INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

QUESTION BANK

Department	**COMPUTER SCIENCE AND ENGINEERING**				
Course Title	**COMPUTER SYSTEM ARCHITECTURE**				
Course Code	AECD04				
Program	B.Tech				
Semester	III	CSE			
Course Type	Core				
Regulation	BT-23				
Course Structure	Theory			Practical	
	Lecture	Tutorials	Credits	Laboratory	Credits
	3	1	4	-	-
Course Coordinator	Ms.D Swetha, Assistant Professor				

COURSE OBJECTIVES:

The students will try to learn:

I	The concepts of register transfer logic and arithmetic operations, instruction format, and instruction cycle.
II	The basic components of computer sysytems, functionality, and interactions with the components.
III	Memory hierarchy, memory management and I/O management.
IV	Pipelining and Multiprocessor techniques for the improvement of efficiency.

COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Demonstrate** a thorough understanding of the basic concepts and principles of computer sysytem architecture.	Understand
CO 2	**Analyze** different types of instruction sets and addressing modes.	Understand
CO 3	**Evaluate** memeory management techniques such as paging, segmentation and virtual memeory	Apply
CO 4	**Compare** different I/O techniques, including programmed I/O, interrupt driven I/O,and direct memory access (DMA) .	Apply
CO 5	**Explore** the implications of parallel processing and apply concepts of pipelining and parallelism to enhance sysytem performance.	Understand

QUESTION BANK:

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MODULE I				
REGISTER TRANSFER AND MICROOPERATIONS				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	Summarize the selection of address for control memory in micro programmed control unit	Understand	This would require the learner to recall the micro-operations then explain the address for control memory	CO 1
2	Build the 4-bit arithmetic circuit for arithmetic micro-operations.	Apply	The learner to define the number system this would be describe the arithmetic micro assigning to micro program	CO 1
3	Explain with an example how to multiply two unsigned binary numbers	Understand	This would require the learner to recall binary numbers then summarize the unsigned binary numbers	CO 1
4	What is the need of subroutine register in a control unit and discuss in detail?	Understand		CO 1
5	Demonstrate the need of some bits of current microinstruction to generate address of the next microinstruction	Understand	This would require the learner to recall micro instruction then explain current microinstruction in address	CO 1
6	Illustrate the mapping from micro-operation to a micro instruction address.	Understand	This would require the learner to recall micro-operation then summarize the mapping micro instruction address	CO 1
7	Explain the micro program control with diagram and give with an example.	Understand	This would require the learner to recall micro program then demonstrate micro program control	CO 1
8	Classify logic micro-operations and explain one stage of logic circuit along with functional table	Understand	This would require the learner to recall micro-operation then explain the one stage logic circuit.	CO 2

9	Explain logic of a micro program sequencer for a control memory	Understand	This would require the learner to recall micro program then explain the sequence for control memory	CO 1
10	Explain the rules in arithmetic operation on floating point numbers.	Understand	his would require the learner to recall arithmetic operations then explain the floating point numbers.	CO 1

PART-B LONG ANSWER QUESTIONS				
1	Illustrate register transfer language (RTL) with examples.	Understand	This would require the learner to recall register functionality then explain the RTL	CO 1
2	Summarize the common bus system using multiplexers with a neat design	Understand	This would require the learner to recall bus operation then outline the common bus systems using multiplexers	CO 1
3	Define micro-operation and illustrate about arithmetic microoperations with examples.	Understand	This would require the learner to recall arithmetic operations then related to operation of arithmetic.	CO 1
4	Illustrate 4-bit binary addersubtractor along with neat sketch.	Understand	This would require the learner to recall number system then explain the 4 bitbinary adder and subtractor	CO 1
5	Explain binary adder and 4-bit binary adder along with neat sketch.	Understand	This would require the learner to recall number system then demonstrate the binary adder	CO 1
6	Explain 4-bit binary incrementer and along with neat sketch.	Understand	This would require the learner to recall number system then explain the binary incrementer	CO 1
7	Explain multiple bus organization in detail.	Understand	This would require the learner to recall bus functionality then outline the multiple bus organization	CO 1
8	Classify shift Micro operations and explain 4-bit combinational circuit shifter.	Understand	This would require the learner to recall micro-operations then demonstrate the combinational circuit	CO 2
9	Make use of control memory and build micro programmed control organization	Apply	The learner to define micro program and describe about control memory, assigning to control organization	CO 1
10	What are the two approaches used for generating the control signals in proper sequence?	Understand	-	CO 1

11	Explain the mapping of instruction and subroutine in address sequencing.	Understand	This would require the learner to define instruction then summarize the address sequencing	CO 1
12	Identify micro program example and build a computer hardware configuration	Apply	The learner to define micro-operations and describe about micro program assigning to computer	CO 1
13	Identify the microinstruction format and also model fetch routine in the Micro program example.	Apply	The learner to define instruction and understand the micro instruction format assigning to micro program	CO 1
14	Explain memory locations and addresses.	Understand	This would require the learner to recall memory then explain the memory locations and address.	CO 1
15	Summarize the different types of addressing modes	Understand	This would require the learner to know addressing modess then list the different addressing modes	CO 1
16	Explain the concept of bus? Find the different bus with appropriate sketches.	Understand	-	CO 1
17	Explain typical hardware control unit with neat diagram.	Understand	This would require the learner to recall the control unit then explain the functionality of hardware control unit	CO 1
18	Explain about micro program control unit with neat sketch.	Understand	This would require the learner to recall the micro program then outline the micro program control unit.	CO 1
19	Illustrate register transfer language (RTL) with examples.	Understand	This would require the learner to recall register functionality then explain the RTL	CO 1
20	Summarize the common bus system using multiplexers with a neat sketch.	Understand	This would require the learner to recall bus operation then outline the common bus systems using multiplexers	CO 1
PART-C SHORT ANSWER QUESTIONS				

1	Define the register transfer language	Remember	-	CO 1
2	What is bus and memory transfer	Remember	-	CO 1
3	State the arithmetic microoperations.	Understand	This would require the learner to recall arithmetic operations then explain the micro-operations	CO 1
4	What is the need of register?	Remember	-	CO 1
5	State the shift micro-operations	Understand	This would require the learner to recall shift operations then explain the shift operations	CO 1
6	What is meant by hardwired control?	Remember	-	CO 1
7	Explain tri state buffer with their application	Understand	This would require the learner to recall memory then understand the tri state buffer and also write its applications	CO 1
8	Find control addresses register in control memory.	Remember	-	CO 1
9	How the mapping process in address sequencing	Remember	-	CO 1
10	Tell the branch logic in address sequencing	Remember	-	CO 1
10	Tell the branch logic in address sequencing	Remember	-	CO 1
11	Classify the instruction format	Understand	This would require the learner to define instruction then list the instruction format	CO 1
12	Define micro-operations in micro program example.	Understand	This would require the learner to know micro-operation then understand micro program	CO 1
13	What are the types of micro instruction?	Remember	-	CO 1
14	Define decoding	Remember	-	CO 1
15	State what is meant by full adder	Remember	-	CO 1
16	Define addressing modes	Remember	-	CO 1

17	What is Bus? Draw the single bus structure.	Remember	-	CO1
18	What are the basic operations performed by the processor?	Remember	-	CO 1
19	Demonstrate the principal operation of micro programmed control unit.	Understand	This would require the learner to know micro-operation then explain the operation of micro programmed control unit	CO 1
20	Define the register transfer language	Remember	-	CO 1
MODULE II				
ORGANIZATION OF A COMPUTER				
PART-A PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	How would you address issues with memory transfer latency in a system with large amounts of data being transferred frequently?	Understand	-	CO 2
2	Explain an addressing mode? List and explain various addressing modes of a computer with example	Understand	-	CO 2
3	Explain the operational concepts between the processor and memory	Understand	This would require the learner to recall processor and memory then understand the operational concept of processor and memory	CO 2
4	How to measure the performance of the computer? Explain.	Understand	-	CO 2
5	Explain the computer levels of programming language in detail.	Understand	This would require the learner to recall programming language then explain the levels of language	CO 2
6	Illustrate the input and output operations with a neat diagram,	Understand	This would require the learner to recall I/O components then explain the I/O operations with neat sketch	CO 2

7	What methods can you use to optimize the performance of addition and subtraction operations in a processor's arithmetic unit?	Remember	-	CO 2
8	How would you design a register transfer operation for a new instruction that combines two existing instructions? What factors would you need to consider to ensure correctness and efficiency?	Understand	This would require the learner to recall fundamentals of computer then outline the architecture and I/O operations	CO 2
9	Draw and explain the connection between memory and processor with the respective registers.	Understand	This would require the learner to recall registers then understand the processor and memory with register	CO 2
10	Demonstrate the various generations of Computer	Understand	This would require the learner to recall computer then summarize the various generations of computer	CO 2
PART-B LONG ANSWER QUESTIONS				
1	Suppose you are designing a new system with a high-speed processor and multiple peripherals. How would you design the bus architecture to ensure optimal performance and avoid bottlenecks?	Understand	This would require the learner to define instruction then explain the instruction types and assembly language programming instructions.	CO 2
2	How would you optimize a logic circuit that needs to perform a complex sequence of logical operations frequently?	Remember	-	CO 2
3	Explain the functions of the processor registers and sketch the block diagram.	Understand	This would require the learner to recall processor, registers then demonstrate the function of processor registers.	CO 2

4	List the various instruction formats and illustrate with an example.	Understand	This would require the learner to define instruction and Understand the instruction format then apply to various instructions analyze with an example	CO 2
5	What are the implications of using different types of shift operations (logical, arithmetic, circular) in a processor, and how would you decide which to implement?	Understand	This would require the learner to recall fundamentals of computer then explain the functionality	CO 2
6	Explain in detail about the instruction cycle.	Understand	This would require the learner to define instruction then demonstrate formation of instruction cycle	CO 2
7	Summarize the input-output subsystem organization and its interfacing	Understand	This would require the learner to recall the input and output modules then explain the its interfacing of subsystem	CO 2
8	Explain important steps for computer design.	Understand	This would require the learner to recall fundamentals of computer then outline the necessity steps to computer design	CO 2
9	Explain the different types of fields that are part of an instruction	Understand	-	CO 2
10	Find the basic components of a microprocessor	Remember	-	CO 2
11	Classify the different types of interrupts in a microprocessor system.	Understand	This would require the learner to recall interrupts then list the different types of interrupts in microprocessor.	CO 2
12	Compare the different kinds of ROMs.	Understand	This would require the learner to recall memory then compare different kinds of ROMs	CO 2
13	How are they useful in implementation of architecture of a processor?	Remember	-	CO 2

14	Explain computer architecture with diagram	Understand	This would require the learner to recall computer then explain the architecture and show the diagram	CO 2
15	Compare the computer architecture and computer Organization	Understand	This would require the learner to recall the computer fundamentals then compare the computer architecture and organization	CO 2
16	Summarize briefly about computer fundamental system?	Understand	This would require the learner to recall the fundamentals of computer then explain the clearly about computer operations	CO 2
17	Illustrate memory unit function.	Understand	This would require the learner to recall memory then explain the memory unit function	CO 2
18	Explain in detail about different instruction types and instruction sequencing	Understand	This would require the learner to recall instruction then compare the types and sequencing	CO 2
19	Explain instruction set architecture? Give examples	Understand	This would require the learner to recall instruction set then explain the architecture	CO 2
20	i). Find the performance of CPU. ii). Compose the factors that affect performance.	Remember	-	CO 2
PART-C SHORT ANSWER QUESTIONS				
1	Define Computer Architecture.	Remember	-	CO 2
2	List the components of computer system.	Remember	-	CO 2
3	List the types of computers	Remember	-	CO 2
4	What are the functional units of a computer?	Remembe	-	CO 2
5	List the types of memory.	Remembe	-	CO 2
6	Define the arithmetic and Logical operations	Remember	-	CO 2
7	What is a Computer Instruction?	Remember	-	CO 1

8	What you mean by central processing unit?	Remember	-	CO 2
9	Classify different memory chips	. Understand	This would require the learner to recall the memory then list the different memory chips	CO 2
10	What are the static and dynamic RAMs?	Remember	-	CO 2
11	List out the levels of programming languages.	Remember	-	CO 2
12	Define the instruction format.	Understand	This would require the learner to define instruction then show the instruction format	CO 2
13	Write short description about Instruction set architecture (ISA) design.	Remember	-	CO 2
14	Show the data transfer instructions	Understand	This would require the learner to define concept of instructions then relate data transfer instructions	CO 2
15	Explain number systems in computer organization.	Understand	This would require the learner to define number system then explain number systems in computer organization	CO 2
16	State operation of control unit	Understand	-	CO 2
17	What is the need of system software?	Remember	-	CO 2
18	What is mean by primary storage and secondary storage?	Remember	-	CO 2
19	Show the basic functional units of a computer.	Remember	-	CO 2
20	Interpret the instruction set architecture.	Understand	This would require the learner to define instruction then explain the instruction set	CO 2
MODULE III				
MICROPROGRAMMED CONTROL AND INPUT-OUTPUT ORGANIZATION				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				

1	Design a microprogram control memory for a simple processor that includes at least five operations (e.g., LOAD, STORE, ADD, SUBTRACT, and JUMP). Describe how you would implement branching in your design.	Apply	–	CO 3
2	Discuss how different addressing methods can improve the efficiency of control signal generation in a microprogrammed control unit. Which method would you choose and why?	Understand	This would require the learner to recall number system then explain the conversion	CO 3
3	Compare and contrast hardwired control and microprogrammed control. Under what circumstances would you prefer one over the other? Provide a scenario where microprogramming is advantageous.	Evaluate	This would require the learner to recall arithmetic operations then demonstrate the restoring division.	CO 3
4	Given trends in technology, predict how microprogrammed control units might evolve in the coming years. What innovations do you foresee impacting their design and implementation?	Understand	This would require the learner to recall arithmetic operation then explain the signed- magnitude operations.	CO 3
5	Consider a scenario where a legacy system relies on hardwired control and input-output organization. Discuss the potential drawbacks of this system and hypothesize on a migration strategy to a microprogrammed control unit with modern I/O capabilities.	Apply	–	CO 3

6	Identify potential bottlenecks in a system utilizing PCI Express for input-output operations. How would you analyze and measure these bottlenecks, and what strategies could you implement to mitigate them?	Understand	This would require the learner to recall floating points then solve problem using subtraction	CO 3
7	Explain the physical and logical architecture of PCI Express. What are the advantages of using PCI Express over older standards like PCI? Discuss any potential challenges in transitioning from PCI to PCI Express.	Understand	This would require the learner to recall arithmetic operations then explain the different arithmetic micro-operations	CO 3
8	Analyze the communication process between the CPU and the Input-Output Processor (IOP). What protocols are involved, and how does this communication differ from standard I/O operations?	Analyze	–	CO 3
9	Explain interrupts handled by a basic computer and interrupt cycle with a flowchart.	Understand	This would require the learner to recall interrupt cycle then related to basic computer	CO 3
10	Assume you are tasked with designing an I/O interface for a new type of sensor (e.g., temperature sensor). What factors would you consider in your design, and how would you ensure that it is efficient and scales well with different sensor types?	Analyze	The learner to define instruction format and describe about addressing instruction then compare and analyse the direct and indirect addressing instructions	CO 3
PART-B LONG ANSWER QUESTIONS				
1	Define control memory in the context of microprogrammed control. How does it differ from control memory in hardwired control systems?	Understand	This would require the learner to recall the memory then demonstrate the memory reference instructions.	CO 4

2	Explain the concept of address sequencing in a microprogrammed control unit. How is the sequence of microinstructions determined?	Apply	The learner to define interrupt cycle3 and models the flow chart.	CO 3
3	Describe the design process of a microprogrammed control unit. What are the key components involved?	Remember	-	CO 3
4	Compare and contrast microprogrammed control with hardwired control in terms of design complexity and flexibility.	Understand	This would require the learner to recall the number system then translate the conversation of binary system	CO 3
5	What are the advantages and disadvantages of using microprogrammed control over hardwired control in modern processors?	Understand	This would require the learner to recall the number system then translate the conversation of binary system	CO 3
6	List and describe the different types of peripheral devices commonly used in computer systems..	Understand	This would require the learner to define the floating points then explain the operation of adder and subtractor	CO 3
7	Explain the role of the Input-Output interface in a computer system. How does it facilitate communication between peripheral devices and the CPU?	Understand	This would require the learner to recall number system then outline the complement operations	CO 3
8	Explain the benefits and challenges associated with daisy chaining priority interrupts compared to parallel priority interrupts. In what situations would one mechanism be favored over the other? Understand	This would require the learner to recall addressing mode then explain different addressing modes	CO 3	

9	How does a priority encoder function in the context of interrupt handling? Explain its significance in a priority interrupt system.	Understand	This would require the learner to recall instructions then demonstrate the data transfer and manipulation instructions.	CO 3
10	Compare and contrast daisy chaining priority and parallel priority interrupt systems. What are the benefits and drawbacks of each?	Understand	This would require the learner to recall floating then demonstrate the IEEE stand for binary floating-point arithmetic	CO 3
11	Describe the concept of Direct Memory Access (DMA) and how it differs from traditional I/O operations. What are the key advantages of DMA?.	Understand	TThis would require the learner to recall multiplier then show the flow chart of multiplication process.	CO 3
12	Explain the role of the Input-Output Processor (IOP) in CPU-IOP communication. How does it enhance the performance of I/O operations?	Remember	-	CO 3
13	Discuss the PCI Express (PCIe) architecture. What are the main differences between PCI Express and older PCI standards in terms of physical and logical architecture?	Understand	This would require the learner to define floating point then demonstrate the floating-point arithmetic	CO 3
14	Compare daisy chaining priority with parallel priority interrupt systems. What are the key differences in terms of implementation complexity and performance?	Understand	This would require the learner to recall multiplier then show the flow chart of multiplication process.	CO 3
15	Explain the concept of daisy chaining priority in interrupt handling. How does it work to determine which interrupt request gets serviced first?	Understand	This would require the learner to define arithmetic operation then explain the decimal arithmetic	CO 3

16	Identify different types of peripheral devices and categorize them into input devices, output devices, and input-output devices. Evaluate their role in a system and the implications of their speed and efficiency on overall system performance.	Understand	This would require the learner to recall memory then list the memory reference instructions.	CO 3
17	Explain the basic architecture of PCI Express (PCIe). How does it differ from the traditional PCI and PCI-X architectures?	Understand	This would require the learner to recall floating point operation then explain the multiplication procedure of floating-point numbers	CO 3
18	Explain the concept of PCIe transactions. What are the different types of transactions supported by PCIe, and how are they categorized?	Apply	The learner to define number system then describes adder functions assigning to BCD adder.	CO 3
19	Discuss the significance of PCIe's packet-based protocol. How does it improve the efficiency and flexibility of data transfer compared to older PCI technologies?	Understand	This would require the learner to recall multiplication then explain the algorithm	CO 3
20	How does the implementation of daisy chaining priority affect the design and complexity of the interrupt controller circuit in a microprogrammed control system?	Remember	-	CO 3
PART-C SHORT ANSWER QUESTIONS				
1	What is micro programmed control?	Remember	-	CO 3
2	Contrast hardwired control with micro programmed control.	Evaluate	This would require the learner to recall data then show representation of data	CO 2
3	What is the significance of address sequencing in the design of control units?	Remember	-	CO 3

4	Explain the difference between polling and interrupt-driven I/O modes..	Understand	This would require the learner to recall number system then list number system	CO 3
5	What are peripheral devices in the context of computer architecture?	Remember	-	CO 3
6	What is Direct Memory Access (DMA)?	Remember	-	CO 3
7	Define the index register addressing mode.	Understand	TThis would require the learner to define registers then summarize the register addressing mode	CO 3
8	What distinguishes PCI Express from other bus architectures?	Remember	-	CO 3
9	What is the purpose of a priority encoder in input-output organization?	Remember	-	CO 3
10	Classify the data transfer and manipulation.	Understand	This would require the learner to recall transfer instructions then show the data transfer and manipulation	CO 3
11	List different addressing modes.	Remember	-	CO 3
12	List out types of interrupts	Remember	-	CO 3
13	Identify potential bottlenecks in a system utilizing PCI Express for input-output operations.	Remember	-	CO 3
14	What is an advantage of using micro programmed control over hardwired control?	Understand	This would require the learner to recall arithmetic operations then show the decimal functions.	CO 3
15	What is the role of an input-output interface?	Remember	-	CO 3
16	How does CPU-IOP communication facilitate data transfer?	Remember	-	CO 3
17	What is mean by program control?	Remember	-	CO 3

18	Name two modes of data transfer used in input-output organization.	Remember	-	CO 3
19	Define Direct Memory Access (DMA).	Remember	-	CO 3
20	What are the main components of PCI Express architecture?	Remember	-	CO 3

MODULE IV				
MEMORY ORGANIZATION				
PART A- PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	Describe the role of each level in the memory hierarchy (cache, main memory, auxiliary memory, and virtual memory) and discuss how they work together to optimize system performance. Which level do you think is most critical for improving speed, and why?	Understandr	This would require the learner to recall the memory then explain the DMA transfer and show the block diagram.	CO 4
2	Explain the fundamental differences between Static RAM (SRAM) and Dynamic RAM (DRAM) in terms of structure, performance, and use cases. In what scenarios would one be preferred over the other?	Understand	This would require the learner to recall the memory then explain the DMA I/O operation.	CO 4
3	When designing a new computer system, what trade-offs must be considered when deciding how much cache memory to include versus how much main memory to allocate? How would these decisions impact overall performance and cost?	Understand	This would require the learner to recall the priority then explain the parallel priority	CO 4
4	How does the operation of Synchronous DRAM (SDRAM) improve performance compared to Asynchronous DRAM? Provide examples of applications where SDRAM is critical.	Understand	This would require the learner to recall the priority then explain the parallel priority	CO 8

5	How has the advancement in non-volatile memory technologies influenced system architecture and software design? Discuss how this may affect both consumer devices and enterprise solutions?	Understand	This would require the learner to recall the control memory then explain the data transfer with handshaking	CO 4
6	Illustrate the characteristics of some common memory technologies	Understand	This would require the learner to recall the memory then explain the characteristics of memory	CO 4
7	Explain a privileged instruction set in memory	Understand	This would require the learner to recall the instruction then explain the privileged instruction	CO 4
8	Demonstrate the asynchronous bus with read and write cycles	Understand	This would require the learner to recall the bus then explain the asynchronous bus with read and write cycles	CO 4
9	Apply the modes of data transfer in memory organization give the functionality in detail	Apply	The learner to define memory then explain about data transfer assigning to memory organization	CO 4
10	Explain the necessity of an interface in memory organization?	Understand	This would require the learner to recall the memory then explain the interface in memory organization	CO 4
PART-B LONG ANSWER QUESTIONS				
1	What is nonvolatile solid-state memory, and how does it differ from volatile memory? Provide examples of nonvolatile solid-state memory technologies.	Understand	This would require the learner to recall direct memory access capability and explain the I/O processor organization	CO 4
2	Compare between asynchronous DRAM and synchronous RAM.	Understand	This would require the learner to recall different types of computer memories and compare between DRAM and RAM.	CO 4
3	Compare isolated I/O and memory mapped I/O	Understand	This would require the learner to recall the interfacing of I/O devices and compare types of interfacing	CO 4

4	Illustrate Strobe Control method of Asynchronous data transfer technique	Understand	This would require the learner to recall control memory then explain the strobe control method and data transfer techniques	CO 6
5	Explain asynchronous communication interface with diagram	Understand	This would require the learner to recall the data transfer techniques then outline the asynchronous method.	CO 4
6	Explain how virtual memory uses paging to manage memory. Discuss the benefits and potential drawbacks of this approach regarding system performance.	Understand	This would require the learner to recall the interfacing then explain the input and output interfacings	CO 4
7	With a block diagram, explain the direct and set associative mapping between cache and main memory	Understand	This would require the learner to recall the memory then explain the memory mapping of direct and set associative	CO 4
8	Explain the I/O bus and interface modules	Understand	This would require the learner to recall the interfacing of I/O devices and explain the bus and interface modules	CO 4
9	With a neat diagram, explain in detail the input interface circuit	Understand	This would require the learner to recall I/O subsystem and demonstrate input interface circuit.	CO 4
10	Classify the differences between static and dynamic memories	Understand	This would require the learner to recall different type of memories and compare between static and dynamic memories.	CO 4
11	Explain the multilevel hierarchy of storage devices	Understand	TThis would require the learner to recall the basic structure of a memory hierarchy and relate the same with multiple levels of caches.	CO 4

12	Illustrate the arrangement of a single bus structure and brief about memory mapped I/O.	Understand	This would require the learner to recall the interfacing of I/O devices and demonstrate single bus structures.	CO 4
13	Compare synchronous and asynchronous communication?	Understand	This would require the learner to recall the data transfer between sender and receiver and compare synchronous and asynchronous transmission	CO 4
14	Explain about interrupt masks provided in any processor?	Understand	This would require the learner to recall the concept of interrupts and explain the masking of interrupts.	CO 4
15	Explain the operation of memory hierarchy	Understand	TThis would require the learner to recall the basic structure of a memory hierarchy and explain the data transfer between multiple levels of Memories.	CO 4
16	Explain any four non-volatile memory concepts with their functionality.	Understand	This would require the learner to recall the memory then explain the kinds of memory function.	CO 4
17	Model the different mapping functions in cache.	Apply	The learner to define memory then describe about mapping assigning to functions of cache	CO 4
18	Demonstrate the any one feature of memory, show that leads to improved performance of computer	Understand	This would require the learner to recall the memory then explain the kinds of memory function.	CO 4
19	Explain the working of 16-megabyte DRAM chip configured as 1M x 6 memory chips	Understand	This would require the learner to recall the memory then explain the DRAM configuration	CO 4
20	What is thrashing in the context of virtual memory? Discuss the conditions that lead to thrashing and suggest strategies to minimize its impact on system performance.	Understand	This would require the learner to recall the memory then explain the paging and segmentation	CO 4

PART-C SHORT ANSWER QUESTIONS				
1	List out the data transfer techniques	Remember	-	CO 4
2	What are the types of interface signals?	Remember	-	CO 4
3	Define synchronous bus.	Remember	-	CO 4
4	Define asynchronous bus.	Remember	-	CO 4
5	List any three of the standard I/O interface.	Remember	-	CO 4
6	Show examples of input and output devices	Remember	-	CO 4
7	What is the function of i/o interface?	Remember	-	CO 4
8	What is the function of i/o interface?	Remember	-	CO 4
9	List out peripheral devices	Remember	-	CO 4
10	Outline the functions of Bus	Remember	-	CO 4
11	What is an I/O channel?	Remember	-	CO 4
12	Outline the functions of memory bus	Remember	-	CO 4
13	Outline the strobe methods	Remember	-	CO 4
14	Define handshaking	Remember	-	CO 4
15	What are the uses of interrupts?	Remember	-	CO 4
16	What is I/O mapped input output?	Remember	-	CO 4
17	Define direct mapping	Remember	-	CO 4
18	Define fully associative mapping	Remember	-	CO 4
MODULE V				
MULTIPROCESSORS				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	Explain different types of hazards that occur in a pipeline.	Understand	This would require the learner to recall the pipeline then explain the various hazards.	CO 5
2	Explain various approaches used to deal with conditional branching.	Understand	This would require the learner to recall the branching then explain the various approaches.	CO 5

3	Explain the basic concepts of pipelining and compare it with sequence processing with a neat diagram.	Understand	This would require the learner to recall the pipelining and compare the sequence processing. .	CO 5
4	Explain instruction pipelining.	Understand	TThis would require the learner to recall the pipeline and explain the instruction pipelining. .	CO 5
5	What is branch hazard? Describe the method for dealing with the branch hazard?	Understand	—	CO 5
6	What is data hazard? Explain the methods for dealing with data hazard?	Understand	-	CO 5
7	Explain the function of six segment pipeline and draw a space diagram for six segment pipelines solving the time it takes to process eight tables	Understand	TThis would require the learner to recall the pipeline then explain the sixsegment pipeline.	CO 5
8	Draw and explain data path modified for pipelined execution.	Understand	–	CO 5
PART-B LONG ANSWER QUESTIONS				
1	Explain about arithmetic pipelining.	Understand	This would require the learner to recall the arithmetic operations and explain the pipelining	CO 5
2	Explain the flowchart of four segment instruction pipelining with neat sketch.	Understand	This would require the learner to recall the arithmetic operations and explain the pipelining.	CO 5
3	Discuss the concept of instruction pipelining? What are the conflicts that occurred during instruction Pipelining?	Evaluate	—	CO 5
4	Why inter process synchronization needed? Explain	Understand	—	CO 6

5	Describe the techniques for handling control hazards in pipelining	Understand	—	CO 5
6	Explain parallel processing and explain the flynn's classification of computer with suitable diagram.	Understand CO 5		
7	Critically assess the evolution of multicore computing architectures with respect to the Intel Core i7-990X. What innovations does this processor introduce, and how do they address previous limitations found in single-core or early multicore processors? Discuss the implications of such innovations on software development and application performance.	Understand	This would require the learner to recall then explain the path techniques.	CO 6
8	Explain the basic concepts of pipelining	Understand	This would require the learner to recall pipelining then explain the concept.	CO 6
9	Demonstrate pipeline? Give the description about arithmetic pipeline.	Understand	—	CO 6
10	Explain hazards to the instruction pipeline with their solution	Understand	This would require the learner to recall the hazards and explain instruction pipeline.	CO 6
11	Explain inter processor communication and synchronization.	Understand	TThis would require the learner to recall synchronization and explain inter processor communication.	CO 5
12	Illustrate the number of clock cycles that takes to process 200 tasks in a six-segment pipeline	Understand	TThis would require the learner to recall the pipeline then explain the segment pipeline.	CO 5

13	What is instruction hazard? Explain in detail how to handle the instruction hazards in pipelining with relevant examples	Understand	TThis would require the learner to recall hazard and explain hazards instruction.	CO 6
14	Explain conventional pipelined execution representation	Understand	This would require the learner to recall pipeline and explain with representation.	CO 6
15	Explain pipeline? Give the description about arithmetic pipeline.	Understand	—	CO 6
16	Analyze the hardware performance issues associated with multicore computers. What factors contribute to the performance limitations of multicore designs?	Analyze	This would require the learner to recall the bus and explain with common bus system.	CO 5
PART-C SHORT ANSWER QUESTIONS				
1	What are the major characteristics of a pipeline?	Remember	—	CO 5
2	What is a pipeline hazard?	Remember	—	CO 5
3	What are the types of pipeline hazards?	Remember	—	CO 5
4	What do you mean by branch penalty?	Remember	—	CO 5
5	What do you mean by delayed branching?	Remember	—	CO 5
6	Discuss the scalability, power consumption, and cost considerations that should be addressed when designing a multiprocessor system.	Remember	—	CO 5
7	Define parallel processing	Remember	—	CO 5
8	Define instruction pipeline.	Remember	—	CO 5
9	What are the steps required for a pipelined processor to process the instruction?	Remember	—	CO 5
10	Discuss the advantages and disadvantages of vector processors in handling large datasets and how they are utilized in modern computing applications.	Remember	—	CO 5

11	How data hazard can be prevented in pipelining?	Remember	—	CO 5
12	How addressing modes affect the instruction pipelining?	Remember	—	CO 5
13	Discuss the concept of inter-processor arbitration in multiprocessor systems	Remember	—	CO 5
14	What are the trade-offs associated with using multiprocessor systems versus single-processor systems?	Remember	—	CO 5
15	Discuss Software performance issues	Remember	—	CO 5

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