⭐ Unit 5: Computer Architecture ⭐

Q1: What is meant by computer architecture?

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

Q2: List out some important components of a Computer system.

Ans: The most important components of computer architecture are as follows:

- ❖ Control Unit
- ❖ Arithmetic and Logic Unit (ALU)
- ❖ Main Memory
- ❖ Bus Interconnection
- ❖ input/output unit

Q3: Define CPU.

Ans: CPU stands for Central Processing Unit. It is the most important component of the computer. It is also known as a 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.

Q4: Define Control Unit.

Ans: 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.

Q5: Define ALU.

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

Q6: What is Main Memory?

Ans: 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.

Q7: What is ROM.

Ans: ROM stands for Read Only Memory. It is a type of internal memory. The contents or instructions that are stored in this type of memory can only be read but cannot be changed or deleted. It is not possible to write new instructions or information into the ROM. That is why it is called read only memory. The ROM is divided into following types: PROM, EPROM, EEPROM.

Q8: Define PROM.

Ans: It stands for Programmable Read Only Memory. This form of ROM is initially blank. The manufacturer can write its own programs or data by using specially devices. If there is any error in writing the instructions, the error cannot be removed from PROM.

Q9: Define EPROM.

Ans: It stands for Erasable Programmable Read Only Memory. Like PROM, it is initial blank. The manufacturer can write its programs or data by using special devices. The users can also crease instructions or data written on EPROM chip with special devices using ultraviolet rays. The users then can also write new programs on it.

Q10: <u>Define EEPROM.</u>

Ans: It stands for Electrically Erasable Programmable Read Only Memory. The user can erase and write instructions with electrical pulses. Its contents can be easily modified electronically.

Q11: <u>Define bit and byte.</u>

Ans: The binary digit l or 0 is called a bit. The bit" stands for binary digit. It is the basic unit for storing data in the computer memory. A combination of 8-bits is called byte. One character takes one byte of memory. The storage capacity of the memory is expressed in terms of number of bytes.

Q12: <u>Explain the function of input/output unit.</u>

Ans: VO unit controls the processor's communication with peripheral devices such as monitor, printer etc.

Q13: <u>What is computer bus?</u>

Ans: 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:

❖ Address Bus   ❖ Data Bus
❖ Control Bus

Q14: <u>What is Data BUS?</u>

Ans: 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. The number of lines in data bus affects the speed of data transfer between different components.

Q15: <u>What do you mean by Width of Bus?</u>

Ans: The amount of data that a bus can carry at one time from one component of computer to another is known as bus width.

Q16: <u>What is Address Bus?</u>

Ans: 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.

Q17: <u>What is Control Bus?</u>

Ans: 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.
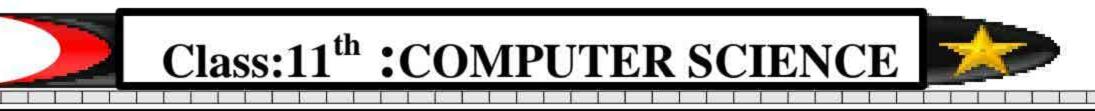
Q18: <u>What is CPU Register?</u>

Ans: 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.

Q19: <u>What is program counter (PC)?</u>

Ans: 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.

Q20: What is an Instruction Register (IR)?

Ans: Once an instruction is fetched from main memory, it is stored in the Instruction Register. The control unit takes instruction from this register, decodes, and executes it by sending signals to the appropriate component of a computer to carry out the task.

Q21: What is a memory address register (MAR)?

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

Q22: What is MBR?

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

Q23: What is a stack pointer register?

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

Q24: What are General Purpose Registers?

Ans: A CPU also has some general-purpose registers. These registers are used along with other 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.

Q25: What is Segment Register?

Ans: 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 the CPU. This register is used to store the base location for program instructions, data, and the stack. The segment register is also known as the address register.

Q26: What is meant by Instruction Set?

Ans: 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.

Q27: Write down different types of operations performed by the CPU.

Ans: The important types of operations performed by the CPU are:

- ❖ Data Transfer
- ❖ Input Output
- ❖ Arithmetic and Logical
- ❖ Control Transfer

Q28: What are Data Transfer Instructions?

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

Q29: What are I/O Instructions?

Ans: The instructions that are used to write and read data to and from the I/O devices are called I/O Instructions. I/O devices are also known as peripheral devices. The peripheral devices may include a keyboard, monitor, and disks, etc.

Q30: **What are Control Transfer Instructions?**

Ans: 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. These instructions may be used to execute a set of instructions repeated for a number of times.

Q31: **What is meant by instruction format?**

Ans: An instruction consists of a group of bits that tells the computer to perform a specific operation. The group of bits of an instruction is logically divided into different parts. Two main parts are:

❖ Operand code

❖ Address of the operand. Each part is used to perform a specific action.

Q32: **What is Zero-Address Instruction Format?**

Ans: In zero-address instruction format, no address is specified. A stack-organized computer does not use an address field for instructions like ADD and MUL.

Q33: **What is one-Address Instruction Format?**

Ans: 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.

Q34: **What is Two-Address Instruction Format?**

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

Q35: **What is the three-address Instruction Format?**

Ans: The instruction of the three-address format uses three address fields. Each address field can specify either a register or a memory address. This type of instruction requires too many bits to specify three addresses.

Q36: **What is Fetch-Decode-Execute Cycle?**

Ans: 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.

Q37: **Define Fetch Instruction.**

Ans: The process of transferring a program instruction from memory to CPU is called fetch instruction. The CPU gets a program instruction from the main memory for taking action on it.

Q38: **Define Decode Instruction.**

Ans: The process of decoding the instruction so that the computer can understand it is called Decode Instruction.

Q39: **Define Execute Instruction.**

Ans: The process of taking action on the decoded instruction is called Execute Instruction.

Q40: **What is operating system?**

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

Q41: **Write the main functions performed by the operating system.**

Ans: The main functions performed by the operation system are:

- ❖ Management of Hardware
- ❖ Load and Execute Programs Resources
- ❖ Memory Management
- ❖ Data Security
- ❖ Providing Interface to the User

Q42: **What is the Command Prompt interface?**

Ans: The command prompt is also referred to as the command line user interface. In this type of user interface, the operating system provides prompt line on the computer screen. 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.

Q43: **What is a computer programming Language?**

Ans: A programming Language provides the way of communication between user and computer. A computer program is written in a programming language. The programming language provides a set of rules for writing computer programs. The instructions of the program are written in a specific manner and according to the rules of the programming language.

Q44: **Define high-level programming languages?**

Ans: The programming languages that are close to human languages (e.g. like English language) are called high- level programming languages. They are easy to understand.

Q45: **Define low-level programming languages?**

Ans: The programming languages that are very close to machine language are called low-level programming languages. The program instructions written in these languages are in binary form i.e. (0 and 1) and symbols.

Q46: **What is the difference between source code and object code?**

Ans: The program written in high level language is called source code. Source code is very easy to understand and modify. The translated program into machine code is known as object code.

Q47: **What is the function of language translator?**

Ans: The special software that is used to translate the programs written in high level language (or assembly language) into machine language programs is called language translator or language processor.

Q48: **What is compiler?**

Ans: The language translator that translates the complete source program into machine code as a whole is called compiler.

Q49: **What is Interpreter?**

Ans: The language translator that translates the source code into machine code statement by statement is called interpreter. It translates one statement of source program into machine code and executes it immediately before translating the next statement.

Q50: What is Assembler?

Ans: The language translator that translates the programs written in assembly language into machine code is called assembler.

Q51: What are the disadvantages of Interpreter?

Ans: The main disadvantages of Interpreter are:

❖ It is a time consuming process of translating and executing statements one by one.

❖ Each time the program is run, the source code is translated again. For this purpose you must have a translator program (interpreter) permanently in your computer.

Q52: What is SRAM?

Ans: It stands for Static Random Access Memory. Its memory cells are made from digital gates. Each cell can store data without any need of frequent recharging. SRAM is more expensive and does not need to be power-refreshed.

Q53: What is DRAM?

Ans: It stands for Dynamic Random Access Memory. Each memory cell must be constantly refreshed to keep data in DRAM. DRAM is least expensive RAM.

Q54: Differentiate between RAM and ROM?

Ans: The difference between RAM and ROM are:

RAM	ROM
❖ RAM is a volatile memory. ❖ The contents in RAM are not stored permanently.	❖ ROM is nonvolatile memory. ❖ The contents of ROM can only be read and the new information cannot be written in ROM.

Q55: State the use of serial port?

Ans: A serial port is used to connect devices to the system unit. A serial port transmits data one bit at a time. It is usually used to connect devices that do not require fast data transmission like mouse and keyboard etc.

Q56: State the use of parallel port?

Ans: Parallel port is used to connect devices that transfer many bits at a time. Printers are connected to computers using parallel ports.

Q57: Describe assembly language?

Ans: Assembly language is a low level computer language. It is one step higher than machine language. In assembly language, symbols are used instead of binary code. These symbols are called mnemonics.

Q58: What are interrupts?

Ans: 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 the processor when it becomes ready. When the CPU receives the interrupt, it suspends all other processing and performs I/O operation.

Q59: Define DMA.

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

Q60: <u>**Explain cache memory.**</u>

Ans: A cache memory is a small and very fast memory. It is designed to speed up the transfer of data and instructions. It is faster than RAM. The data and instructions that are most recently or more frequently used by the CPU are stored in a cache.

Q61: <u>**What is the concept of memory address?**</u>

Ans: The main memory consists of memory cells. Each memory cell has a unique number. This number is called a memory address.

Q62: <u>**Why RAM is called volatile memory?**</u>

Ans: RAM is temporary memory. When the power is turned off, the information in this memory is lost. Thus it is called volatile memory.

Q63: <u>**What is bus interconnection?**</u>

Ans: A computer system consists of different devices such as CPU, main memory and I/O devices. These devices are connected to an internal communication channel of the computer system to transfer data between these devices. The internal communication channel of the computer system is called bus interconnection.