



GALGOTIAS COLLEGE OF ENGINEERING & TECHNOLOGY

Knowledge Park-II, Greater Noida, Uttar Pradesh, 201310

MCA Department

Session- 2023-2024 [Odd Semester]

Computer Organization And Architecture (KCA-105)

UNIT-1 (Introduction And Processor Organization)

Short Answer Questions (2 Marks)

1. Define BUS and Memory Transfer.
2. Define the Term Computer Architecture and Computer Organization.
3. What do you mean by BUS arbitration? List different types of BUS arbitration.
4. Draw the basic functional units of computer.
5. Differentiate between Daisy chaining and centralized parallel arbitration.
6. What are the Different Types of Addressing Modes.
7. Discuss PUSH and POP operation of register stack?
8. What is General purpose Registers? Give Example.

Long Answer Questions (7 or 10 Marks)

1. Draw a diagram of a Bus system in which it uses 3 state buffers and a decoder instead of the multiplexers.
2. Explain in detail multiple bus organization with the help of a diagram.
3. Describe the process of self-exploration with the help of a diagram. Give one example from your life to illustrate how you self-explored any proposal shared in the class.
4. A digital computer has a common bus system for 8 registers of 16 bit each. The bus is constructed using multiplexers.
 - I. How many select input are there in each multiplexer?
 - II. What is the size of multiplexers needed?
 - III. How many multiplexers are there in the bus?
5. What do you mean by processor organization? Explain various types of processor organization.
6. What is the Stack Organization? Compare register stack and memory stack.
7. How the fast Adders are designed? Discuss.

UNIT-2(Arithmetic and Logic Unit)

Short Answer Questions (2 Marks)

1. What is carry propagation and carry generator?
2. What is Restoring and Non Restoring method in Division?
3. Discuss Biasing with reference to Floating point representation.
4. Represent -14 using 2's Complement Method.
5. What is Arithmetic and Logic Circuit?

Long Answer Questions (7 or 10 Marks)

1. Explain in Detail the principle of carry look ahead adder and design 4-bit CLA adder.
2. Evaluate the Arithmetic Statement:

$$X=A+B*[C*D+E*(F+G)]$$

Using a Stack Organized computer with zero address operation instruction.

3. Explain 2-bit by 2-bit Array multiplier. Draw the flowchart for divide operation of two numbers in signed magnitude form..
4. Show the multiplication process using Booth algorithm, when the following binary numbers, (+13) x (-15) are multiplied.
5. A binary floating-point number has seven bits for a biased exponent. The constant used for the bias is 64.
 - I. List the biased representation of all exponents from -64 to +63.
 - II. Show that after addition of two biased exponents, it is necessary to subtract 64 in order to have a biased exponent's sum.
 - III. Show that after subtraction of two biased exponents, it is necessary to add 64 in order to have a biased exponent's difference.
6. Explain IEEE standard for floating point representation. Represent the number (-1460.125)₁₀ in single precision and double precision format.

UNIT-3 (Control Unit)

Short Answer Questions (2 Marks)

1. What is RISC And CISC? Differentiate.
2. Give a note on Subroutine.
3. What is I/O control method.
4. List the steps involved in Instruction cycle.

5. Difference Between Vertical and Horizontal Microprogrammed unit.
6. What are the types of Instruction format.
7. Define micro-operation and micro code.

Long Answer Questions (7 or 10 Marks)

1. Draw the flowchart for instruction cycle with neat Diagram and Explain.
2. What is a micro program sequencer? With Block diagram , explain the working of micro program Sequencer.
3. Differentiate with Hardwired and Microprogrammed control unit. Explain each component of hardwired control unit organization.
4. Represent the following conditional control statement by two register transfer statements with control functions.
If(P=1) then ($R1 \leftarrow R2$) else if (Q=1) then ($R1 \leftarrow R3$)
5. Explain with neat diagram, the address selection for control memory.
6. Discuss the different modes of data transfer.
7. What do you mean by Pipelining? Discuss arithmetic pipeline.

UNIT-4 (Memory Unit)

Short Answer Questions (2 Marks)

1. What is SRAM and DRAM?.
2. What is the difference between 2D and 2.5 D Memory Organization.
3. Define HIT and MISS ratio in memory with an example.
4. Define Virtual memory.
5. How memory read and write operations are performed in computer system?
6. Discuss PROM, EPROM, and EEPROM.

Long Answer Questions (7 or 10 Marks)

1. A digital computer has a memory unit of 64K X 16 and a cache memory of 1K words. The cache uses direct mapping with a block size of four words.
 - I. How many bits are there in the tag, index, block, and word fields of the address format?
 - II. How many bits are there in each word of cache, and how they are divided into functions? Include a valid bit.
 - III. How many blocks can the cache accommodate?
2. What is an Associative memory? What are its advantages and disadvantages?

3. Explain the characteristics of units and space. Units are submerged in space. Explain the statement.
4. The logical address space in a computer system consists of 128 segments. Each segment can have up to 32 pages of 4K words each. Physical memory consists of 4K blocks of 4K words each. Formulate the logical and physical address formats.
5. How is the Virtual address mapped into physical address? What are the different methods of writing into cache?
6. A computer uses RAM chips of 1024*1 capacity.
 - i) How many chips are needed & how should their address lines be connected to provide a memory capacity of 1024*8?
 - ii) How many chips are needed to provide a memory capacity of 16 KB?
7. Calculate the page fault for a given string with the help of LRU & FIFO page replacement algorithm, Size of frames = 4 and string 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6
8. What do you mean by Memory Hierarchy? Discuss Memory hierarchy in detail.
9. Explain various Types of Cache mapping.

UNIT-5 (Input/Output)

Short Answer Questions (2 Marks)

1. What is the transfer rate of an eight-track magnetic tape whose speed is 120 inches per second and whose density is 1600 bits per inch?
2. List down the functions performed by an Input/Output unit.
3. Why does the DMA get priority over CPU when both request memory transfer?
4. Explain the term cycle stealing.
5. What do you mean by vector interrupt?
6. Differentiate Between I/O processor and data communication processor.
7. What do You mean by Serial communication?

Long Answer Questions (7 or 10 Marks)

1. Explain how the computer buses can be used to communicate with memory and I/O. Also draw the block diagram for CPU-IOP communication.
2. What are the different methods of asynchronous data transfer? Explain in detail.
3. Explain destination-initiated transfer using handshaking method.
4. What are the different methods of asynchronous data transfer? Explain in detail.
5. Draw and explain the block diagram of typical DMA controller.
6. Discuss Interrupt handling Process with the help of flow chart.

