CS/BCA(N)/ODD/SEM-1/BCAN-101/2019-20



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code: BCAN-101

PUID: 01095 (To be mentioned in the main answer script)

DIGITAL ELECTRONICS

Time Allotted: 3 Hours

Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

- 1. Choose the correct alternatives for any ten of the following: $10 \times 1 = 10$
 - The Boolean equation of AND operation is
 - a) Y = A

b) Y = A + B

c) Y = AB

- d) None of these.
- The Boolean equation of OR operation is
 - a) Y = A

b) Y = A + B

c) Y = AB

- d) None of these.
- The dual of a Boolean function is obtained by
 - a) interchanging all 0s and 1s only
 - b) changing 0s to 1s only
 - c) changing 1s to 0s only
 - d) interchanging all 0s and 1s and '+' and '.' signs.

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[Turn over

, ivi	Wh	en representing in w	hich	of the following codes
<i>\rightarrow '</i>	the	consecutive decimal	num	bers differ only in one
	bit	?		
	a)	Excess-3	b)	Gray
		BCD	d)	Hexadecimal.
W	ln	a $J - K$ flip-flop wh	icn J	V = 1 and $K = 1$ and
		ck = 1 the output wil		
	a)	toggle		
	b)	1		
	c)	0.		
4	•	recall previous outp		
vi)	(A)	B + A'B + A'B) is equ	al to	
-	a)	A + B'	b)	A' + B
	c)	A+B .	d)	1.
viij	2's	complement of 1010	101 is	6
	(a)	0101011	b)	10101010
	c)	1100000	d)	1000001.
(yiii)	Dec	cimal digits can be	conv	erted to binary code
	usi	ng	_	
	a)	Decoder	\b)	Encoder
	c)	Mux	d)	DeMux.
\ix}	Ac	decoder with 64 out	put l	ines has
	dat	a inputs.		•
	a)	64	b)	1
l	S	6	d)	None of these.
X	The	binary code of (21.1	25)	10 is
Ĺ	al)	10101.001	p) ·	10100.001
	c)	10101.010	d)	10100.111.
xi)	Rac	e condition is avoided	d by	
	a)	J-K flip-flop		
	b)	S-R flip-flop		
	c)	master-slave flip-flo	p	
	d)	none of these.		
(Xii)	Whi	ich one is sequential (circui	it ?
	a)	Multiplexer	b)	Decoder
	c)	Priority encoder	d)/	Counter.

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GROUP - B (Short Answer Type Questions)

Answer any three of the following. $3 \times 5 = 15$ Draw the truth table for a three input adder. Explain clearly the meaning of the input and the output symbols in the truth table. Write the Boolean expressions for the sum and carry. 2 + 2 + 1

- 3. Implement XOR operation using four 2-input NAND gates. Verify the output for different combinations of inputs.
- 4. a) Prove that the multiplexer is a universal logic module.
 - b) Use 4-to-1 MUX and other necessary logic gate to design a full-subtractor.
- Simplify the following expressions using Boolean algebra

i)
$$AB + A(B+C) + B(B+C)$$
 2

ii)
$$A^{\dagger}BC + B^{\dagger}CD + AC + A^{\dagger}B^{\dagger}CD^{\dagger}$$
 3

 Use a Karnaugh map to find the minimum sum of products for the expression

$$X = A^{\dagger} B^{\dagger} C + A B^{\dagger} C + A^{\dagger} BC + ABC^{\dagger}.$$

GROUP - C

(Long Answer Type Questions)

Answer any three of the following. $3 \times 15 = 45$

- 7. a) Represent the decimal number 45 in
 - i) Hexadecimal code
 - ii) Gray code

iii) BCD code. 2+2+2

- b) . Which gates are called universal gates and why? 2
- c) Design a 2 × 4 decoder. Give truth table and draw circuit diagram using basic gates. 2 + 2
- d) Implement the expression using a Multiplexer. F(A, B, C, D) = ?(0, 1, 4, 5, 7, 9, 11, 13, 15) 3

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3

[Turn over

- بربھی	a)	What is combinational circuit?
	b)	Differentiate between combinational and sequential circuit.
	(c)	Explain the functionality of clocked JK flip-flop. Give truth table and diagram. $2+2+2$
	d)	Explain the Master-Slave Flip-flop. 2
	e)	How does it overcome the race condition of J-K flip- flop? Use proper logic diagram. 1 + 2
9.	a)	What do you mean by serial shifting?
	b)	To shift 4 bit binary data out from SISO shift register what will be the input bits to a shift register? Explain with proper diagram. What do you mean by modulus of counter? $2+3+2$
	c)	Draw logic diagram for 4 bit Parallel In Parallel Out shift register and explain how it is used to shift data serially. https://www.makaut.com 3 + 3
(10	-Wri	te short notes on any <i>three</i> of the following: 3×5
	A)	Encoder
	b)	T Flip-flop
	SY/	PROM
	SY	Priority Checker
	c)	Ring counter.
11.	a)	What is register? Design a decimal to binary encoder. 2+3
	b)	What do you mean by shift register? Explain the Scrial-In-Serial-Out shift register. Design a Mod-10 counter. $2 + 3 + 3$
	c)	What do you mean by Johnson counter? 2