

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**B.Sc. DEGREE EXAMINATION – PHYSICS****FIRST SEMESTER – NOVEMBER 2022****UPH 1502 – INTRODUCTION TO DIGITAL ELECTRONICS**

Date: 03-12-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A**Answer ALL the Questions****1. Define the following****(5 x 1 = 5)**

<i>i</i>	Flip flop	K1	CO1
<i>ii</i>	De Morgan's theorem	K1	CO1
<i>iii</i>	Encoder	K1	CO1
<i>iv</i>	1's complement representation of a binary number	K1	CO1
<i>v</i>	Octal number system	K1	CO1

2. Fill in the blanks**(5 x 1 = 5)**

<i>i</i> are universal gates.	K1	CO1
<i>ii</i> select lines are required for an 8-1 multiplexer.	K1	CO1
<i>iii</i>	The flip flop is a device.	K1	CO1
<i>iv</i>	The result of binary addition of 1101 & 1100 is	K1	CO1
<i>v</i>	The abbreviation of ASCII stand for.....	K1	CO1

3. State whether true or false**(5 x 1 = 5)**

<i>i</i>	Both OR and AND gates can have only two inputs.	K2	CO1
<i>ii</i>	The standard form of S-R flip flop is Set-Reset	K2	CO1
<i>iii</i>	All the rules for Boolean algebra are exactly the same as for ordinary algebra.	K2	CO1
<i>iv</i>	A circuit with many inputs but only one output is called a multiplexer.	K2	CO1
<i>v</i>	If the sign bit is zero, the given number is positive.	K2	CO1

4. Choose the correct answer**(5 x 1 = 5)**

<i>i</i>	1's complement representation of 1101 0110 is a)0010 1010 b) 0010 1001 c) 1110 1000 d)1010 1010	K2	CO1
<i>ii</i>	How many select lines will be there if the inputs of a demultiplexer are 4? a) One b) Five c) Three d) Two	K2	CO1
<i>iii</i>	Octal to binary conversion: $(24)_8$ is equal to a) $(111101)_2$ b) $(010100)_2$ c) $(111100)_2$ d) $(101010)_2$	K2	CO1
<i>iv</i> is an example for sequential circuit. a) Flip flop b) full adder c) half adder d) none of the above.	K2	CO1

v	A 3-input NOR gate has eight input possibilities, how many of those possibilities will result in a HIGH output? 1 b) 2 c) 7 d) 8	K2	CO1
SECTION B			
Answer any TWO of the following in about 150 words			(2 x 10 = 20)
5.	(a) Apply De Morgan's theorem and find the complement of $\overline{AB + A\overline{B}} = \overline{A\overline{B}} + AB$. (5) (b) Show that $(\overline{A} + B) (\overline{B} + C) (\overline{C} + A) = (A + \overline{B}) (B + \overline{C}) (C + \overline{A})$ (5)	K3	CO2
6.	Solve the following a) Add 94 & 125 in binary number system (5) b) Subtract 87 from 165 in binary number system (5)	K3	CO2
7.	$(298.A)_H = (X)_{10} = (Y)_2 = (Z)_8$. Find X, Y, Z	K3	CO2
8.	Show the working of a 2-4 decoder with a block diagram and truth table.	K3	CO2
SECTION C			
Answer any TWO of the following in 150 words			(2 x 10 = 20)
9.	(a) Analyse and reduce the Boolean expression $F(A,B,C) = ABC + \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\overline{C}$ $Y = [A\overline{B}(C + BD) + \overline{A}\overline{B}]C$.	K4	CO3
10.	Explain the working of 4-1 multiplexer with truth table and block diagram.	K4	CO3
11.	Using 2's complement, subtract (i) 75 from 45 (5) (ii) 88 from 126 (5)	K4	CO3
12.	With a circuit diagram explain the working of clocked RS flip flop.	K4	CO3
SECTION D			
Answer any ONE of the following			(1 x 20 = 20)
13.	a) Illustrate the function of NAND as an universal gate (12) b) Simplify (i) $F(A, B, C) = \sum(1, 3, 4, 5, 6, 7)$ (4) (ii) $F(A, B, C) = \sum(0, 2, 4, 6, 7)$ (4)	K5	CO4
14.	a) Convert (10) (i) $(FF.E6)_{16}$ to binary, (ii) $(88.525)_{10}$ to Hex, (iii) $(49.625)_{10}$ to octal, (iv) $(11011011.1111)_2$ to octal b) Explain the working of D- flip flop with the circuit diagram and truth table. (10)	K5	CO4
SECTION E			
Answer any ONE of the following			(1 x 20 = 20)
15.	(a) Construct half adder and full adder circuit and explain its working. Write down the truth tables. (14) (b) Represent $(175)_{10}$ in binary and Gray code. (6)	K6	CO5
16.	(a) Design the K-map and give the output of the following expression $Y = F(A, B, C, D) = \sum(0, 2, 3, 6, 7) + \sum_d(5, 8, 10, 11, 15)$ (8) (b) Describe the working of a JK flip flop with a neat diagram and give its truth table.	K6	CO5
