

UNIT	Q NO	QUESTIONS
1	1	Which number system uses only 0 and 1? (a) Decimal (b) Octal (c) Binary (d) Hexadecimal Ans:Binary
1	2	What is the 1's complement of binary number 0101? (a) 1010 (b) 1011 (c) 1101 (d) 1111 Ans:1010
1	3	What is the hexadecimal equivalent of binary number 11011010? (a) DA (b) AC (c) BC (d) D9 Ans:DA
1	4	Which code is widely used for character representation in computers? (a) BCD (b) ASCII (c) HEX (d) Graycode Ans:ASCII
1	5	The NOT gate inverts the input signal. What is the output of NOT 0? (a) 0 (b) 1 (c) 2 (d) Undefined Ans:1
1	6	Which of the following represents 1's complement of 10110? (a) 01001 (b) 00110 (c) 10111 (d) 00111 Ans:01001
1	7	Which gate outputs HIGH only when both inputs are HIGH? (a) OR (b) AND (c) NOT (d) NOR Ans:AND
1	8	The binary equivalent of decimal 25 is (a) 11001 (b) 11010 (c) 10110 (d) 11101 Ans:11001
1	9	Which of the following is a universal gate? (a) XOR (b) NAND (c) OR (d) AND Ans:NAND
1	10	The result of binary subtraction 1001-0100 is (a) 1100 (b) 0011 (c) 0101 (d) 1000 Ans:0101

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1	11	Which logic gate gives a HIGH output only when inputs differ? (a) AND (b) OR (c) XOR (d) NAND Ans:XOR
1	12	What is the decimal equivalent of binary 1010? (a) 8 (b) 9 (c) 10 (d) 11 Ans:10
1	13	The full form of BCD is (a) Binary Coded Decimal (b) Basic Coded Decimal (c) Binary Central Decoder (d) Base Code Device Ans:Binary Coded Decimal
1	14	Binary addition of 1001+0011 equals (a) 10100 (b) 1100 (c) 1110 (d) 1010 Ans:1100
1	15	Which gate performs logical multiplication? (a) OR (b) NOT (c) AND (d) NAND Ans:AND
1	16	ASCII code for letter 'A' is: (a) 65 (b) 66 (c) 67 (d) 64 Ans:65
1	17	The 1's complement of 1100 is (a) 1100 (b) 0011 (c) 1001 (d) 1010 Ans:0011
1	18	Convert 27 to binary (a) 11001 (b) 11011 (c) 10101 (d) 11100 Ans:11011
1	19	Which gate has the symbol $\oplus$? (a) OR (b) NAND (c) XOR (d) AND Ans:XOR
1	20	What is the BCD representation of decimal 92? (a) 10010010 (b) 10100011 (c) 10010110 (d) 01101001 Ans:10010010

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1	21	Logic gates are implemented using: (a) Ics (b) Diodes (c) Transistors (d) All of the Above Ans:All of the Above
1	22	Binary equivalent of hexadecimal F is: (a) 1110 (b) 1111 (c) 1010 (d) 1100 Ans:1111
1	23	The NAND gate is a combination of: (a) AND+NOT (b) OR+NOT (c) NOT+XOR (d) AND+XOR Ans:AND + NOT
1	24	Which logic gate has only one input? (a) AND (b) OR (c) NOT (d) XOR Ans:NOT
1	25	Binary subtraction of 1011-0101: (a) 0100 (b) 0110 (c) 1110 (d) 1000 Ans:0110
1	26	Decimal equivalent of binary 11100 is: (a) 28 (b) 30 (c) 32 (d) 34 Ans:30
1	27	What is the logic level for binary 1? (a) 0V (b) 2V (c) 5V (d) HIGH Ans:HIGH
1	28	Which gate's output is HIGH only if all inputs are LOW? (a) OR (b) NAND (c) NOR (d) AND Ans:NOR
1	29	Binary to octal:110101 converts to: (a) 33 (b) 45 (c) 65 (d) 32 Ans:33
1	30	ASCII value of digit '0' is: (a) 47 (b) 48 (c) 49 (d) 50 Ans:48

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1	31	Decimal 85 in hexadecimal is: (a) 55 (b) 4A (c) 5B (d) 40 Ans:5B
1	32	What is ASCII value of character 'A'? (a) 41 (b) 65 (c) 97 (d) 60 Ans:65
1	33	Which number system uses base 16? (a) Binary (b) Decimal (c) Octal (d) Hexadecimal Ans:Hexadecimal
1	34	Find the result:1101+0110 (a) 0011 (b) 1011 (c) 10011 (d) 1111 Ans:1111
1	35	A logic gate with output LOW for all HIGH inputs is: (a) NAND (b) AND (c) OR (d) NOT Ans:NAND
1	36	Hexadecimal 'C' equals: (a) 11 (b) 12 (c) 13 (d) 14 Ans:12
1	37	Which gate is used to detect inequality of inputs? (a) AND (b) OR (c) XOR (d) XNOR Ans:XOR
1	38	What will be output of NAND gate with inputs A=1,B=1? (a) 1 (b) 0 (c) Undefined (d) Depends on circuit Ans:0
1	39	What is 2's complement of binary number 1001? (a) 0111 (b) 1101 (c) 1111 (d) 0111 Ans:111
1	40	What is the 1's complement of 1110? (a) 0001 (b) 0000 (c) 0011 (d) 0000 Ans:0001

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1	41	Decimal equivalent of hexadecimal 1F: (a) 25 (c) 31 (b) 30 (d) 32 Ans:31
1	42	The AND gate outputs 1 only when: (a) Any input is 1 (c) Any input is 0 (b) All inputs are 1 (d) Both inputs are 0 Ans:All inputs are 1
1	43	Binary equivalent of decimal number 12: (a) 1010 (c) 1110 (b) 1100 (d) 1001 Ans:1100
1	44	How many symbols are in hexadecimal system? (a) 8 (c) 12 (b) 10 (d) 16 Ans:16
1	45	Convert binary 101111 to decimal: (a) 47 (c) 46 (b) 48 (d) 45 Ans:47
1	46	What is the primary function of logic gates? (a) Store Data (c) Make decisions based on inputs (b) Perform Calculations (d) Transmit signals Ans:Make decisions based on inputs
1	47	What is the decimal value of BCD 1001 0101? (a) 95 (c) 85 (b) 59 (d) 75 Ans:95
1	48	What is the output of an OR gate when both inputs are 0? (a) 1 (c) Undefined (b) 0 (d) Depends on Input Ans:0
1	49	Convert octal 75 to binary: (a) 111101 (c) 111110 (b) 100110 (d) 101100 Ans:111110
1	50	Which logic gate is used to build flip-flops? (a) OR (c) XOR (b) AND (d) NAND Ans:NAND

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2	1	Which Boolean law states that $A+A=A$? (a) Associative Law (c) Absorption Law Ans:Idempotent Law (b) Idempotent Law (d) Commutative Law
2	2	Simplify the Boolean expression $A+AB$ (a) AB (c) B Ans:A (b) A (d) A+B
2	3	What is the result of $A \cdot (A+B)$? (a) A (c) AB Ans:A (b) B (d) A+B
2	4	Which theorem is expressed by $(AB)'=A'+B'$? (a) Consensus (c) Duality Ans:De-Morgan's Theorem (b) De-Morgan's Theorem (d) Involution
2	5	Which of the following is NOT a valid Boolean identity (a) $A+0=A$ (c) $A+A=0$ Ans:A+A=0 (b) $A \cdot 1=A$ (d) $A \cdot A=A$
2	6	What is the function of a full adder? (a) Adds two bits (c) Adds three bits including carry Ans:Adds three bits including carry (b) Subtracts two bits (d) Converts binary to decimal
2	7	K-map for 3 variables has how many cells? (a) 6 (c) 4 Ans:8 (b) 8 (d) 12
2	8	What is the simplified form of $A'B + AB'$? (a) A (c) $A \oplus B$ Ans:A⊕B (b) B (d) A+B
2	9	Which gate is used to build a half adder along with XOR? (a) AND (c) NAND Ans:AND (b) OR (d) NOR
2	10	The output of a 2:1 multiplexer is controlled by: (a) 1 select line (c) 3 select line Ans:1 select line (b) 2 select line (d) 4 select line

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2	21	In Boolean algebra, what is $A \cdot 0$ equal to? (a) 1 (b) 0 (c) A (d) Undefined Ans:0
2	22	How many outputs does a 3-to-8 decoder have? (a) 3 (b) 8 (c) 6 (d) 9 Ans:8
2	23	What is the function of a comparator? (a) Perform Addition (b) Find Square Root (c) Compare Two Binary Numbers (d) Encode Binary Data Ans:Compare Two Binary Numbers
2	24	The simplified form of $AB + A'B$ is: (a) A (b) B (c) $A+B$ (d) $A \text{ XOR } B$ Ans:B
2	25	Which Boolean expression is correct for NOR operation? (a) $(A+B)'$ (b) $(AB)'$ (c) $A+B$ (d) $A'+B$ Ans:$(A+B)'$
2	26	Which of the following is not a standard logic gate? (a) AND (b) OR (c) NAND (d) SUM Ans:SUM
2	27	Which term represents grouping of 1s in K-map? (a) Cell (b) Loop (c) Quad (d) Don't care Ans:Loop
2	28	A combinational circuit has: (a) Memory (b) Feedback (c) No Memory (d) Clock Ans:No memory
2	29	What is the simplified result of $A(A+B)$? (a) $A+B$ (b) AB (c) A (d) $A^2 + AB$ Ans:A
2	30	The expression $A+A'$ is always: (a) A (b) A' (c) 0 (d) 1 Ans:1

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2	31	A multiplexer can be used to implement: (a) Encoder (b) Decoder (c) Any Logic Function (d) Flip flop Ans:Any Logic Function
2	32	What is the dual of $A+AB$? (a) $A(B+1)$ (b) $A+B$ (c) $A.(A+B)$ (d) $A(B+A)$ Ans:$A.(A+B)$
2	33	How many input lines does a 1:4 demultiplexer have? (a) 1 (b) 2 (c) 3 (d) 4 Ans:1
2	34	A decoder converts binary information from: (a) n outputs to 2^n inputs (b) 2^n inputs to n outputs (c) n inputs to 2^n outputs (d) None of the above Ans:n inputs to 2^n outputs
2	35	What is the SOP form of logic function? (a) Sum of Outputs (b) Sequence of Operations (c) Sum of Products (d) Standard Output Pattern Ans:Sum of Products
2	36	Don't care conditions can be used for simplifying Boolean expressions in (a) Registers (b) Terms (c) K Maps (d) Latches Ans:K Maps
2	37	K-map helps to: (a) Write Code (b) Reduce Logic Expressions (c) Draw Truth Tables (d) Build Counters Ans:Reduce Logic Expressions
2	38	Which function outputs 1 if $A > B$ in 2-bit comparator? (a) $A'B$ (b) AB' (c) $A \oplus B$ (d) $A+B$ Ans:AB'
2	39	Half subtractor has how many outputs? (a) 1 (b) 2 (c) 3 (d) 4 Ans:2
2	40	In SOP form, product terms are: (a) ANDed Literals (b) ORed Literals (c) NOTed Literals (d) ExclusiveOR Literals Ans:ANDed literals

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2	41	How many minterms are in a 4-variable function? (a) 4 (b) 8 (c) 16 (d) 32 Ans:16
2	42	What does a full subtractor require? (a) 1 XOR gate (b) 2 XOR gates (c) 3 Logic gates (d) 2 bits only Ans:2XOR gates
2	43	Which logic circuit selects one input from many? (a) Multiplexer (b) Decoder (c) Comparator (d) Adder Ans:Multiplexer
2	44	Boolean identity: $A+1 = ?$ (a) A (b) 1 (c) 0 (d) A' Ans:1
2	45	SOP and POS are used for: (a) Timing (b) Optimization (c) Boolean Simplification (d) Looping Ans:Boolean Simplification
2	46	The expression $A'B+AB$ is equal to: (a) $A+B$ (b) $A\oplus B$ (c) AB (d) $A'B'$ Ans:$A\oplus B$
2	47	What is the main function of a priority encoder? (a) Converts binary to Gray code (b) Gives output based on highest priority input (c) Adds two binary numbers (d) Multiplies two inputs Ans:Gives output based on highest priority input
2	48	In a 4-to-2 priority encoder, if inputs $D_3=0, D_2=0, D_1=1, D_0=0$, what will be the output? (a) 00 (b) 01 (c) 10 (d) 11 Ans:01
2	49	What happens when multiple inputs are active in a priority encoder? (a) All outputs become undefined (b) The lowest priority input is selected (c) The highest priority input determines the output (d) The output is always 0 Ans:The highest priority input determines the output
2	50	Which of the following is true about a priority encoder? (a) It ignores input priority (b) It cannot handle multiple active inputs (c) It requires a separate output to indicate valid input (d) It outputs all active inputs simultaneously Ans:It requires a separate output to indicate valid input

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3	1	Which of the following devices serves as a memory for sequential circuits? (a) Multiplexer (b) Logic gates (c) Flip Flop (d) Decoder Ans:Flip flop
3	2	What is the key difference between combinational and sequential circuits? (a) Combinational circuits have memory, while sequential circuits do not. (b) Sequential circuits have memory, while combinational circuits do not. (c) Combinational circuits are faster than sequential circuits. (d) Sequential circuits are easier to design than combinational circuits. Ans:Sequential circuits have memory, while combinational circuits do not.
3	3	In a sequential circuit, the output depends on: (a) The present input only (b) The past output only (c) Both the present input and the past output (d) None of the above Ans:Both the present input and the past output
3	4	A synchronous counter is one where: (a) All flip-flops are clocked simultaneously. (b) Flip-flops are clocked one after the other. (c) The clock signal is not used. (d) The output is always changing. Ans:All flip-flops are clocked simultaneously.
3	5	Which of the following is NOT a type of sequential circuit? (a) Flip-flop (b) Counter (c) Multiplexer (d) Shift register Ans:Multiplexer
3	6	The main function of a flip-flop in digital circuits is to: (a) Store Data (b) Perform arithmetic operations (c) Act as a counter (d) Convert analog signals to digital Ans:Store Data
3	7	Which of the following flip-flops has two inputs, Set (S) and Reset (R)? (a) JK Flip Flop (b) SR Flip Flop (c) D Flip Flop (d) T Flip Flop Ans:SR Flip Flop
3	8	What does a JK flip-flop do when both J and K inputs are high (1)? (a) Toggle the output (b) Set the output to 1 (c) Reset the output to 0 (d) Hold the output Ans:Toggle the output
3	9	A T flip-flop is derived from which of the following flip-flops? (a) JK Flip Flop (b) SR Flip Flop (c) D Flip Flop (d) T Flip Flop Ans:JK Flip Flop
3	10	In a D flip-flop, what happens to the output when the clock signal is high and the data input is 1? (a) The output stays the same (b) The output becomes 1 (c) The output becomes 0 (d) The output toggles Ans:The output becomes 1

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3	11	Which of the following is an application of flip flops (a) Registers (b) Counters (c) Latches (d) All of the above Ans:All of the above
3	12	The variation of 0 to 1 is called (a) low level (b) Negative edge (c) Positive edge (d) High level Ans:Positive edge
3	13	During Toggle condition, the output Qn becomes (a) Qn = 0 (b) Qn = 1 (c) Qn = Qn (d) Qn = Qn' Ans:Qn = Qn'
3	14	What is the primary function of a shift register? (a) Store data (b) Shift data serially or parallelly (c) Perform arithmetic operations (d) Convert analog signals to digital Ans:Shift data serially or parallelly
3	15	How many types of basic shift registers are there? (a) Two (b) Three (c) Four (d) Five Ans:Four
3	16	Which shift register is used to convert serial data into parallel data? (a) Serial-in serial-out (SISO) (b) Parallel-in serial-out (PISO) (c) Serial-in parallel-out (SIPO) (d) Parallel-in parallel-out (PIPO) Ans:Serial-in parallel-out (SIPO)
3	17	A 4-bit shift register can store how many bits of data? (a) 1 (b) 4 (c) 8 (d) 16 Ans:4
3	18	What is the function of a 'shift right' operation in a shift register? (a) It moves data towards the leftmost bit. (b) It moves data towards the rightmost bit. (c) It keeps data in place. (d) It resets the register. Ans:It moves data towards the rightmost bit.
3	19	In a 4-bit parallel-in parallel-out (PIPO) shift register, how many data inputs are there? (a) 1 (b) 2 (c) 4 (d) 8 Ans:4
3	20	What is the role of a 'clock pulse' in a shift register? (a) It clears the data in the register. (b) It synchronizes the shifting of data. (c) It converts the data to parallel form. (d) It doubles the data in the register. Ans:It synchronizes the shifting of dat

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3	21	Which of the following types of triggering is used in a flip-flop to change its state? (a) Level triggering (b) Edge triggering (c) Pulse triggering (d) Both A and B Ans:Edge triggering
3	22	What type of triggering is used in a D flip-flop? (a) Level triggering (b) Edge triggering (c) Dual-edge triggering (d) None of the above Ans:Edge triggering
3	23	In edge-triggered devices, what triggers a state change? (a) The level of the input signal (b) The rising or falling edge of the clock signal (c) The duration of the input signal (d) The number of clock pulses Ans:The rising or falling edge of the clock signal
3	24	Which flip-flop is considered the simplest to implement? (a) D flip-flop (b) SR flip-flop (c) JK flip-flop (d) T flip-flop Ans:D flip-flop
3	25	How many flip-flops are required to construct a 4-bit synchronous counter? (a) 1 (b) 2 (c) 4 (d) 8 Ans:4
3	26	In a synchronous counter, the output of each flip-flop depends on: (a) Its own input only (b) The clock signal only (c) The clock and the outputs of previous flip-flops (d) The inputs of other flip-flops only Ans:The clock and the outputs of previous flip-flops
3	27	A 4-bit synchronous counter can count from: (a) 0 to 15 (b) 1 to 15 (c) 0 to 9 (d) 1 to 10 Ans:0 to 15
3	28	In an asynchronous counter, the clock pulse is applied to: (a) All flip-flops simultaneously (b) Only the first flip-flop (c) Only the last flip-flop (d) Only the middle flip-flop Ans:Only the first flip-flop
3	29	In an asynchronous counter, the output of one flip-flop is connected to: (a) The clock input of the next flip-flop (b) The data input of the next flip-flop (c) The reset input of the next flip-flop (d) The reset signal of the first flip-flop Ans:The clock input of the next flip-flop
3	30	How many states does a 3-bit asynchronous counter have? (a) 3 (b) 6 (c) 8 (d) 16 Ans:8

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3	31	A decade counter counts from: (a) 0 to 15 (b) 1 to 10 (c) 0 to 9 (d) 0 to 99 Ans:0 to 9
3	32	A decade counter resets after: (a) Reaching 5 (b) Reaching 9 (c) Reaching 10 (d) Reaching 15 Ans:Reaching 9
3	33	A decade counter is also called a: (a) Mod-16 counter (b) Mod-10 counter (c) Mod-8 counter (d) Binary counter Ans:Mod-10 counter
3	34	How many flip-flops are required to implement a decade counter? (a) 1 (b) 2 (c) 3 (d) 4 Ans:4
3	35	A decade counter is a type of: (a) Synchronous counter (b) Asynchronous counter (c) Modulo counter (d) Both A and B Ans:Modulo counter
3	36	A decade counter counts in: (a) Binary (b) Hexadecimal (c) Decimal (d) Octal Ans:Decimal
3	37	In a decade counter, what happens when the count reaches 10? (a) It resets to 0 (b) It starts counting down (c) It stops counting (d) It continues counting to 15 Ans:It resets to 0
3	38	Which of the following is NOT a feature of a decade counter? (a) It counts in decimal numbers (b) It resets after 9 (c) It uses a binary counter (d) It requires only two flip-flops Ans:It requires only two flip-flops
3	39	In a SR flip-flop, what happens when both S and R inputs are HIGH? (a) The output is undefined (b) The output remains unchanged (c) The output is set HIGH (d) The output is set LOW Ans:The output is undefined
3	40	Which among the following is NOT a type of register? (a) Program Counter (b) General Purpose Register (c) Memory Address Register (d) Flash Drive Ans:Flash Drive

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3	41	Which of the following is true about a down counter? (a) It counts from a lower value to a higher value (b) It counts in reverse order, from the maximum value down to 0 (c) It only counts from 0 to 9 (d) It counts based on external triggers Ans: It counts in reverse order, from the maximum value down to 0
3	42	In a down counter, when the count reaches 0, what happens next? (a) It resets to the maximum value (b) It stops counting (c) It starts counting upwards (d) It holds the current value Ans: It resets to the maximum value
3	43	Which type of counter is used when you need to count in ascending order? (a) Down counter (b) Modulo Counter (c) Up counter (d) Both up and down counters Ans: Up Counter
3	44	What does LSB stand for in binary numbers? (a) Least Significant Byte (b) Least Significant Bit (c) Logical Set Bit (d) Low Signal Bit Ans: Least Significant Bit
3	45	In a binary number, the MSB is the: (a) Bit with the lowest value (b) Bit with the highest value (c) Bit furthest to the left (d) Bit furthest to the right Ans: Bit furthest to the left
3	46	In a binary number 1101, which bit is the MSB? (a) The first bit (1) (b) The second bit (1) (c) The third bit (0) (d) The fourth bit (1) Ans: The first bit (1)
3	47	What is the output of an SR flip-flop when S=0 and R=0? (a) Set (b) Reset (c) No Change (d) Toggle Ans: No Change
3	48	In a JK flip-flop, what happens when J=1, K=0? (a) Reset (b) Toggle (c) Set (d) Hold Ans: Set
3	49	What is the condition of a D flip-flop when D=0 at the clock edge? (a) Q = 1 (b) Q = 0 (c) Q toggles (d) Q is undefined Ans: Q=0
3	50	Which flip-flop has only one input besides the clock? (a) SR flip-flop (b) D flip-flop (c) JK flip-flop (d) T flip-flop Ans: D flip-flop

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4	1	What is a sensor? (a) A device that processes data (b) A device that stores data (c) A device that detects changes in the environment (d) A device that transmits signals Ans: A device that detects changes in the environment
4	2	Which of the following is a temperature sensor? (a) LDR (b) Thermistor (c) PIR sensor (d) Microphone Ans: Thermistor
4	3	An LDR (Light Dependent Resistor) is used to detect: (a) Sound (b) Motion (c) Temperature (d) Light Ans: Light
4	4	A microphone is an example of which type of sensor? (a) Light sensor (b) Sound sensor (c) Motion sensor (d) Temperature sensor Ans: Sound sensor
4	5	What does TTL stand for in digital electronics? (a) Transistor to Load Logic (b) Transistor-Transistor Logic (c) Time Transfer Logic (d) Transmission Timing Logic Ans: Transistor-Transistor Logic
4	6	What does CMOS stand for? (a) Central Metal Oxide Semiconductor (b) Current Mode Output Signal (c) Complementary Metal-Oxide-Semiconductor (d) Complex Mode Output System Ans: Complementary Metal-Oxide-Semiconductor
4	7	TTL logic typically operates at which voltage level? (a) 1.2 V (b) 3.3 V (c) 5 V (d) 12 V Ans: 5 V
4	8	What is the primary function of a switch in electronic circuits? (a) Store data (b) Open or close a circuit (c) Increase voltage (d) Convert AC to DC Ans: Open or close a circuit
4	9	A relay is typically used to: (a) Generate signals (b) Store electricity (c) Control a high voltage circuit with a low voltage signal (d) Reduce resistance in a circuit Ans: Control a high voltage circuit with a low voltage signal
4	10	What does LED stand for? (a) Light Energy Device (b) Low Energy Display (c) Light Emitting Diode (d) Light Electron Display Ans: Light Emitting Diode

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4	11	Which part of the relay creates a magnetic field to operate the switch? (a) Contact (b) Armature (c) Coil (d) Spring Ans:Coil
4	12	In LED interfacing, the longer leg of the LED is usually the: (a) Cathode (b) Anode (c) Base (d) Ground Ans:Anode
4	13	What is a solenoid? (a) A type of resistor (b) A magnetic coil that moves a plunger when energized (c) A digital switch (d) A type of capacitor Ans:A magnetic coil that moves a plunger when energized
4	14	What type of signal is typically used to drive a solenoid? (a) Analog signal (b) DC signal (c) AC signal (d) RF signal Ans:DC signal
4	15	A solenoid converts: (a) Electrical energy to magnetic energy only (b) Electrical energy to mechanical motion (c) Magnetic energy to light (d) Mechanical energy to heat Ans:Electrical energy to mechanical motion
4	16	What is used to control the speed of a DC motor? (a) Transformer (b) Frequency generator (c) PWM (Pulse Width Modulation) (d) Encoder Ans:PWM (Pulse Width Modulation)
4	17	What does ADC stand for? (a) Advanced Digital Controller (b) Analog Digital Converter (c) Analog to Digital Converter (d) Amplified Data Converter Ans:Analog to Digital Converter
4	18	What does DAC stand for? (a) Digital Analog Control (b) Data Analog Converter (c) Digital to Analog Converter (d) Digital Amplifier Converter Ans:Digital to Analog Converter
4	19	What is the main purpose of an ADC? (a) Convert digital signals to analog (b) Store data in binary format (c) Convert analog signals to digital (d) Amplify analog signals Ans:Convert analog signals to digital
4	20	What type of output does a DAC provide? (a) Digital only (b) Analog only (c) Binary (d) Clock signals Ans:Analog only

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4	21	Which of the following is a type of DAC? (a) R-2R Ladder (b) Flash (c) Differential Amplifier (d) Comparator Ans:R-2R Ladder
4	22	What does SAR stand for in Successive Approximation ADC? (a) Sample and Reset (b) Successive Approximation Register (c) Signal Amplification Relay (d) Sequential Analog Response Ans:Successive Approximation Register
4	23	What is the main function of the comparator in a Successive Approximation ADC? (a) Generate clock signals (b) Compare input voltage with DAC output (c) Store digital output (d) Amplify analog input Ans:Compare input voltage with DAC output
4	24	Which component converts the digital output back to analog for comparison in SAR ADC? (a) ADC (b) DAC (c) Comparator (d) Sample and hold circuit Ans:DAC
4	25	The conversion time in a SAR ADC is proportional to: (a) The number of bits (b) Input voltage magnitude (c) Frequency of input signal (d) Number of comparators Ans:The number of bits
4	26	Which of the following is true about SAR ADCs? (a) They are the fastest type of ADC (b) They use a single comparator and a DAC (c) They use multiple comparators simultaneously (d) They do not require a DAC Ans:They use a single comparator and a DAC
4	27	What is the main feature of a dual slope ADC? (a) Uses two integrators (b) Measures the time taken to discharge a capacitor (c) Integrates the input signal over a fixed time interval (d) Uses flash conversion technique Ans:Integrates the input signal over a fixed time interval
4	28	Which component is primarily used in dual slope ADC for integration? (a) Capacitor (b) Resistor (c) Inductor (d) Transformer Ans:Capacitor
4	29	What happens during the 'run-up' phase of a dual slope ADC? (a) The capacitor discharges through a reference voltage (b) The input voltage is integrated over a fixed period (c) The output is converted to digital (d) The capacitor is charged to full voltage Ans:The input voltage is integrated over a fixed period
4	30	During the 'run-down' phase, the capacitor: (a) Charges from the input voltage (b) Discharges through the reference voltage (c) Is disconnected from the circuit (d) Is replaced by a resistor Ans:Discharges through the reference voltage

UNIT	Q NO	QUESTIONS
4	31	The output of a dual slope ADC is proportional to: (a) The discharge time during run-down (b) The charge time during run-up (c) The frequency of the input signal (d) The amplitude of the reference voltage only Ans: The discharge time during run-down
4	32	The accuracy of a dual slope ADC depends mainly on: (a) The reference voltage stability (b) The number of comparators (c) The speed of the ADC (d) The number of bits only Ans: The reference voltage stability
4	33	Which type of signal is suitable as an input for a dual slope ADC? (a) Only digital signals (b) Both AC and DC signals (c) Only high frequency signals (d) Only low voltage signals Ans: Both AC and DC signals
4	34	What is a Weighted Resistor D/A Converter? (a) A device that converts analog to digital signals (b) A type of amplifier (c) A circuit that uses resistors weighted in binary to generate analog output (d) A filter circuit Ans: A circuit that uses resistors weighted in binary to generate analog output
4	35	What is the function of resistors in a Weighted Resistor DAC? (a) Filter the input (b) Control current direction (c) Provide binary-weighted currents or voltages (d) Store data Ans: Provide binary-weighted currents or voltages
4	36	What happens to the resistor value as you move from MSB to LSB in a Weighted Resistor DAC? (a) It increases linearly (b) It decreases exponentially (c) It stays constant (d) It follows a binary weighting Ans: It follows a binary weighting
4	37	The analog output of a weighted resistor DAC is proportional to: (a) The sum of all input voltages (b) The digital input bits weighted by resistors (c) The clock frequency (d) The reference voltage only Ans: The digital input bits weighted by resistors
4	38	A 4-bit Weighted Resistor DAC uses resistors of: (a) Equal values (b) Powers of 2, like R, 2R, 4R, 8R (c) Decreasing by 1 each time (d) Increasing by 10 each time Ans: Powers of 2, like R, 2R, 4R, 8R
4	39	One disadvantage of a Weighted Resistor DAC is: (a) High speed (b) Low resolution (c) Requires precise resistor values (d) It can't work with digital signals Ans: Requires precise resistor values
4	40	The output of a Weighted Resistor DAC is typically: (a) AC (b) Analog voltage or current (c) Digital pulses (d) Clock signals Ans: Analog voltage or current

UNIT	Q NO	QUESTIONS
4	41	In a 3-bit Weighted Resistor DAC, how many input bits are used? (a) 1 (b) 2 (c) 3 (d) 8 Ans:3
4	42	What is the role of the op-amp in a Weighted Resistor DAC? (a) It adds noise to the output (b) It holds the digital input (c) It converts the weighted currents to a voltage (d) It stores binary data Ans:It converts the weighted currents to a voltage
4	43	What would happen if the resistors are not precisely matched in a Weighted Resistor DAC? (a) The output becomes faster (b) There will be more accurate conversion (c) The DAC may produce incorrect or distorted output (d) It will function better at higher frequencies Ans:The DAC may produce incorrect or distorted output
4	44	What resistor values are used in an R-2R ladder DAC? (a) All equal resistors (b) R and 2R only (c) 1k and 10k (d) R, 2R, and 3R Ans:R and 2R only
4	45	The R-2R ladder DAC converts: (a) Analog signals to digital (b) Digital signals to analog (c) Frequency to voltage (d) Voltage to current Ans:Digital signals to analog
4	46	What is the role of the op-amp in an R-2R ladder DAC? (a) Inverts the output (b) Acts as a buffer and summing amplifier (c) Converts AC to DC (d) Stores digital data Ans:Acts as a buffer and summing amplifier
4	47	In an R-2R DAC, each bit in the digital input contributes to the output: (a) Equally (b) Linearly (c) Proportionally based on its position (MSB to LSB) (d) Randomly Ans:Proportionally based on its position (MSB to LSB)
4	48	A TTL gate output is connected to a CMOS gate input through a pull-up resistor to 5 V. The purpose of the resistor is to: (a) Increase the voltage of logic HIGH to meet CMOS VIH (b) Limit current when input is HIGH (c) Reduce propagation delay (d) Pull input LOW when output is floating Ans:Increase the voltage of logic HIGH to meet CMOS VIH
4	49	Which ADC type is best suited for high-accuracy, low-speed applications such as digital multimeters? (a) Flash ADC (b) Successive approximation ADC (c) Dual-slope ADC (d) Parallel comparator ADC Ans:Dual-slope ADC
4	50	An R-2R ladder DAC uses only two resistor values: (a) R and 2R (b) R and R/2 (c) 2R and 4R (d) R and 3R Ans:R and 2R

UNIT	Q NO	QUESTIONS
5	1	Which of the following is a volatile memory? (a) ROM (b) RAM (c) Flash memory (d) Hard disk Ans:RAM
5	2	What does ROM stand for? (a) Read On Memory (b) Read Only Memory (c) Random Only Memory (d) Run On Memory Ans:Read Only Memory
5	3	Which memory loses its contents when power is turned off? (a) Non-volatile memory (b) Volatile memory (c) Permanent memory (d) Optical memory Ans:Volatile memory
5	4	Which type of RAM is faster? (a) DRAM (b) SRAM (c) PROM (d) EPROM Ans:SRAM
5	5	Which memory can be electrically erased and reprogrammed? (a) EEPROM (b) ROM (c) DRAM (d) SRAM Ans:EEPROM
5	6	Which of the following is non-volatile memory? (a) SRAM (b) DRAM (c) ROM (d) Cache Ans:ROM
5	7	Which memory is used for temporary data storage in a computer system? (a) RAM (b) ROM (c) Hard disk (d) CD-ROM Ans:RAM
5	8	Cache memory is used to: (a) Store permanent data (b) Increase processing speed (c) Backup files (d) Store music Ans:Increase processing speed
5	9	The smallest unit of memory is: (a) Byte (b) Bit (c) Word (d) Nibble Ans:Bit
5	10	Which memory type is commonly used for BIOS storage? (a) EEPROM (b) SRAM (c) DRAM (d) Cache Ans:EEPROM

UNIT	Q NO	QUESTIONS
5	11	What happens during a memory read operation? (a) Data is written to memory (b) Data is transferred from memory to CPU (c) Address lines are cleared (d) Memory contents are erased Ans:Data is transferred from memory to CPU
5	12	What happens during a memory write operation? (a) Data is transferred from CPU to memory (b) Data is transferred from memory to CPU (c) Memory is refreshed (d) Address lines are disabled Ans:Data is transferred from CPU to memory
5	13	What is memory access time? (a) Time to execute an instruction (b) Time to locate a file on a disk (c) Time between a request for data and its delivery (d) Time to refresh the screen Ans:Time between a request for data and its delivery
5	14	Which factor usually makes memory faster? (a) Higher capacity (b) Lower access time (c) More address lines (d) Larger word length Ans:Lower access time
5	15	Which lines are used to select a memory location? (a) Data lines (b) Control lines (c) Address lines (d) Status lines Ans:Address lines
5	16	During a read operation, which control signal is activated? (a) Write Enable (WE) (b) Read Enable (RE) (c) Chip Disable (CD) (d) Reset Ans:Read Enable (RE)
5	17	ROM stands for: (a) Read Only Memory (b) Random Only Memory (c) Read On Memory (d) Run On Memory Ans:Read Only Memory
5	18	Which of the following is a characteristic of ROM? (a) Volatile (b) Non-volatile (c) Requires constant refreshing (d) Loses data when power is off Ans:Non-volatile
5	19	Which type of ROM is programmed during manufacturing and cannot be changed later? (a) PROM (b) EPROM (c) Mask ROM (d) EEPROM Ans:Mask ROM
5	20	PROM stands for: (a) Programmable Read Only Memory (b) Permanent Read On Memory (c) Primary Read Only Memory (d) Programmed Random Memory Ans:Programmable Read Only Memory

UNIT	Q NO	QUESTIONS
5	21	Which type of ROM can be erased by exposing it to UV light? (a) PROM (b) EPROM (c) EEPROM (d) Mask ROM Ans:EPROM
5	22	Which type of ROM can be erased and reprogrammed electrically? (a) PROM (b) EPROM (c) EEPROM (d) Mask ROM Ans:EEPROM
5	23	Which ROM type is widely used for storing firmware in modern computers? (a) Mask ROM (b) EPROM (c) EEPROM / Flash ROM (d) PROM Ans:EEPROM / Flash ROM
5	24	What is the main disadvantage of Flash ROM? (a) Data cannot be changed (b) Limited number of write/erase cycles (c) Needs constant power (d) Very slow read speed Ans:Limited number of write/erase cycles
5	25	Which of the following is not a type of ROM? (a) PROM (b) EPROM (c) EEPROM (d) SRAM Ans:SRAM
5	26	Which of the following is a volatile memory? (a) DRAM (b) SRAM (c) Both A and B (d) ROM Ans:Both A and B
5	27	DRAM needs to be: (a) Erased with UV light (b) Refreshed periodically (c) Written once only (d) Reprogrammed electrically Ans:Refreshed periodically
5	28	SRAM is: (a) Slower than DRAM (b) Faster than DRAM (c) Same speed as DRAM (d) Non-volatile Ans:Faster than DRAM
5	29	Which type of RAM uses flip-flops to store data? (a) DRAM (b) SRAM (c) ROM (d) Flash Ans:SRAM
5	30	Which type of RAM stores data using capacitors? (a) DRAM (b) SRAM (c) PROM (d) EEPROM Ans:DRAM

UNIT	Q NO	QUESTIONS
5	31	In sequential access memory, data is: (a) Accessed in any order (c) Accessed by key matching Ans: Accessed in a fixed sequence (b) Accessed in a fixed sequence (d) Accessed via index table
5	32	In random access memory, data can be: (a) Accessed only in sequence (c) Accessed only once Ans: Accessed directly from any location (b) Accessed directly from any location (d) Accessed after a delay
5	33	Direct access memory allows: (a) Only sequential data reading (c) Key-based search Ans: Access to blocks of data directly (b) Access to blocks of data directly (d) CPU-only access
5	34	Which is an example of direct access storage? (a) Magnetic disk (c) ROM chip Ans: Magnetic disk (b) Tape drive (d) Cache memory
5	35	A pen drive is also known as: (a) USB flash drive (c) Optical disk Ans: USB flash drive (b) Hard disk (d) Magnetic tape
5	36	Which type of memory is used in pen drives? (a) DRAM (c) Flash memory Ans: Flash memory (b) SRAM (d) Mask ROM
5	37	SD card stands for: (a) Secure Disk (c) Standard Disk Ans: Secure Digital (b) Secure Digital (d) Storage Device
5	38	SSDs are generally _____ than traditional hard drives. (a) Slower (c) Same speed Ans: Faster (b) Faster (d) Less reliable
5	39	An SSD stands for: (a) Solid-State Disk (c) System Storage Disk Ans: Solid-State Disk (b) Secure Storage Device (d) Small Storage Drive
5	40	PLD stands for: (a) Programmable Logic Device (c) Programmed Logical Data Ans: Programmable Logic Device (b) Permanent Logic Device (d) Parallel Logic Device

UNIT	Q NO	QUESTIONS
5	41	Which of the following is a type of PLD? (a) PROM (b) PLA (c) PAL (d) All of the above Ans:All of the above
5	42	The main goal of memory management is to: (a) Increase CPU speed (b) Manage allocation and deallocation of memory (c) Store permanent files (d) Control I/O devices Ans:Manage allocation and deallocation of memory
5	43	Which type of memory is directly accessible by the CPU? (a) Secondary storage (b) Main memory (c) Virtual memory (d) Cache only Ans:Main memory
5	44	The main difference between Flash ROM and NVRAM is: (a) Both are volatile (b) One is volatile, one is not (c) Use in graphics (d) Cost per GB Ans:One is volatile, one is not
5	45	NVRAM is typically used in: (a) BIOS settings storage (b) USB drives (c) SSD storage cells (d) Graphic cards Ans:BIOS settings storage
5	46	Which is more flexible for prototyping? (a) Fixed logic (b) Programmable logic (c) Equal flexibility (d) None Ans:Programmable logic
5	47	Which can be reprogrammed after manufacturing multiple times? (a) Fixed logic (b) Programmable logic (c) EEPROM (d) Flash memory Ans:Programmable logic
5	48	Fixed logic devices are: (a) Configurable after manufacturing (b) Hardwired at fabrication (c) Software programmable (d) Reprogrammable multiple times Ans:Hardwired at fabrication
5	49	Programmable logic devices are: (a) Manufactured for a single function (b) Configurable by the user (c) Only used for memory storage (d) Cannot be updated Ans:Configurable by the user
5	50	Which memory is closest to the CPU? (a) Cache memory (b) Secondary storage (c) Main memory (d) Registers Ans:Registers

NOTE: PART B - 3 MARKS

UNIT NO	Q.NO	QUESTION
1	1	Draw the logic circuit for the Boolean expression $Y = A \cdot B + C$.
1	2	Realize the OR gate using only NAND gates.
1	3	Represent the decimal number 125 in BCD and explain its advantage over pure binary.
1	4	Perform $10011 - 1101$ using 1's complement subtraction.
1	5	Convert the decimal number 255 into hexadecimal and binary
1	6	Draw the circuit of a 2-input XOR gate using only NAND gates.
1	7	Show how the decimal number 93 is represented in 8-4-2-1 BCD code.
1	8	Illustrate the truth table of a 3-input OR gate.
1	9	Realize an NAND gate using only NOR gates.
1	10	Subtract $110010 - 100111$ using 2's complement method and show all steps.
2	1	Use a 3-variable K-map to simplify $F(A, B, C) = A'B + ABC$.
2	2	Simplify $F(A, B, C) = \Sigma(3, 5, 6)$ using a K-map.
2	3	Solve using K-map: $F(A, B, C) = \Sigma(1, 4, 6, 7)$.
2	4	Compare half-adder and full-adder in three points.
2	5	Explain how a 2-bit comparator can be used to compare two binary numbers.
2	6	Draw the circuit diagram of a Full Adder and give its truth table
2	7	Draw the circuit diagram of a Full Subtractor and give its truth table
2	8	Explain the working of a 1X4 Demultiplexer.
2	9	What is the purpose of a priority encoder?
2	10	Derive the difference and borrow expressions for a half-subtractor.
3	1	State the drawback of an SR flip-flop.
3	2	Compare SR, JK, and D flip-flops in any two points.
3	3	State the advantage of a JK flip-flop over an SR flip-flop.
3	4	Differentiate between level triggering and edge triggering.
3	5	Show how a JK flip-flop can be used as a T flip-flop.
3	6	Explain the operation of a serial-in parallel-out (SIPO) register.
3	7	Compare asynchronous and synchronous counters.
3	8	Draw the logic diagram of a 4-bit ripple counter.
3	9	Explain how a synchronous counter eliminates propagation delay.
3	10	Explain the working of a 3-bit synchronous down counter.
4	1	Differentiate between active and passive sensors.
4	2	Draw the circuit of successive approximation A/D converter
4	3	Define CMOS and state its voltage levels.
4	4	Compare TTL and CMOS logic families in two points.
4	5	State the role of a current limiting resistor in interfacing an LED.
4	6	Explain how a DC motor can be interfaced with TTL logic.
4	7	Explain how a solenoid can be driven using a digital output.
4	8	Explain the working principle of a successive approximation A/D converter.
4	9	Compare successive approximation and dual slope A/D converters.
4	10	Compare weighted resistor and R-2R ladder D/A converters.
5	1	What is meant by memory read operation?
5	2	What are address lines in memory?
5	3	Differentiate between memory capacity and word length.
5	4	Differentiate between ROM and RAM
5	5	State the characteristic of EPROM.
5	6	Differentiate between volatile and non-volatile memory.
5	7	Define sequential memory access with one example.
5	8	Define memory hierarchy.
5	9	Differentiate between Flash ROM and NVRAM
5	10	Differentiate between fixed logic devices and programmable logic devices.

NOTE: PART C 10 MARKS

UNIT NO	Q.NO	QUESTION
1	1	Convert and interpret the given decimal number 148 into its equivalent Binary, Octal, and Hexadecimal representations.
1	2	Explain and illustrate the working principles of AND, OR, NOT, and EX-OR gates using their symbols and truth tables.
1	3	Differentiate and demonstrate the concepts of ASCII and Unicode, supporting your explanation with suitable examples.
1	4	Design and demonstrate the realization of AND, OR, and NOT gates using only NAND gates.
1	5	Construct and justify any four logic gates using only NOR gates.
2	1	Simplify and validate the Boolean expression $Y = AB'C + A'BC + AB'C' + A'B'C + A'B'C'$ using a Karnaugh Map, and draw the corresponding logic diagram for the output.
2	2	Explain and evaluate, with a suitable logic diagram, the working of a Full Adder circuit.
2	3	Illustrate and explain, with a suitable logic diagram, the working of a Full Subtractor circuit.
2	4	Describe and compare the working principles of a Multiplexer and Demultiplexer circuit, supported by appropriate diagrams.
2	5	Design and explain the logic diagram of a single-bit comparator, illustrating its operation with suitable examples.
3	1	Explain and assess the logic diagram of a JK flip-flop and its functional behavior.
3	2	Demonstrate and explain the operation of a Parallel-In Serial-Out (PISO) shift register, using a suitable example.
3	3	Illustrate and explain, with a logic diagram, the operation of an Asynchronous Up Counter.
3	4	Summarize and explain the operation of a 4-bit synchronous down counter.
3	5	Demonstrate and verify the functionality of a decade counter using a logic diagram and truth table.
4	1	Explain and apply the concept of solenoid interfacing, supported by a suitable diagram.
4	2	Describe and explain the working of a Successive Approximation Analog-to-Digital Converter (ADC) with a neat diagram.
4	3	Explain and interpret the operation of a Dual Slope ADC, using an appropriate diagram.
4	4	Explain and justify the working of a binary weighted resistor Digital-to-Analog Converter (DAC) with a diagram.
4	5	Explain and illustrate the operation of an R-2R ladder type DAC with a suitable diagram.
5	1	Compare and evaluate Flash ROM and NVRAM based on their characteristics and applications.
5	2	Explain and interpret the operation of a Pen Drive and SD Card.
5	3	Differentiate and contrast Fixed Logic and Programmable Logic.
5	4	Explain and illustrate, with a suitable diagram, the architecture of a Programmable Logic Array (PLA).
5	5	Explain and integrate the concepts of memory accessing, memory hierarchy, and memory management, highlighting their interrelationships.