**CSA1235:COMPUTERARCHITECTURE**

**1)what is cpu performance?**

*CPU performance refers to the effectiveness and efficiency of a computer's central processing unit (CPU) in executing instructions. High CPU performance implies that a computer can process a large number of instructions per unit time, enabling it to operate more quickly and handle more simultaneous tasks.*

**2)what is memory addressing?**

In computing, a memory address is a reference to a specific memory location used at various levels by software and hardware. Memory addresses are fixed-length sequences of digits conventionally displayed and manipulated as unsigned integers.There are various types of addressing modes, including immediate addressing, register addressing, direct addressing, indirect addressing, indexed addressing, base+offset addressing, and stack addressing. The exact number and types may vary depending on the architecture and design of the processor**.**

**3)what is memory allocation?**

Memory allocation is the process of reserving virtual or physical computer space for a specific purpose (e.g., for computer programs and services to run). Memory allocation is part of the management of computer memory resources, known as memory management**.**

**4)what is arithmetic operations?**

Integer arithmetic is arithmetic without fractions. Integers are represented as a sequence of bits, with each bit representing a power of two and a single bit indicating the sign.Computer arithmetic is a branch of computer engineering that deals with representing integers and real values in digital systems. It also deals with efficient algorithms for manipulating these numbers using hardware circuits or software routines.

**5)what are floating point operations?**

In computer architecture, floating point is a way to represent and perform arithmetic operations on real numbers. It's a numerical data type that can handle values with fractional parts and a wide range of magnitudes.In computing, floating-point arithmetic (FP) is arithmetic that represents subsets of real numbers using an integer with a fixed precision, called the significand, scaled by an integer exponent of a fixed base. Numbers of this form are called floating-point numbers.Specific to floating-point numbers, a floating-point operation is any mathematical operation (such as +, -, \*, /) or assignment that involves floating-point numbers (as opposed to binary integer operations). Floating-point numbers have decimal points in them**.**

**6)what is single-precision?**

Single-precision floating-point format uses 32 bits of computer memory and can represent a wide range of numerical values. Often referred to as FP32, this format is best used for calculations that won't suffer from a bit of approximation.

**7)what is double-precision?**

Double-precision floating-point format, on the other hand, occupies 64 bits of computer memory and is far more accurate than the single-precision format. This format is often referred to as FP64 and used to represent values that require a larger range or a more precise calculation**.**

**8)what is restoring?**

The term "restoring" refers to the fact that after each repetition, the value of register A is restored. Register Q in this case holds the quotient, while register A holds the remainder. Here, the divisor is loaded in M and the n-bit dividend is loaded in Q.

The restoring division algorithm is a slow division algorithm that calculates the quotient digit by digit. This algorithm will generate a quotient and a remainder after the division algorithm. Division algorithm in computer architecture uses registers for storing the numbers and calculations.

**9)what is non-restoring?**

The Non-Restoring Division Algorithm is a method used to perform division operations on unsigned integers without relying on restoring intermediate remainders. It's an iterative approach that approximates the quotient and updates the remainder in each iteration, leading to an accurate division result.

**10)what is booth algorithm?**

Booth's algorithm examines adjacent pairs of bits of the 'N'-bit multiplier Y in signed two's complement representation, including an implicit bit below the least significant bit, y−1 = 0. For each bit yi, for i running from 0 to N − 1, the bits yi and yi−1 are considered.Booth's algorithm is a multiplication algorithm that examines adjacent pairs of bits in a signed two's complement representation. It's a method for multiplying two signed binary numbers using a technique called “bit shifting”. The algorithm was introduced in 1951 by Andrew Donald Booth

**11)what is code converter?**

A code converter is a logic circuit that changes data presented in one type of binary code to another type of binary code, such as BCD to binary, BCD to 7segment, binary to BCD, BCD to XS3, binary to Gray code, and Gray code to binary.A code converter is a logic circuit that changes a type of binary code to another type. Code conversion is a method used to convert code from one format to another. It is commonly used in computers, microprocessors, and digital electronics.

**12)what is meant by RAM?**

RAM (random access memory) is a computer's short-term memory, where the data that the processor is currently using is stored. Your computer can access RAM memory much faster than data on a hard disk, SSD, or other long-term storage device, which is why RAM capacity is critical for system performance.

**13)what is meant by ROM?**

ROM, or read-only memory, is a type of computer memory that can only be read from, not written to. It is a type of storage that contains data that can't be changed or modified. ROM retains its contents even after the power to the device it's installed in has been turned off.

**14)what is virtual memory?**

Virtual memory is an essential component of computer architecture that makes use of secondary storage, such as disks, to attain the accessible memory size, which extends the physical memory. Virtual memory relies on a memory management unit (MMU) to translate logical addresses to physical addresses.A virtual machine (VM) is a virtual environment that functions as a virtual computer system with its own CPU, memory, network interface, and storage, created on a physical hardware system (located off- or on-premises).

**15)what is cache memory?**

cache memory, supplementary memory system that temporarily stores frequently used instructions and data for quicker processing by the central processing unit (CPU) of a computer. The cache augments, and is an extension of, a computer's main memory.Cache memory is a supplementary memory system that temporarily stores frequently used instructions and data. It is built directly into the CPU and is a type of random access memory**.**

**16)what is single bus organization?**

In one bus organization, a single bus is used for multiple purposes. A set of general-purpose registers, program counters, instruction registers, memory address registers (MAR), and memory data registers (MDR) are connected with the single bus. Memory read/write can be done with MAR and MDR.

**17)what is multiple bus organization?**

Multiple bus organization in computer architecture is a design that allows multiple. devices to work simultaneously.

**18)what is two-stage pipelining?**

In a pipelined processor, a pipeline has two ends, the input end and the output end. Between these ends, there are multiple stages/segments such that the output of one stage is connected to the input of the next stage and each stage performs a specific operationIn a 2 -stage pipeline, you break down a task into two sub-tasks and execute them in pipeline. Lets say each stage takes 1 cycle to complete. That means in a 2-stage pipeline, each task will take 2 cycles to complete (known as latency).

**19)what is four-stage pipelining?**

A pipelined processor uses a 4-stage instruction pipeline with the following stages: Instruction fetch (IF), Instruction decode (ID), Execute (EX) and Writeback (WB).

**20)what is dynamic prediction?**

This says whether the branch was recently taken or not. Based on this, the processor fetches the next instruction from the target address / sequential address. If the prediction is wrong, flush the pipeline and also flip prediction. So, every time a wrong prediction is made, the prediction bit is flipped.

**21)what is static prediction?**

Static prediction is the simplest branch prediction technique because it does not rely on information about the dynamic history of code executing. Instead, it predicts the outcome of a branch based solely on the branch instruction.

**22)what is data hazards?**

Data hazards occur when instructions that exhibit data dependence modify data in different stages of a pipeline. Ignoring potential data hazards can result in race conditions (also termed race hazards). There are three situations in which a data hazard can occur: read after write (RAW), a true dependency.

Some common examples of pipeline hazards in computer science are data hazards (read after write, write after read, and write after write), structural hazards (conflicts in accessing hardware resources), and control hazards (branching and jumping can disrupt instruction flow).

**23)what is instruction hazards?**

Instruction hazards are a type of hazard that can occur in pipelined computer architectures. These hazards arise when instructions are not executed in the correct order or when the pipeline stages are not utilized efficiently.Three common types of hazards are data hazards, structural hazards, and control hazards (branching hazards).

**24)what is structural hazards?**

A structural hazard occurs when two (or more) instructions that are already in pipeline need the same resource. The result is that instruction must be executed in series rather than parallel for a portion of pipeline. Structural hazards are sometimes referred to as resource hazards.

**25)** **What is bus arbitration in computer architecture?**

Bus Arbitration refers to the process by which the current bus master accesses and then leaves the control of the bus and passes it to another bus requesting processor unit. The controller that has access to a bus at an instance is known as a Bus master.

**26)what is direct memory addressing?**

When it comes to computer architecture, one of the key concepts is the Direct Addressing Mode. In this mode, the address part of the instruction is directly equal to the effective address. This means that the operand is located in memory, and the address is directly provided by the instruction's address field.

**27)what is meant by pipeline interrupts?**

In the pipelined interrupt model, the CPU can receive interrupts most of the time, but the delivery logic of those events may be deferred by a software mechanism until the kernel actually accepts them.

**28)what is PCI interrupts?**

A PCI device uses the pci-bus object to raise and lower the interrupt signal for a specific interrupt pin. The pci-bus object then passes the interrupt to the host-to-PCI bridge that translates the interrupt to a system architecture specific interrupt.