



QUESTION BANK

Year / Semester: II B.Tech IV Semester

Regulation: R23

Subject and Code: Digital Logic & Computer Organization – 23ESC232T

SYLLABUS

UNIT I: (9)

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.

UNIT 2: (9)

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

UNIT 3: (9)

Computer Arithmetic : Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT 4: (9)

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT 5: (9)

Input /Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces



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Max Marks: 10

S.No.	CO	Questions	BT
Unit I: (Data Representation & Digital Logic Circuits – I)			
1	1	Simplify the Boolean function and implement using K-MAP with logic gates a). $F(W,X,Y,Z) = \sum(0,1,2,3,4,5,6,8,9,12,13,14)$. b) $F(A,B,C,D) = \sum(1,3,7,8,11,15) + d(0,2,5,9,10)$.	L4
2	1	(A) Express the following number OCTAL (i) $(378.93)_{10} = (x)_8$ (ii) $(B9F.AE)_{16} = (x)_8$ ii). $(1024)_{10} = ()_2$	L3
3	1	Demonstrate subtraction with r and (r-1)'s complements with proper examples.	L4
4	1	Explain the minimization of logic expressions using K –MAP using suitable examples.	L3
5	1	a). Explain universal logic gates with examples. b). Design 8:1 Multiplexer and explain its working with truth table and logic diagram.	L5
6	1	Simplify the Boolean function $F(A,B,C,D) = \sum(0,1,2,5,8,9,10)$ using Karnaugh maps.	L4
7	1	Design Full adder and explain its working with truth table and logic diagram..	L3
8	1	Describe the design and working of a 3 to 8 decoder with logic diagram.	L5
9	1	Implement the following Boolean function using 8:1 Multiplexer. $F(A,B,C,D) = A'BD' + ACD + BC'D + A'C'D$	L4



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10	1	Illustrate basic logic operations of (NOT, OR, AND) with symbol, truth table, Boolean expression.	L3
11	1	Explain number base conversions with examples.	L3
S.No.	CO	Questions	BT
Unit II: (Sequential Circuits & Basic Structure of Computers)			
1	2	a) Explain the design and operation of a 4-bit binary counter using JK Flip-flops.	L4
2	2	Explain SR Flip flop, D Flip flop, JK Flip flop and T Flip flop with Truth table, Excitation table and Characteristic equations	L3
3	2	Design and operation of a 3-bit ripple counter using JK Flip-Flop.	L4
4	2	Explain the design and operation of Shift registers and types.	L3
5	2	Analyze Von-Neumann architecture.	L5
6	2	What are the major components of computer functional unit, and how do they interact.	L4
7	2	Design a synchronous 4-bit UP counters using Flip-Flop.	L3
8	2	Compare multiprocessors and multicomputer.	L5
9	2	Write a short notes on a).computer generations b).Bus types.	L4



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10	2	Explain the procedure of implementing a synchronous sequential circuit with minimal usage of flipflops.	L3
11	2	Compare different generations of computers and their defining characteristics	L4
S.No.	CO	Questions	BT
Unit III: (Computer Arithmetic & Processor Organization)			
1	3	a) Explain signed number addition & subtraction. b) Design Fast Adder.	L4
2	3	Explain the addition and subtraction of signed numbers using two's complement representation with examples.	L3
3	3	Describe the process of integer division with an example.	L4
4	3	Explain the Booth's multiplication algorithm with an example.	L3
5	3	Comment on the Booth's algorithm and its efficiency for multiplication representing the steps as a flow chart with example.	L5
6	3	Explain multibus organization.	L4
7	3	Differentiate hardwired & microprogrammed control.	L3
8	3	Design Arithmetic Logic Unit (ALU).	L5
9	3	Explain the basic functional units of a computer with a neat block diagram.	L4



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10	3	a) Highlight the pros and cons of hardwired control unit b). Explain about IEEE-754 floating point standards with neat diagram. Represent -12.62510 in single precision IEEE-754 format.	L3
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S.No.	CO	Questions	BT
Unit IV: (Memory Organization)			
1	4	a) Explain memory hierarchy. b) Compare RAM & ROM.	L4
2	4	Explain about semiconductor RAM memories.	L3
3	4	Explain how cache memory is organized and managed for performance optimization.	L4
4	4	Discuss memory speed and cost tradeoff.	L3
5	4	Analyze virtual memory concepts.	L5
6	4	Explain memory management requirements.	L4
7	4	Describe memory performance considerations.	L3
8	4	Evaluate secondary storage devices.	L5
9	4	Discuss the structure and benefits of solid state drives compared to traditional storage devices.	L4



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10	4	Compare cache memory, main memory, and secondary storage in terms of access time and cost.	L3
11	4	Explain the basic concepts of memory organization and the memory hierarchy in a computer system..	L3

S.No.	CO	Questions	BT
Unit V: (Input / Output Organization)			
1	5	a) Explain about programmed I/O. b) Explain about interrupt driven I/O.	L4
2	5	Describe how Direct Memory Access (DMA) improves system performance.	L3
3	5	Describe processor examples for I/O.	L4
4	5	Discuss the need for standard I/O interfaces and explain their importance in computer systems.	L3
5	5	Analyze interrupt handling mechanism.	L5
6	5	Explain bus structures in I/O organization.	L4
7	5	Discuss the evolution and significance of USB in computer architecture	L3
8	5	Evaluate advantages of DMA over programmed I/O.	L5
9	5	Explain about accessing I/O devices.	L4



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10	5	Define interrupts and types.	L3
11	5	Compare and contrast different types of USB interfaces.	L3

Note: L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating

Instruction to Faculty Members:

The Six Levels of Bloom's Taxonomy:

1. **Remembering:** Retrieving, recognizing, and recalling relevant knowledge from long-term memory (e.g., list, define, name, locate).
2. **Understanding:** Constructing meaning, explaining ideas, or concepts (e.g., summarize, interpret, classify, compare).
3. **Applying:** Using information in new situations or implementing procedures to solve problems (e.g., solve, use, demonstrate, implement).
4. **Analyzing:** Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure (e.g., contrast, categorize, distinguish, diagram).
5. **Evaluating:** Making judgments based on criteria and standards through checking and critiquing (e.g., judge, critique, justify, defend, argue).
6. **Creating:** Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure (e.g., design, construct, develop, formulate).