Computer 11
Unit 5: Computer Architecture
Short Questions + Long Questions

Long Question No. 1: What is meant by computer architecture? Explain important components of Computer system

Q1: What is meant by computer architecture? List out some important components of Computer system

The way in which various components of a computer are connected with one another is called computer architecture.

The most important components of computer architecture are as follows:

1. Control Unit 2. Arithmetic and logic Unit (ALU) 3. Main Memory 4. I/O Unit 5. Bus Interconnection

Q2: Define CPU?

CPU stands for Central Processing Unit. It is the most important component of the computer. It is also known as processor. CPU is considered as the brain of the computer. It performs all operations on data according to the given instructions. It executes instructions and tells other parts of computer what to do.

Q3: Define Control Unit?

It acts as a supervisor of the computer. It controls all parts of the computer. It fetches the instructions and data from main memory. It interprets those instructions to find what operation is to be performed. It controls the execution of instructions.

Q4: Define ALU?

ALU stands for Arithmetic and Logic Unit. It is that part of CPU where actual execution of the instructions takes place. It performs all the arithmetic and logical operations on the data.

Q5: What is Main Memory?

It is used to store data and instructions that are currently in use. Sometimes, main memory is also referred to as working area of computer. The main memory is divided into two parts ROM and RAM. The main memory consists of memory cells. Each memory cell has a unique number. This number is called **memory address**.

Q6: What is computer bus?

A set of electrical paths through which computer sends and receives data and instructions is called a computer bus. These are used to connect the CPU with other components of computer. Following are three types of Buses: 1. Address Bus 2. Data Bus 3. Control Bus.

Q7: Explain the function of input/output unit?

I/O unit controls the processor's communication with peripheral devices such as monitor, printer etc. Peripheral devices have unique tasks, organization, and speeds, so the CPU doesn't manage them directly. Instead, a special hardware called an I/O unit is used. This unit keeps track of the states of attached devices and compensates for speed differences between peripherals and the computer.

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Long Question No. 2: What is RAM? Discuss its types.

Q8: What is RAM? / RAM is considered primary and volatile memory. Why?

RAM, or Random Access Memory, is a temporary storage medium for active programs and data. It allows the processor to directly read and write information. RAM is considered primary and volatile memory, meaning data is lost when the power is turned off.

Q9: Define DRAM.

DRAM stands for Dynamic Random Access Memory. DRAM needs to be refreshed with an electric charge to preserve data. This refreshing process introduces delays, making it slower than other forms of memory. It less expensive.

Q10: Define SRAM.

2. SRAM stands for Static Random Access Memory. SRAM does not require constant refreshing, making it faster than DRAM. It also uses less power, but it is more expensive. SRAM technology is often used to build fast memory, such as cache memory.

Q11: What is Cache Memory?

Cache memory, situated between RAM and the CPU, serves as a small yet high-speed memory type. Its primary purpose is to store frequently accessed instructions and data, aiming to enhance the overall performance of the processor

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Long Question No. 3: What is ROM? Discuss its types.

Q12: What is ROM. / ROM is called non-volatile Memory. Why?

ROM, or Read Only Memory, is a type of computer memory where data and instructions are stored by the manufacturer during the manufacturing process. ROM's distinctive feature is that the stored data or instructions cannot be altered after manufacturing. It is non-volatile, meaning it retains its data even when the power is turned off, storing data permanently.

Q13: What is PROM?

PROM stands for Programmable Read Only Memory. PROM is initially blank and allows users or manufacturers to write data or programs onto it using special devices. Once programmed, the data or program becomes permanent and cannot be changed or erased. If an error occurs during programming, the PROM chip becomes unusable.

Q14: What is PROM?

EPROM stands for Erasable Programmable Read Only Memory. EPROM is initially blank and allows users or manufacturers to write programs or data onto it. EPROM can be erased using

special devices and ultraviolet rays, allowing users to modify the data or program, providing flexibility compared to PROM.

Q15: What is PROM?

EEPROM stands for Electrically Erasable Programmable Read Only Memory. EEPROM allows users to write or change instructions or information using electrical devices. This type of ROM offers easy data modification, providing flexibility in adapting to changing requirements.

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> **Long Question No. 4: What is computer bus? Explain in detail different types of busses used in computer.**

Q16: What is Bus. / Bus interconnection?
A computer system consists of different devices such as CPU, main memory and I/O devices. These devices are interconnected by using a set of parallel lines (Conducting wires) called Bus. This internal communication channel of the computer system is called bus interconnection.

Q17: What is Control Bus?
The computer bus which is used to send different commands or signals from one component to another is called control bus. The control bus directly connects the CPU, main memory and I/O ports.

Q18: What is Data BUS?
The computer bus which is used to transfer data from one component of computer to another is called data bus. It connects CPU with memory and other hardware devices. On the system bus 32 or 64 lines are reserved for data transfer which are called data bus. The number of lines in data bus affects the speed of data transfer between different components.

Q19: What do you mean by Width of Bus?
The amount of data that a bus can carry at one time from one component of computer to another is known as bus width.

Q20: What is Address Bus?
The computer bus which is used to connect CPU with memory to identify the different memory locations within main memory is called Address bus. An address bus can travel 256 different values at a time.

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> **Long Question No. 5: Explain I/O unit. / Discuss two ways of transferring data from the peripherals into computer.**

Q7: Explain the function of input/output unit?
I/O unit controls the processor's communication with peripheral devices such as monitor, printer etc. Peripheral devices have unique tasks, organization, and speeds, so the CPU doesn't manage them directly. Instead, a special hardware called an I/O unit is used. This unit keeps track of the states of attached devices and compensates for speed differences between peripherals and the computer.

Q21: What is interrupt?

An interrupt is a signal. In this scheme, the processor issues a command to an I/O device for input or output operation. The device generates an interrupt signal to processor when it becomes ready. When CPU receives interrupt, it suspends all other processing and performs I/O operation.

Q22: Define DMA?

DMA stands for Direct Memory Access. In this scheme, processor issues I/O command and then gets busy in some other processing. A special hardware receives data from I/O device. It uses system bus to store data in main memory directly without going through CPU.

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Long Question No. 6: What is CPU Register? Discuss Special purpose registers.

Q23: What is CPU Register?

CPU contains small storage areas that are used to store data and instructions during program execution. The storage areas or locations inside the CPU are called registers. The size of these registers is 2, 4 or 8 bytes.

Q24: What is program counter (PC)?

This register is used to store the address of the next instruction to be fetched for execution. When the instruction is fetched, the value of PC is incremented. Thus this register always points or holds the address of next instruction is to be fetched.

Q25: What is memory address register (MAR)?

This register holds the address of memory where CPU wants to read or write data. When CPU wants to store data in the memory or reads the data from the memory, it places the address of the required memory location in the MAR.

Q26: What is the purpose of Instruction Register (IR)?

Once the instruction is fetched from main memory, it is stored in the Instruction Register **IR** where this instruction is decoded.

Q27: What is the purpose of Memory buffer register (MBR)?

This register is used to store data or instructions coming from the memory or going to the memory.

Q28: What is stack pointer register?

A stack represents a set of memory blocks. The data is stored in and retrieved from these blocks in an order i.e. Last in and first out (LIFO). The stack pointer register is used to manage the stacks in memory.

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Long Question No. 7: What is CPU Register? Discuss General purpose registers.

Q29: What are General Purpose Registers?

A CPU also has some general-purpose registers. These registers are us used along with ether registers to perform arithmetic & Logical operations. These registers are also used for data movement purposes inside the computer. These registers are called EAX, EBX, ECX and EDX.

Q30: What is address or Segment Register? List down names

A block of memory is called a segment. The segment register is used to store the addresses of the memory blocks that are being currently used by CPU. This register is used to store base

location for program, instructions, data and the stack. Segment register is also known as address register

Q30 Define following registers.

AX (Accumulator Register): Used for arithmetic and data operations.

BX (Base Register): Used for arithmetic and data movement and special addressing abilities.

CX (Counter Register): Used for counting purpose. Acts as a counter for repeating or looping.

DX (Data): Has special role in division and multiplication.

Address or Segment Registers: The address or segment register is a group of 4, sometimes registers named CS, DS, ES, SS. The segment register used as base location for program instruction, data, and the stack.

CS (Code Segment): The CS register holds the base location of all executable instructions (code) in the program.

DS (Data Segment): The DS register is the default base location for memory variables. The CPU calculates the offsets of variables using the current value of DS.

ES (Extra Segment): The ES register is an additional base location for the memory variables.

SS (Stack Segment): The SS register contains the base location of the current

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Long Question No. 8: Define Instruction set. Explain types of CPU instructions / Operations performed by thy CPU.

Q31: What is meant by Instruction Set?

A set of instructions that a CPU can execute to perform different operations on data is known as the instruction set of that CPU. Normally, a modern CPU can execute 80 to 120 instructions.

Q32: Write down different types of operations performed by CPU?

The important types of operations performed by CPU are Data Transfer, Input Output, Arithmetic & Logical Control Transfer.

Q33: What are Data Transfer Instructions?

The instructions that are used to transfer data from one unit of computer to another during program execution are called Data Transfer Instructions.

Q34: What are I/O Instructions?

The instructions that are used to write and read data to and from the I/O devices are called I/O Instructions. To use these operations a programmer may use input and print command.

Q35: What are Control Transfer Instructions?

The instructions that are used to transfer the execution control from one part of the program to another during program execution are called Control Transfer Instructions. **Example** are: Jump, Jumpz (jump if zero).

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Long Question No. 9: **What is instruction format? Describe various instruction formats.**

Q36: What is meant by instruction format?

An instruction format refers to the structure of a statement in machine code that instructs a computer to perform a specific action. The group of bits of an instruction is logically divided into different parts. Each part is used to perform a specific action.

Two main parts are:

1. Operand code

2. Address of the operand.

Q37: What is Zero-Address Instruction Format?

In this format, there is no address field present. It is commonly used in stack-organized computers for instructions like ADD and MUL, where operands are retrieved directly from the stack. **Q33:**

Q38: What is One-Address Instruction Format?

This format uses only one address field. It uses one accumulator register (AC) for all data manipulation. A second register is required for multiplication and division.

Q39: What is Two-Address Instruction Format?

The Two instruction of two-address format uses two address fields. Each address field can specify either a register or a memory address. Two-address instructions are the common in commercial computers. Examples of such instructions are MOV, ADD and CMP.

Q40: What is Three-Address Instruction Format?

The instruction of three-address format uses three address fields. Each address field can specify either a register or a memory address. This format reduces execution time but This type of instruction requires too many bits to specify three addresses.

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Long Question No. 10: **Explain Fetch-Decode-Execute Cycle.**

Q41: What is Fetch-Decode-Execute Cycle?

For every instruction of the program, the control unit (CPU) carries out three basic operations, known as the Fetch-Decode-Execute Cycle. It is also called the Machine Cycle.

Q42: Define Fetch Instruction?

The CPU reads the value of PC and the instruction pointed to by PC into the instruction register. This fetching of instruction involves the following **steps:**

➢ Copy the contents of PC into the MAR and request a memory read

➢ Copy the data read from the memory into MBR and instruction then in the IR. Increment PC so that it points to the next

Q43: Define Decode Instruction?

After the fetching of instruction is completed the CPU decodes the instruction. The process of decoding the instruction so that the computer understand it is called Decode Instruction.

Q44: Define Execute Instruction

After decoding the instruction, the processor executes the instruction. The process of taking action on the decoded instruction is called Execute Instruction.

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Long Question No. 11: **What is operating system? Discuss functions of operating system**

Q45: What is operating system? What are the functions performed by the operating system.

A set of programs running in the background on a computer system and providing an environment in Which other programs can be executed and the computer system can be used efficiently.

The main functions performed by the operation system (Write explanation from book Pg. 86)

- ➢ Management of Hardware
- ➢ Load and Execute Programs
- ➢ Memory Management
- ➢ Data Security
- ➢ Providing Interface to the Use

Q46: What is Command Prompt interface?

In this type of user-interface, the user communicates with the computer (or operating system) by typing commands through keyboard. The user interface provided by MS-DOS operating system is an example of command prompt.

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Long Question No. 12: **What are programming languages? Explain low-level and high-level languages.**

Q47: Define Programming Languages:

Programming languages serve as the medium of communication between users and computers. Programs, written in these languages, facilitate various computational tasks. There are different types of programming languages tailored for specific applications, such as business or scientific programs.

Q48: Define Syntax.

The **syntax** of a programming language consists of a set of rules that govern the structure and composition of a computer program. Process of finding errors in the source code in called **debugging**.

Q49: What is Low-Level Languages?

Low-level languages are closely tied to machine language, represented in binary form (0s and 1s). Examples of low-level languages include machine language and assembly language.

Q50: What is Machine Language?

In machine language, instructions are expressed in binary form, comprising 0s and 1s. It serves as the foundational language of computers, and the computer can directly understand and execute instructions in machine language without the need for further translation.

Q51: What is Assembly Language?

Assembly language, while still low-level, Instructions in assembly language are written using short names or symbols known as *mnemonics*, making them more human-readable. Examples include mnemonics like ADD for addition, MUL for multiplication, and SUB for subtraction.

Q52: What is High-Level Languages?

High-level languages are closer to human languages, making them easier for programmers to learn and use. Instructions in high-level languages are expressed in English-like words, such as print and input. Example of high level language include C, C++ and JAVA.

Q53: Differentiate between Source Code and Object Code.

Programs written in any high-level programming language or assembly language are referred to as source code. However, computers can only execute machine code. Therefore, source code must undergo translation into machine code before it can be run on a computer. The translated program in machine code is known as object code.

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Long Question No. 13: What is a language translator? Explain its different types.

Q54: What is Language Translator?

A language translator is a system software that translates source code into machine code (object code), acting as a language processor. Therefore, most programs are written in high-level languages like C/C++, Java, or BASIC and translated into machine code before running on a computer.

Q55: What is Compiler? / How does it work?

A compiler is a type of language translator that translates the entire source code into machine code as a whole. It analyzes the source code, checks for errors, and, if error-free, translates the entire code into object code (machine code). Examples include C and C++ compilers.

Q56: What is Interpreter? / How does it work?

In contrast to compilers, interpreters translate and execute statements of a source code one by one. They translate one statement, execute it immediately, and continue this process until the end of the program. While interpreters are helpful in detecting and correcting errors in the source program, they are time-consuming, do not produce object code.

Q57: What is Assembler?

An assembler specifically translates programs written in assembly language into machine code. It plays a crucial role in converting human-readable mnemonics into the binary language understood by the computer.

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Long Question No. 14: **What is a language translator? Explain its different types.**

Q58: What is a Port? A port, in computing, refers to a hardware interface that allows peripheral devices to connect to a computer system unit. These ports serve as the connecting point or interface through which data is transmitted between the computer and its peripherals.

Q59: Define Serial Port. Serial ports transmit data one bit at a time, making them slower compared to other types of ports. They were commonly used for connecting devices like mice, keyboards, and modems.

Q60: Define Parallel Port. Parallel ports transmit multiple bits of data simultaneously, enabling faster data transmission compared to serial ports. They were typically used for connecting printers and scanners.

Q61: Define USB Port. USB (Universal Serial Bus) ports are the most widely used standard ports in PCs today. They allow for the connection of a wide range of peripheral devices, including keyboards, mice, speakers and USB flash.

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