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**DEPARTMENT OF ELECTRONICS AND
COMMUNICATION ENGINEERING**

QUESTION BANK

FOR

EEC31020 – DIGITAL ELECTRONICS

UNIT	Q NO	QUESTIONS
I	1	Which number system uses only 0 and 1? (a) Decimal (b) Octal (c) Hexadecimal (d) Binary Ans: Binary
I	2	What is the base of the hexadecimal system? (a) 2 (b) 8 (c) 10 (d) 16 Ans: 16
I	3	Binary 1101 is equal to _____ in decimal. (a) 11 (b) 12 (c) 13 (d) 14 Ans: 13
I	4	1's complement of 1010 is: (a) 1010 (b) 0101 (c) 1100 (d) 0100 Ans: 0101
I	5	ASCII code is mainly used for: (a) Arithmetic operation (b) Text Representation (c) Memory access (d) Image processing Ans: Text Representation
I	6	BCD stands for (a) Binary Count Decimal (b) Binary Coded Decimal (c) Boolean Code Data (d) Bit Conversion Device Ans: Binary Coded Decimal
I	7	Which is not a weighted number system? (a) Binary (b) Decimal (c) Gray (d) Octal Ans: Gray
I	8	Hexadecimal number 2F is equivalent to _____ in decimal. (a) 45 (b) 47 (c) 40 (d) 50 Ans: 47
I	9	Which code is used to reduce error in mechanical switches? (a) Gray Code (b) BCD (c) ASCII (d) Binary Ans: Gray Code
I	10	What is the binary equivalent of decimal 25? (a) 11001 (b) 10101 (c) 10011 (d) 11011 Ans: 11001

UNIT	Q NO	QUESTIONS
I	11	Gray code of 4bit binary number 1001 is (a) 1000 (b) 1101 (c) 1100 (d) 1011 Ans:1101
I	12	Which of the following code is a weighted code? (a) Gray (b) Excess-3 (c) BCD (d) ASCII Ans:BCD
I	13	The maximum value of 4-bit binary number is: (a) 15 (b) 16 (c) 8 (d) 14 Ans:15
I	14	The decimal equivalent of 100000 in binary is: (a) 16 (b) 32 (c) 64 (d) 48 Ans:32
I	15	What is the 2's complement of 1001? (a) 110 (b) 1111 (c) 1011 (d) 0111 Ans:0111
I	16	2's complement of a number is obtained by: (a) Reversing bits (b) Reversing and adding 1 (c) Flipping and subtracting 1 (d) Direct addition Ans:Reversing and adding 1
I	17	Which Boolean law states $A + A = A$? (a) Idempotent Law (b) Associative Law (c) Distributive Law (d) Complement Law Ans:Idempotent Law
I	18	The output of the expression $A \cdot A = ?$ (a) 0 (b) A (c) 1 (d) A' Ans:A
I	19	The output of the expression $A + 1 = ?$ (a) A (b) 0 (c) 1 (d) A' Ans:1
I	20	The output of the expression $A \cdot 0 = ?$ (a) A (b) 0 (c) 1 (d) A' Ans:0

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I	21	The output of the expression $A + A' = ?$ (a) A (b) 1 (c) 0 (d) A' Ans:1
I	22	The expression $(A + B)'$ is equivalent to: (a) $A' + B'$ (b) $A \cdot B$ (c) $A' \cdot B'$ (d) $A + B$ Ans:$A' \cdot B'$
I	23	Demorgan's first theorem states that _____ (a) $(A + B)' = A' + B'$ (b) $(A \cdot B)' = A' \cdot B'$ (c) $(A + B)' = A' \cdot B'$ (d) $A + B = AB$ Ans:$(A + B)' = A' \cdot B'$
I	24	Which representation involves min terms? (a) SOP (b) POS (c) K-map (d) Gray Code Ans:SOP
I	25	In SOP form, 1 means that _____ (a) A variable is true (b) A variable is complemented (c) A term is minimized (d) A variable is missing Ans:A variable is true
I	26	POS stands for (a) Product of sum (b) Power of signal (c) Product of sequence (d) Probability of sum Ans:Product of sum
I	27	K-map is used for _____ (a) Code conversion (b) Simplification (c) Addition (d) Subtraction Ans:Simplification
I	28	How many cells a 4-variable K- map has? (a) 8 (b) 16 (c) 4 (d) 32 Ans:16
I	29	Which of the following is a canonical form? (a) SOP (b) POS (c) K-map (d) Both A & B Ans:Both A & B
I	30	The result of the Binary subtraction $1010 - 0011 = ?$ (a) 101 (b) 1001 (c) 111 (d) 11 Ans:111

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I	31	What is the weight of MSB in 4-bit binary? (a) 2 (c) 8 Ans:8	(b) 4 (d) 1
I	32	Which logic uses only 0 and 1? (a) Fuzzy logic (c) Analog logic Ans:Binary logic	(b) Binary logic (d) Sequential logic
I	33	The Gray code is a type of: (a) Weighted code (c) Error correction code Ans:Non- weighted code	(b) Non- weighted code (d) Signed code
I	34	Which of the following code is used in seven segment display? (a) BCD (c) ASCII Ans:BCD	(b) Gray (d) Excess-3
I	35	The 1's complement of 1111 is: (a) 0000 (c) 1000 Ans:0000	(b) 1110 (d) 1100
I	36	Decimal to binary conversion involves: (a) Multiplication (c) Subtraction Ans:Division by 2	(b) Division by 2 (d) Addition
I	37	What is the 1's complement of 1100? (a) 0011 (c) 1111 Ans:0011	(b) 1100 (d) 1000
I	38	Excess-3 code is a: (a) Weighted code (c) Alphanumeric code Ans:Self- complementing code	(b) Self- complementing code (d) None
I	39	Which number system has base-8? (a) Binary (c) Decimal Ans:Octal	(b) Octal (d) Hex
I	40	Which code is not used in digital applications? (a) Binary (c) ASCII Ans:Roman	(b) Octal (d) Roman

UNIT	Q NO	QUESTIONS
I	41	Which logic gate is used in binary adders? (a) AND (b) XOR (c) OR (d) NOT Ans:XOR
I	42	In Boolean algebra, $A + AB = ?$ (a) A (b) B (c) AB (d) $A'B$ Ans:A
I	43	What is the dual of $A + 0 = A$? (a) $A \cdot 1 = A$ (b) $A + 1 = A$ (c) $A \cdot 0 = A$ (d) $A \cdot A = A$ Ans:A . 1 = A
I	44	A Karnaugh Map helps in: (a) Simplifying logic (b) Drawing circuits (c) Coding data (d) Building gates Ans:Simplifying logic
I	45	Which expression is a minterm? (a) $A + B$ (b) $A'B$ (c) $A + B + C$ (d) $A' + B$ Ans:A'B
I	46	Simplified expression of the Boolean logic $AB + AB' = ?$ (a) A (b) B (c) 1 (d) 0 Ans:A
I	47	1's complement of 0000 is: (a) 1111 (b) 1010 (c) 0111 (d) 1110 Ans:1111
I	48	Which of the following codes is an alphanumeric code? (a) Gray (b) ASCII (c) Hex (d) Excess-3 Ans:ASCII
I	49	Binary 1111 is equivalent to Hex: (a) E (b) D (c) F (d) C Ans:F
I	50	BCD equivalent of Decimal number 10 is: (a) 1010 (b) 0001 0000 (c) 0001 0001 (d) 1000 0001 Ans:0001 0000

UNIT	Q NO	QUESTIONS
II	1	What is the symbol of the AND gate? (a) Dot ($\cdot$) (b) Plus (+) (c) Circle ($\circ$) (d) Cross ($\times$) Ans:Dot ($\cdot$)
II	2	Which gate gives a HIGH output only when all inputs are HIGH? (a) OR (b) AND (c) NAND (d) NOR Ans:AND
II	3	The output of a NOT gate is the _____ of the input. (a) Same (b) Double (c) Inverse (d) Sum Ans:Inverse
II	4	The truth table of an OR gate with 2 inputs has how many possible combinations? (a) 1 (b) 2 (c) 3 (d) 4 Ans:4
II	5	What is the Boolean expression for a NOR gate? (a) $A + B$ (b) $A \cdot B$ (c) $A + \bar{B}$ (d) $(A + B)'$ Ans:($A + B$)'
II	6	A NAND gate is equivalent to which operation? (a) $(A \cdot B)'$ (b) $A + B$ (c) $\bar{A} + \bar{B}$ (d) $(A + B)'$ Ans:($A \cdot B$)'
II	7	The 2- input XOR gate gives HIGH output when the inputs are _____ (a) LOW (b) unequal (c) equal (d) HIGH Ans:unequal
II	8	Which gate is considered a universal gate? (a) XOR (b) NOT (c) NAND (d) AND Ans:NAND
II	9	Which gate produces a LOW output when all inputs are HIGH? (a) NAND (b) NOR (c) Both A and B (d) NAND Ans:Both A and B
II	10	The number of possible input combinations for 3 inputs is _____ (a) 4 (b) 6 (c) 8 (d) 16 Ans:8

UNIT	Q NO	QUESTIONS
II	11	What is the output of an AND gate if inputs are A=1, B=0? (a) 0 (b) 1 (c) 0 or 1 (d) Undefined Ans:0
II	12	NAND gate is the combination of which two gates? (a) OR + NOT (b) AND + NOT (c) NOR + NOT (d) XOR + NOT Ans:AND + NOT
II	13	Realizing AND gate using only NAND gate requires _____ number of NAND gates. (a) 1 (b) 2 (c) 3 (d) 4 Ans:2
II	14	Which of the following logic gates is not basic gate? (a) OR (b) NOR (c) AND (d) NOT Ans:NOR
II	15	The output of XNOR logic is HIGH when _____ (a) Inputs are same (b) Inputs differ (c) One is HIGH (d) All LOW Ans:Inputs are same
II	16	Which gate is used to invert a signal? (a) OR (b) NAND (c) NOT (d) AND Ans:NOT
II	17	In Boolean algebra,the output of the expression $A + 0 = ?$ (a) A (b) 1 (c) 0 (d) $\bar{A}$ Ans:A
II	18	A NAND gate has input A=1, B=1. With this condition the Output is: (a) 0 (b) 1 (c) A (d) B Ans:0
II	19	What gate has the truth table outputs 0,1,1,1 for input combinations 00,01,10,11? (a) OR (b) AND (c) NAND (d) NOR Ans:OR
II	20	XOR gate is also known as _____ (a) Coincidence gate (b) Anti- coincidenc e (c) Equality gate (d) Inequality gate Ans:Inequality gate

UNIT	Q NO	QUESTIONS
II	21	Which expression represents OR gate? (a) $A + B$ (b) $A \cdot B$ (c) $\bar{A} + \bar{B}$ (d) $A\bar{B}$ Ans: A + B
II	22	Output of OR gate if A=0 and B=1? (a) 0 (b) 1 (c) Undefined (d) A Ans: 1
II	23	Which is NOT a universal gate? (a) NAND (b) NOR (c) AND (d) Both A and B Ans: AND
II	24	The minimum number of NAND gates to implement OR gate is (a) 1 (b) 2 (c) 3 (d) 4 Ans: 3
II	25	A logic expression $A + AB$ simplifies to: (a) A (b) B (c) AB (d) $A + B$ Ans: A
II	26	What is the output of NOR gate when all inputs are 0? (a) 0 (b) 1 (c) Undefined (d) A Ans: 1
II	27	A logic gate that produces 1 only when both inputs differ? (a) XOR (b) AND (c) NAND (d) OR Ans: XOR
II	28	The output of the Boolean expression is $A + A = ?$ (a) 1 (b) A (c) 0 (d) $\bar{A}$ Ans: A
II	29	The minimum number of NOR gates to implement EXNOR gate is (a) 1 (b) 2 (c) 3 (d) 4 Ans: 4
II	30	The minimum number of NAND gates to implement the logic function $A+B$ (a) 1 (b) 2 (c) 3 (d) 4 Ans: 3

UNIT	Q NO	QUESTIONS
II	31	What is the output of an OR gate with inputs $A = 0$, $B = 1$? (a) 0 (b) 1 (c) Depends on A (d) A' Ans:1
II	32	Which gate produces output only when inputs differ? (a) AND (b) OR (c) XOR (d) XNOR Ans:XOR
II	33	Which logic gate is equivalent to staircase light control? (a) NOR (b) NAND (c) XOR (d) NOT Ans:NAND
II	34	What is the function of a NAND gate? (a) $A.B$ (b) $A + B$ (c) $(A.B)'$ (d) $(A + B)'$ Ans:(A.B)'
II	35	Which of the following is an universal gate? (a) XOR (b) NOT (c) NAND (d) AND Ans:NAND
II	36	What is the output of a NOR gate with inputs 0 and 0? (a) 1 (b) 0 (c) Undefined (d) 1,0 Ans:1
II	37	The expression $A + AB + ABC$ simplifies to: (a) ABC (b) A (c) B (d) BC Ans:A
II	38	Which gate is used in a inverter operation? (a) OR (b) NAND (c) NOR (d) NOT Ans:NOT
II	39	How many inputs can a basic logic gate have? (a) 1 (b) 2 or more (c) Only 2 (d) Only 3 Ans:2 or more
II	40	The truth table of a 2-input AND gate has how many rows? (a) 2 (b) 1 (c) 4 (d) 8 Ans:4

UNIT	Q NO	QUESTIONS
II	41	A universal gate can be used to build _____ (a) AND gate only (b) OR gate only (c) Any logic gate (d) NOT gate only Ans: Any logic gate
II	42	A logic gate that gives output 1 only when all inputs are 0 is _____ (a) AND (b) OR (c) NOR (d) NAND Ans: NOR
II	43	What is the function of an XOR gate with A= 1 and B = 1? (a) 0 (b) 1 (c) Undefined (d) High impedance Ans: 0
II	44	What is the logic expression for a EX-NOR gate? (a) $A + B$ (b) $A'B' + AB$ (c) $A'B + AB'$ (d) B Ans: $A'B' + AB$
II	45	Which logic gate is equivalent to NOT(A AND B)? (a) OR (b) NAND (c) NOR (d) XOR Ans: NAND
II	46	In a NOR gate, if anyone input is 1, the output will be: (a) 1 (b) 0 (c) Same as input (d) Undefined Ans: 0
II	47	Realization of Boolean expression using logic gates involves: (a) Programming (b) Simplification (c) Hardware implementation (d) Software simulation Ans: Hardware implementation
II	48	The output of a NOT gate is the: (a) Same as input (b) Complement of input (c) Double the input (d) Square of input Ans: Complement of input
II	49	Which logic gate can be made using only NAND gates? (a) NOT (b) AND (c) OR (d) All of these Ans: All of these
II	50	What is the logic expression for a NAND gate? (a) $A.B$ (b) $A + B$ (c) $(A + B)'$ (d) $(A.B)'$ Ans: $(A.B)'$

UNIT	Q NO	QUESTIONS
III	1	Which logic circuit is used to add two binary numbers? (a) Decoder (b) Adder (c) MUX (d) Subtractor Ans: Adder
III	2	Which gate give sum output in a half-adder circuit? (a) OR (b) AND (c) XOR (d) NAND Ans: XOR
III	3	How many outputs are there in a full adder? (a) 1 (b) 2 (c) 3 (d) 4 Ans: 2
III	4	Which logic circuit performs binary subtraction? (a) Adder (b) Decoder (c) Subtractor (d) Encoder Ans: Subtractor
III	5	Which logic function cannot be performed by a multiplexer? (a) AND (b) OR (c) NOT (d) Subtract Ans: Subtract
III	6	How many outputs are there in a half adder? (a) 1 (b) 2 (c) 3 (d) 4 Ans: 2
III	7	What are the outputs of a half adder? (a) Sum and Difference (b) Carry and Borrow (c) Sum and Carry (d) Sum and Borrow Ans: Sum and Carry
III	8	Which of the following is not a combinational circuit? (a) MUX (b) Decoder (c) Flip-Flop (d) Adder Ans: Flip-Flop
III	9	The output of a decoder is: (a) Always 1 (b) Always 0 (c) Depends on input combination (d) Always high Ans: Depends on input combination
III	10	What is the number of output lines for a 3x8 decoder? (a) 2 (b) 4 (c) 8 (d) 3 Ans: 8

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III	11	Which IC is used as a 4- bit full adder? (a) 7483 (b) 7400 (c) 7404 (d) 7476 Ans:7483
III	12	What does an encoder do? (a) Selects data (b) Decodes data (c) Converts input to binary (d) Adds binary Ans:Converts input to binary
III	13	How many inputs are there in a full adder? (a) 2 (b) 3 (c) 1 (d) 4 Ans:3
III	14	A half adder does not consider which input? (a) A (b) B (c) Carry In (d) None Ans:Carry In
III	15	A 1-to-4 demux has how many selection lines? (a) 1 (b) 2 (c) 3 (d) 4 Ans:2
III	16	A multiplexer has how many select lines for 8 inputs? (a) 2 (b) 3 (c) 4 (d) 8 Ans:3
III	17	What is the main use of a decoder? (a) Data selection (b) Data processing (c) Code translation (d) Signal addition Ans:Code translation
III	18	Which combinational circuit has one input and many outputs? (a) MUX (b) Demux (c) Adder (d) Subtractor Ans:Demux
III	19	Which device has many inputs and one output? (a) Decoder (b) Encoder (c) MUX (d) Demux Ans:MUX
III	20	Which logic gate is used in parity checking? (a) AND (b) OR (c) XOR (d) NAND Ans:XOR

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III	21	What is the output of 4- bit even parity generator for 1001? (a) 0 (b) 1 (c) Depends (d) 2 Ans:0
III	22	What is the purpose of a parity bit? (a) To correct error (b) To detect error (c) To encode data (d) Both A and B Ans:Both A and B
III	23	How many outputs are there in a full subtractor? (a) 2 (b) 3 (c) 1 (d) 4 Ans:2
III	24	Difference output of a half subtractor for A=1, B=0? (a) 0 (b) 1 (c) high impedance (d) invalid state Ans:1
III	25	How many outputs are there in a half subtractor? (a) 1 (b) 2 (c) 3 (d) 4 Ans:2
III	26	A demux with 2 selection lines has how many outputs? (a) 2 (b) 3 (c) 4 (d) 8 Ans:4
III	27	What is the carry output of a full adder if the inputs are (1,0)? (a) 0 (b) 1 (c) Undefined (d) Depends Ans:0
III	28	A 4-to-1 multiplexer has _____ inputs? (a) 2 (b) 3 (c) 4 (d) 1 Ans:4
III	29	A 2-to-4 decoder can produce how many output lines? (a) 2 (b) 3 (c) 4 (d) 8 Ans:4
III	30	Output of a 2-bit even parity generator for input 10? (a) 0 (b) 1 (c) 2 (d) Depends Ans:1

UNIT	Q NO	QUESTIONS
III	31	In 3-bit even parity generator, 3 inputs are 1. What is the generated Parity bit? (a) 0 (b) 1 (c) Depends (d) None Ans:1
III	32	4-to-16 decoder requires how many inputs? (a) 2 (b) 4 (c) 3 (d) 5 Ans:4
III	33	What does a multiplexer do? (a) Distribute data (b) Selects one input (c) Splits inputs (d) Adds Ans:Selects one input
III	34	Purpose of enable input in decoder? (a) Activate outputs (b) Add delay (c) Control MUX (d) Subtract Ans:Activate outputs
III	35	What is the number of select lines in a 8-to-1 MUX? (a) 2 (b) 4 (c) 3 (d) 8 Ans:3
III	36	How many full adders are required for 4-bit addition? (a) 4 (b) 2 (c) 1 (d) 3 Ans:4
III	37	A combinational circuit is a digital circuit has _____ (a) Memory (b) Feedback (c) No memory (d) Clock Ans:No memory
III	38	Output of encoder with no active enable input? (a) 0 (b) 1 (c) Undefined (d) High impedance Ans:0
III	39	A demux routes data from: (a) Many→ one (b) One→Many (c) One→One (d) Many→Many Ans:One→Many
III	40	3-to-8 decoder IC? (a) 74138 (b) 7404 (c) 7485 (d) 7474 Ans: 74138

UNIT	Q NO	QUESTIONS
III	41	The circuit used for digital code conversion? (a) Decoder (b) MUX (c) Adder (d) Subtractor Ans:Decoder
III	42	Output of even parity checker on even input? (a) 0 (b) 1 (c) Undefined (d) Depends Ans:0
III	43	A demux can act as: (a) Data selector (b) Data Distributor (c) Encoder (d) Decoder Ans:Data Distributor
III	44	Which is not a combinational circuit? (a) MUX (b) counter (c) Decoder (d) Adder Ans:counter
III	45	Gate which is commonly used for parity generation? (a) XOR (b) AND (c) NOR (d) NAND Ans:XOR
III	46	2-to-1 MUX required to build 4-to-1 MUX? (a) 2 (b) 3 (c) 4 (d) 5 Ans:3
III	47	Function of priority encoder? (a) Assigns priority (b) Stores input (c) Decodes (d) MUX control Ans:Assigns priority
III	48	For a 3-to-8 decoder with input 011, What will be the output? (a) D0 (b) D3 (c) D7 (d) D5 Ans:D3
III	49	The digital circuit which is used to select binary information from among many lines? (a) MUX (b) Decoder (c) Adder (d) Subtractor Ans:MUX
III	50	Gate to implement 2- bit even parity? (a) XOR (b) NAND (c) OR (d) AND Ans:XOR

UNIT	Q NO	QUESTIONS
IV	1	What is the basic function of a flip- flop? (a) Amplification (b) Oscillation (c) Storage (d) Switching Ans:Storage
IV	2	A latch is formed using which type of gates? (a) XOR (b) NAND/NOR (c) AND (d) Buffer Ans:NAND/NOR
IV	3	Which of the following is a level- triggered device? (a) SR latch (b) D flip-flop (c) JK flip-flop (d) Master- Slave FF Ans:SR latch
IV	4	What is the function of the "Clear" input in a flip-flop? (a) Sets output to 1 (b) Toggles the output (c) Resets output to 0 (d) Disables input Ans:Resets output to 0
IV	5	The output of a JK flip- flop toggles when: (a) J=0, K=1 (b) J=1, K=0 (c) J=1, K=1 (d) J=0, K=0 Ans:J=1, K=1
IV	6	What is the characteristic equation of a D flip- flop? (a) $Q_{n+1} = Q'$ (b) $Q_{n+1} = D$ (c) $Q_{n+1} = D + Q'$ (d) $Q_{n+1} = JQ' + K'Q$ Ans:$Q_{n+1} = D$
IV	7	Which flip-flop eliminates the race- around condition? (a) T flip-flop (b) D flip-flop (c) Master- Slave JK FF (d) SR latch Ans:Master- Slave JK FF
IV	8	Which type of flip-flop is formed by connecting J and K inputs together? (a) SR (b) D (c) T (d) JK Ans:T
IV	9	What is the minimum number of flip-flops required to build a mod-8 counter? (a) 2 (b) 4 (c) 3 (d) 8 Ans:3
IV	10	In a 4-bit ripple counter, the maximum count value is: (a) 8 (b) 4 (c) 15 (d) 16 Ans:15

UNIT	Q NO	QUESTIONS
IV	11	In a synchronous counter, all flip-flops are triggered by using _____ (a) Different clocks (b) Same clock (c) External signal (d) Feedback Ans: Same clock
IV	12	What is the maximum number of states of a 3-bit asynchronous counter? (a) 6 (b) 8 (c) 7 (d) 3 Ans: 8
IV	13	The main disadvantage of ripple counter is: (a) High power (b) Slow speed (c) More hardware (d) None Ans: Slow speed
IV	14	Which flip-flop is most suitable for frequency division? (a) SR (b) T (c) D (d) JK Ans: T
IV	15	A decade counter counts from _____ (a) 0 to 8 (b) 0 to 9 (c) 0 to 10 (d) 1 to 10 Ans: 0 to 9
IV	16	Which of the following is an asynchronous device? (a) 4-bit synchronous counter (b) Synchronous D flip-flop (c) Ripple counter (d) None Ans: Ripple counter
IV	17	Which type of counter has all flip-flops triggered simultaneously? (a) Asynchronous (b) Synchronous (c) Ripple (d) Modulus Ans: Synchronous
IV	18	A preset input in a flip-flop sets the output to: (a) 0 (b) Toggle state (c) 1 (d) Hold previous Ans: 1
IV	19	Flip-flops store how many bits of information? (a) 2 (b) 1 (c) 4 (d) 8 Ans: 1
IV	20	In a JK flip-flop, when J=1 and K=0, the output is: (a) Reset (b) Toggle (c) Set (d) No change Ans: Set

UNIT	Q NO	QUESTIONS
IV	21	A Master- Slave flip- flop uses how many flip-flops internally? (a) 1 (b) 3 (c) 2 (d) 4 Ans:2
IV	22	Clock signal in sequential circuits is used for: (a) Latching output (b) Triggering input (c) Synchronization (d) Resetting counter Ans:Synchronization
IV	23	Which counter counts the sequence from 0 to 9? (a) Ripple counter (b) Up/Down counter (c) Decade counter (d) Mod-5 counter Ans:Up/Down counter
IV	24	How many flip- flops are needed for MOD- 16 counter? (a) 2 (b) 3 (c) 4 (d) 5 Ans:4
IV	25	The logic symbol for a JK flip-flop contains _____ (a) Only 1 input (b) 2 inputs and a clock (c) 4 inputs (d) 3 inputs and no clock Ans:2 inputs and a clock
IV	26	In T flip- flop, toggling means: (a) Set (b) Reset (c) Change state (d) Hold state Ans:Change state
IV	27	What is the function of a counter? (a) Data storage (b) Arithmetic (c) Frequency multiplication (d) Counting states Ans:Counting states
IV	28	A synchronous counter avoids delay because: (a) It is slow (b) It uses edge triggering (c) All flip-flops are clocked together (d) Feedback loop Ans:All flip-flops are clocked together
IV	29	Which type of triggering is most commonly used? (a) Level (b) Edge (c) Pulse (d) Manual Ans:Edge
IV	30	Which FF has the drawback of race around condition? (a) JK FF (b) SR FF (c) D FF (d) T FF Ans:JK FF

UNIT	Q NO	QUESTIONS
IV	31	In a JK flip-flop, what happens when both inputs are 0? (a) Set (b) Reset (c) No change (d) Toggle Ans:No change
IV	32	What is the frequency division factor for a 3-stage ripple counter? (a) 4 (b) 8 (c) 6 (d) 2 Ans:8
IV	33	Which one is a non- clocked storage element? (a) Flip-flop (b) Latch (c) Counter (d) Register Ans:Latch
IV	34	The propagation delay in ripple counter increases with: (a) More inputs (b) More flip- flops (c) Less feedback (d) Higher frequen cy Ans:More flip- flops
IV	35	D flip-flop is called delay flip- flop because: (a) Output is always 0 (b) Input is delayed (c) Output follows input after clock (d) None of these Ans:Output follows input after clock
IV	36	Which circuit stores 8 bits of data? (a) T Flip-Flop (b) 4-bit counter (c) 8-bit register (d) SR Latch Ans:8-bit register
IV	37	What is the maximum modulo of a 4-bit binary counter? (a) 8 (b) 16 (c) 10 (d) 4 Ans:16
IV	38	The hold condition in an SR latch occurs when: (a) S=0, R=0 (b) S=1, R=0 (c) S=0, R=1 (d) S=1, R=1 Ans:S=0, R=0
IV	39	Which flip-flop is commonly used in shift registers? (a) SR (b) D (c) JK (d) T Ans:D
IV	40	Calculate the modulus of a counter made with 5 flip-flops. (a) 16 (b) 31 (c) 32 (d) 64 Ans:32

UNIT	Q NO	QUESTIONS
IV	41	Which is true for synchronous counter? (a) Less speed (c) High speed Ans:High speed (b) More delay (d) Edge triggered
IV	42	A MOD-10 counter resets after how many counts? (a) 8 (c) 10 Ans:10 (b) 9 (d) 11
IV	43	The circuit that cycles through a set sequence of states is called a: (a) Flip-flop (c) Counter Ans:Counter (b) Shift register (d) Multiplexer
IV	44	Clock skew affects which type of counters the most? (a) Synchronous (c) Ring counter Ans:Asynchronous (b) Asynchronous (d) Decade counter
IV	45	If a counter counts 000, 001, 010, it is: (a) Asynchronous counter (c) Ring counter Ans:Asynchronous counter (b) Synchronous counter (d) Johnson counter
IV	46	A shift register shifts data on: (a) Logic high (c) Logic low Ans:Clock edge (b) Clock edge (d) Level change
IV	47	The output Q of a T flip- flop when T=1 is : (a) Complemented (c) Same as input Ans:Complemented (b) Stored (d) Undefined
IV	48	Which one is not a sequential logic device? (a) Latch (c) Decoder Ans:Decoder (b) Counter (d) Flip-flop
IV	49	A flip-flop changes state on: (a) Level change (c) Clock edge Ans:Clock edge (b) Voltage level (d) Constant signal
IV	50	Which counter would you apply for generating a sequence 0-1-3-2 repeatedly? (a) Asynchronous counter (c) Ring counter Ans:Synchronous counter (b) Synchronous counter (d) Johnson counter

UNIT	Q NO	QUESTIONS
V	1	Which register shifts data one bit at a time in both input and output? (a) SISO (b) PISO (c) SIPO (d) PIPO Ans:SISO
V	2	Which register loads all bits simultaneously but shifts out serially? (a) SISO (b) PISO (c) SIPO (d) PIPO Ans:PISO
V	3	Which register accepts serial data and outputs in parallel? (a) SISO (b) SIPO (c) PIPO (d) PISO Ans:SIPO
V	4	Which register can load and output data in parallel? (a) SISO (b) SIPO (c) PISO (d) PIPO Ans:PIPO
V	5	What is the main application of shift registers? (a) Data storage (b) Data conversion (c) Data transmission (d) All of these Ans:All of these
V	6	Which register type is most suitable for serial-to-parallel conversion? (a) SISO (b) SIPO (c) PISO (d) PIPO Ans:SIPO
V	7	Which register is commonly used for parallel-to-serial conversion? (a) SISO (b) SIPO (c) PISO (d) PIPO Ans:PISO
V	8	In shift registers, shifting direction can be (a) Left only (b) Right only (c) Both directions (d) None Ans:Both directions
V	9	Which register type is often used in temporary data storage? (a) SISO (b) SIPO (c) PIPO (d) Any of these Ans:Any of these
V	10	Which register is used in ring counters? (a) SISO (b) SIPO (c) PIPO (d) PISO Ans:SISO

UNIT	Q NO	QUESTIONS
V	11	PROM is (a) Programmable once (b) Erasable by UV (c) Electrically erasable (d) Volatile Ans:Programmable once
V	12	EPROM can be erased using (a) Electrical pulses (b) UV light (c) Magnetic field (d) Heat Ans:UV light
V	13	EEPROM is erased using (a) UV light (b) Electrical pulses (c) Magnetic field (d) Heat Ans:Electrical pulses
V	14	Flash memory is a type of (a) RAM (b) ROM (c) DRAM (d) SRAM Ans:ROM
V	15	SRAM stores data using (a) Capacitors (b) Flip-flops (c) Magnetic bits (d) Optical cells Ans:Flip-flops
V	16	DRAM stores data using (a) Capacitors (b) Flip-flops (c) Magnetic bits (d) Optical cells Ans:Capacitors
V	17	Which memory needs refreshing to retain data? (a) SRAM (b) DRAM (c) ROM (d) PROM Ans:DRAM
V	18	Which memory is faster? (a) SRAM (b) DRAM (c) Both same speed (d) None Ans:SRAM
V	19	RAM is _____ (a) Volatile (b) Non-volatile (c) Permanent storage (d) Read-only Ans:Volatile
V	20	ROM is _____ (a) Volatile (b) Non-volatile (c) Temporary storage (d) Read-write Ans:Non-volatile

UNIT	Q NO	QUESTIONS
V	21	Which memory is used for firmware? (a) RAM (b) ROM (c) Cache (d) DRAM Ans:ROM
V	22	Which memory sits between CPU and main memory? (a) ROM (b) Cache (c) SSD (d) PROM Ans:Cache
V	23	Cache memory improves performance by (a) Reducing CPU clock speed (b) Reducing average access time (c) Increasing memory size (d) Increasing voltage Ans:Reducing average access time
V	24	Associative memory is also called (a) Content-addressable memory (b) Sequential memory (c) Direct-access memory (d) Virtual memory Ans:Content-addressable memory
V	25	Which storage device uses magnetic coating on platters? (a) SSD (b) HDD (c) Flash drive (d) DVD Ans:HDD
V	26	Which type of ROM can be rewritten multiple times electrically? (a) PROM (b) EPROM (c) EEPROM (d) Mask ROM Ans:EEPROM
V	27	In shift registers, data transfer can be (a) Serial only (b) Parallel only (c) Serial or Parallel (d) None Ans:Serial or Parallel
V	28	Which is the primary difference between SRAM and DRAM? (a) Size (b) Cost (c) Storage element (d) None Ans:Storage element
V	29	Which type of memory is best for high-speed cache? (a) DRAM (b) SRAM (c) Flash (d) EEPROM Ans:SRAM
V	30	Which storage is the slowest among the options? (a) Cache (b) Main memory (c) Secondary storage (d) Registers Ans:Secondary storage

UNIT	Q NO	QUESTIONS
V	31	If you need to convert 4-bit parallel data into a serial stream, which register would you select? (a) SIPO (b) PISO (c) SISO (d) PIPO Ans:PISO
V	32	To store a lookup table permanently in hardware, which memory would you use? (a) RAM (b) ROM (c) DRAM (d) Cache Ans:ROM
V	33	You must design a circuit that delays a serial signal by 4 clock cycles. Which device would you use? (a) Counter (b) Shift register (c) Multiplexer (d) Decoder Ans:Shift register
V	34	Which memory would you use to store BIOS? (a) DRAM (b) SRAM (c) ROM (d) Cache Ans:ROM
V	35	You need a memory that is non-volatile and can be electrically reprogrammed many times. Which do you choose? (a) EEPROM (b) SRAM (c) DRAM (d) PROM Ans:EEPROM
V	36	Which memory type will you choose to speed up CPU access to frequently used instructions? (a) RAM (b) Cache (c) ROM (d) EEPROM Ans:Cache
V	37	You want to design a serial-in parallel-out converter. How many clock pulses are needed to load 8 bits? (a) 1 (b) 4 (c) 8 (d) 16 Ans:8
V	38	To refresh data automatically, which memory technology would you select? (a) SRAM (b) DRAM (c) ROM (d) Flash Ans:DRAM
V	39	Which type of shift register would be best to output serial data from parallel input sensors? (a) SIPO (b) PISO (c) SISO (d) PIPO Ans:PISO
V	40	You want to store a program permanently during manufacturing. Which ROM type is most suitable? (a) PROM (b) EPROM (c) EEPROM (d) Mask ROM Ans:Mask ROM

UNIT	Q NO	QUESTIONS
V	41	Which storage medium would you select for very high-speed temporary data during computation? (a) Cache (b) Flash (c) DRAM (d) EEPROM Ans:Cache
V	42	In an application where data must be shifted both left and right, which register do you need? (a) Universal shift register (b) SISO (c) PISO (d) SIPO Ans:Universal shift register
V	43	If you connect the last output of a shift register back to its first input, what application can you create? (a) Counter (b) Buffer (c) Ring counter (d) Decoder Ans:Ring counter
V	44	Which memory is faster SRAM or DRAM? (a) DRAM (b) SRAM (c) Both equal (d) Depends on voltage Ans:SRAM
V	45	Which register arrangement is used in UART to convert data formats? (a) SISO and PISO (b) SIPO and PISO (c) SISO and PIPO (d) SIPO and PIPO Ans:SIPO and PISO
V	46	Which shift register type is most suitable for serial-to-parallel data conversion? (a) SISO (b) PISO (c) SIPO (d) PIPO Ans:SIPO
V	47	To clear all contents of a register instantly, which control input is used? (a) Clock (b) Reset (c) Load (d) Enable Ans:Reset
V	48	Which memory type is best for firmware updates that require multiple rewrites? (a) PROM (b) EPROM (c) EEPROM (d) Mask ROM Ans:EEPROM
V	49	Which register type will output data in parallel after receiving it serially? (a) PIPO (b) SIPO (c) PISO (d) SISO Ans:SIPO
V	50	For a digital audio buffer, which memory would you select for cost efficiency? (a) SRAM (b) DRAM (c) EEPROM (d) Flash Ans:DRAM

Unit	Part A/B	Q no	Questions
1	B	1	What is a BCD code? Express the decimal number $(96)_{10}$ using BCD code.
1	B	2	What is an ASCII code ? How many bits does an ASCII code contain?
1	B	3	What is Gray code ? Mention its application?
1	B	4	Prove De Morgan's theorem using truth table ?
1	B	5	Find the 2's complement of the binary number $(10111111)_2$
1	B	6	Give the output of the following boolean expression i) 0 (OR) A ii) 0 (AND) A iii) 1 (AND) A
1	B	7	Give a brief note on SOP representation.
1	B	8	Give a brief note on POS representation.
1	B	9	Give the binary equivalent of the following decimal numbers. i) 127_{10} ii) 200_{10}
1	B	10	carry out binary addition $1101_2 + 1101_2 + 1111_2$
2	B	1	Which gates are called universal gates? What is the reason?
2	B	2	Define XOR gate and mention one application.
2	B	3	Realize a 2-input OR gate using only NAND gates.
2	B	4	Realize the Boolean expression $Y = (A+B)C'$ using logic gates.
2	B	5	Write the canonical SOP (Sum of Products) for the truth table where output is 1 for minterms $\sum(1, 2, 5, 7)$.
2	B	6	Realize NOT, AND, OR gates using only NOR gates.
2	B	7	Give the commutative and associative laws in Boolean algebra.
2	B	8	Implement $Y = A + B'C$ using logic gates.
2	B	9	Define the Ex-NOR gate and write its expression.
2	B	10	Express XNOR function using only NOR gates.
3	B	1	Write the logical expressions for Sum and Carry of a Full Adder.
3	B	2	Give the truth table of a Full Adder.
3	B	3	Write the logical expressions for Difference and Borrow of a Full Subtractor.
3	B	4	Draw the truth table of a Full Subtractor.
3	B	5	Draw the truth table of a 3-to-8 Decoder.
3	B	6	Write the logical expression for the outputs of a 1-to-4 Demultiplexer.
3	B	7	Give the output expression of 3-to-8 decoder.
3	B	8	Write any two applications of Multiplexer and Demultiplexer.
3	B	9	Write the uses of Encoder and Decoder.
3	B	10	Write the truth table of 1-to-4 demultiplexer.
4	B	1	Write the truth table of JK flip-flop.
4	B	2	What is race-around condition in JK flip-flop?
4	B	3	Write the truth table of clocked SR flip-flop.
4	B	4	Write the counting sequence of a 4-bit asynchronous up counter.

4	B	5	What is the need of Preset and Clear inputs in flip-flops?
4	B	6	Draw the timing diagram of a decade counter.
4	B	7	Differentiate between synchronous and asynchronous counters.
4	B	8	Write any two applications of counters.
4	B	9	What are the types of digital counters.
4	B	10	Write the counting sequence of a 3-bit asynchronous down counter.
5	B	1	Draw the block diagram of a Serial-In Serial-Out (SISO) register.
5	B	2	Draw the block diagram of a Parallel-In Parallel-Out (PIPO) register.
5	B	3	Write the difference between EPROM and EEPROM.
5	B	4	Differentiate between SRAM and DRAM.
5	B	5	Write the difference between SIPO and PISO registers.
5	B	6	What is associative memory?
5	B	7	Write any two differences between RAM and ROM.
5	B	8	State the application of associative memory.
5	B	9	Draw the block diagram of a Parallel-In Serial-Out (PISO) register.
5	B	10	Draw the block diagram of a Serial-In Parallel-Out (SIPO) register.
1	C	1	State and prove De Morgan's theorems using truth table.
1	C	2	Write a short note on Gray code? Convert the following binary numbers into Gray code: 1011 & 1101.
1	C	3	Perform binary subtraction using 2's complement method for $(10101)_2 - (01110)_2$. Convert the decimal number 59 into BCD.
1	C	4	State and explain basic Boolean laws with truth table.
1	C	5	Find the 1's and 2's complement of the binary number $(10101)_2$ & $(01110)_2$.
2	C	1	Draw the symbol, write the logical expression, and truth table for AND, OR and NOT gates
2	C	2	Prove that NOR gate is a universal gate with suitable logic realizations.
2	C	3	Prove that NAND gate is a universal gate with suitable logic realizations.
2	C	4	Draw the logic diagram using only basic gates and verify the output for the possible input combinations in the form of a truth table.
2	C	5	Draw the symbol, truth table and write the expression for Ex-NOR & EXOR gate. Also compare both the logic gates.
3	C	1	Explain the operation of 8-to-3 encoder with truth table, logical expression and logic diagram.
3	C	2	Explain the operation of 3-to-8 decoder with truth table and logic diagram.
3	C	3	Explain the operation of 4-to-1 multiplexer with truth table, logical expression and logic diagram.
3	C	4	Explain the operation of Full Adder with truth table, logical expression and logic diagram.
3	C	5	Explain the operation of Half Subtractor with truth table, Boolean expression and logic diagram.
4	C	1	Draw the logic diagram of a 4-bit asynchronous counter and explain its operation.

4	C	2	Draw the logic diagram of clocked SR flip-flop using NAND gates and explain its operation.
4	C	3	Explain the operation of JK flip-flop with logic diagram and truth table.
4	C	4	Draw the logic diagram of a decade counter and explain its operation.
4	C	5	Explain the operation of T-flip-flop with logic diagram and truth table.
5	C	1	Explain the operation of Parallel In Serial Out PISO shift register.
5	C	2	Explain the operation of Serial In Parallel Out SIPO shift register.
5	C	3	Compare SRAM and DRAM.
5	C	4	Explain the basic concept and working principle of associative memory.
5	C	5	Explain ROM and its types: PROM, EPROM, EEPROM and Flash memory.