LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

FIRST SEMESTER – **NOVEMBER 2024**

UPH 1502 – INTRODUCTION TO DIGITAL ELECTRONICS

Date: 13-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

	SECTION A - K1 (CO1)	
	Answer ALL the Questions -	**(10 x 1 = 10)**
1.	**Define the following**	
a)	Sum of Products method.	
b)	Unsigned binary numbers.	
c)	Duality principle.	
d)	Controlled inverter	
e)	Logic gate	
2.	**Fill in the blanks**	
a)	_____are called universal gates.	
b)	A SR flip-flop can be constructed by cross-coupling _____ logic gates	
c)	_____select lines are required for 4 to 1 multiplexer.	
d)	The result of binary addition of (1101) and (1100) is _____.	
e)	The race around condition is overcome in a _____ flip-flop.	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	True or False	
a)	A decoder converts analogue into to digital data.	
b)	A NOT gate is also called an invertor gate.	
c)	1 is considered high in negative logic.	
d)	A circuit with many inputs and one output is called a multiplexer.	
e)	All the rules of Boolean algebra are the same as that of ordinary algebra.	
4.	**MCQ**	
a)	If the sign bit is zero, then the given number is (i) positive (ii) negative) (iii) fractional (iv) none of the options	
b)	_____ is an example of a sequential circuit. (i) Flip-Flop (ii) half adder (iii) full adder (iv) invertor	
c)	The 1s' complement of the binary number (1110001) is_____.	

	(i) (0011100) (ii) (0001110) (iii) (0101010) (iv) 0001111)

d)	The output of an Ex-Nor gate will be high when (i) both the inputs are high (ii) both are inputs are low (iii) both the inputs are complimentary to each other (iv) none of the options
e)	A NAND gate is a bubbled _____ gate. (i) AND (ii) NOT (iii) OR (iv) none of the given options
SECTION B - K3 (CO2)	
Answer any TWO of the following	**(2 x 10 = 20)**
5.	Design a half adder using logic gates and explain the working of the same
6.	With a neat circuit diagram, explain the working of a T flip-flop.
7.	Convert the following: (2.5 x 4 = 10 marks) (a) Decimal 107 to its binary equivalent (b) Decimal 1020 to its hexadecimal equivalent (c) Hexadecimal 25 to its binary equivalent. (d) Decimal 98.625 to its octal equivalent.
8.	Explain the BCD to seven segment decoder in detail with truth table and necessary circuit diagram.
SECTION C – K4 (CO3)	
Answer any TWO of the following	**(2 x 10 = 20)**
9.	Explain the basic laws of Boolean algebra with relevant truth tables.
10.	Explain the working of a 4 to 1 multiplexer with a neat circuit diagram.
11.	Simplify using Karnaugh maps. (a) F (A, B, C) = Σ (1,2,3,5,7) (5 marks) (b) F(A,B,C,D)= Σ (2,3,4,5) + Σd (10,11,12,13,14,15) (5 marks).
12.	Construct a D flip-flop using NAND gates and explain its working with a relevant truth table.
SECTION D – K5 (CO4)	
Answer any ONE of the following	**(1 x 20 = 20)**
13.	With neat circuit diagrams and relevant truth tables explain the construction and working of AND, OR and NOT gates (5 marks) (b)Correlate with relevant circuit diagrams the working of NAND and NOR gates as universal building blocks (15 marks)
14.	State and prove De Morgan's theorems
SECTION E – K6 (CO5)	
Answer any ONE of the following	**(1 x 20 = 20)**
15.	Explain the working of RS clocked flip flop with a diagram
16.	What is a full adder? Obtain the SOP expression for the sum and carry of a full adder from the truth table and simplify them using Ex-OR expressions.

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