location within the system.
- Addresses are used to access or reference data or instructions during program execution.
- In CPU instructions, addresses are often used to specify the location of operands or data in memory that need to be accessed or manipulated.



2-2

Addressing Mode:

The addressing mode specifies how the operands of an instruction are interpreted and accessed.

Common addressing modes include:

- Immediate: Operand value is directly specified within the instruction.
- Register: Operand value is stored in a CPU register.
- Direct: Operand value is located at a specific memory address.
 - Indirect: Operand value is located at the memory address stored in another memory location.



Instruction Length:

- The instruction length indicates the number of bits or bytes required to encode the entire instruction.
- Different CPU architectures may have fixed-length or variable-length instructions.

Flags:

- Flags are status indicators or condition code bits that reflect the outcome of an instruction's execution.
- Common flags include zero flag (Z), carry flag (C), sign flag (S), overflow flag (V), etc.
- Flags are typically set or cleared based on the result of arithmetic or logical operations, and they influence subsequent instructions or control flow.



Control Signals:

- Control signals are internal signals generated by the CPU to control various stages of instruction execution, such as instruction fetch, instruction decode, operand fetch, execution, and result write-back.
- Control signals coordinate the operation of different functional units within the CPU, such as the instruction decoder, ALU (Arithmetic Logic Unit), register file, and memory interface.



Memory Reference Instructions

In Memory reference instruction:

- First 12 bits(0-I I) specify an address.
- Next 3 bits specify operation code (opcode). (000-110)
- Left most bit specify the addressing mode I
- , I = 0 for direct address ,
 - = 1 for indirect address







Register Reference Instructions



In Register Reference Instruction:

- First 12 bits(0-11) specify specify the register operation.
- The next three bits equals to 111 specify opcode.
- The last mode bit of the instruction is 0.





I/O Reference Instructions

In I/O Reference Instruction:



- First 12 bits (0-11) specify the I/O operation.
- The next three bits equals to 111 specify opcode.
- The last mode bit of the instruction is 1. Indirect





Which field in a CPU instruction specifies the memory location where data is to be read from or written to? A. Opcode B. Operand G. Address D. Control signal

What role does the addressing mode field play in a CPU instruction?

- A. Specifies the operation to be performed
- **B.** Determines the size of the instruction
- Specifies how operands are interpreted and accessed
- **D.** Controls the execution of the instruction

4. The control signals generated by the CPU are used for:
A. Specifying the operation to be performed
B. Determining the memory address for data transfer
Controlling various stages of instruction execution
D. Indicating the size of the instruction

5. What type of data is typically stored in the operand field of a CPU instruction?
A. Flags
B. Control signals
C. Immediate values
D. Opcode values



- A. Memory address of the instruction
- **B. Size of the instruction**
- **Operation to be performed**
- **D.** Data to be operated on



7. The addressing mode specifies:
A. How operands are interpreted and accessed
B. The size of the CPU instruction
C. The type of operation to be performed
D. The memory location of the next instruction









9. What does I=1 in addressing mode mean? A. Direct Ø. Indirect C. Relative D. Register





11. Addressing Mode is of how many bit(s)?

C. 5 D. 12

B. 3



12. Address is of how many bit(s)?A. 1

B.

C

••

3

2



13. What is the use of Flags?

- A. Store data
- **B.** Status Indicators
- **C. Encode Instruction**
- **D.** Control execution







15. Which of the following is a operand?
A. constant
B. register value
C. memory address
D. All of the above











