PAPER ID-411537

Subject Code: KOE039

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2021-22
DIGITAL ELECTRONICS

Time: 3 Hours ***Total Marks: 100***

Notes:

- *Attempt all Sections and Assume any missing data.*
- *Appropriate marks are allotted to each question, answer accordingly.*

SECTION-A	Attempt **All** of the following Questions in brief	Marks**(10X2=20)**	**CO**
Q1(a)	How are binary digits used to express the integer and fractional parts of a number?		1
Q1(b)	Explain how BCD addition is carried out.		1
Q1(c)	Implement a 4:1 multiplexer using 2:1 multiplexer.		2
Q1(d)	Demultiplexer is decoder circuit with an additional enabling input. Do you agree with the above statement?		2
Q1(e)	Give the difference between positive and negative edge triggering.		3
Q1(f)	A flip-flop has 5 ns delay from the time the clock edge occurs to the time the output is complemented. What is the maximum delay in a 10-bit binary ripple counter that uses these flip-flops? What is the maximum frequency the counter can operate reliably?		3
Q1(g)	Define critical race and non-critical race.		4
Q1(h)	What is the significance of state assignment?		4
Q1(i)	Why is ECL logic faster than TTL?		5
Q1(j)	Compare static RAM and dynamic RAM.		5

SECTION-B	Attempt **ANY THREE** of the following Questions	Marks**(3X10=30)**	**CO**
Q2(a)	Realize a 3-input gate using 2-input gates for the following gates: (i) AND (ii) OR (iii) NAND (iv) NOR		1
Q2(b)	(i)Implement a full subtractor circuit using only NAND gates. (ii)Using 4:1 multiplexers, implement the following function F (A, B, C) =∑m(0,2,3,5,7)		2
Q2(c)	Define bi-directional shift register. Draw and explain 3 bit bi-directional shift register using D flip-flop.		3
Q2(d)	Design a primitive state diagram and state table for a circuit with two asynchronous inputs (X and Y) and one output Z. This circuit is to be designed so that if any change takes place on X and Y, Z is to change states. Assume initially that the two inputs never change simultaneously.		4
Q2(e)	(i) Write a note on interfacing TTL with CMOS. (ii) Explain the parameters used to characterize logic families.		5

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q3(a)	Minimize the following using Tabular method F(A,B,C,D,E) =∑m(0,1,2,3,6,7,14,15,16,19,31)		1
Q3(b)	(i) Reduce the expression f = ∑ m (0,1,2,3,5,7,8,9,10,12,13) using K-maps and implement the real minimal expression using NAND logic. (ii) Design the logic circuit for a BCD to decimal decoder.		1

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q4(a)	Construct BCD adder using two 4-bit binary parallel adder and logic gates.		2
Q4(b)	Explain 4-bit magnitude comparator.		2

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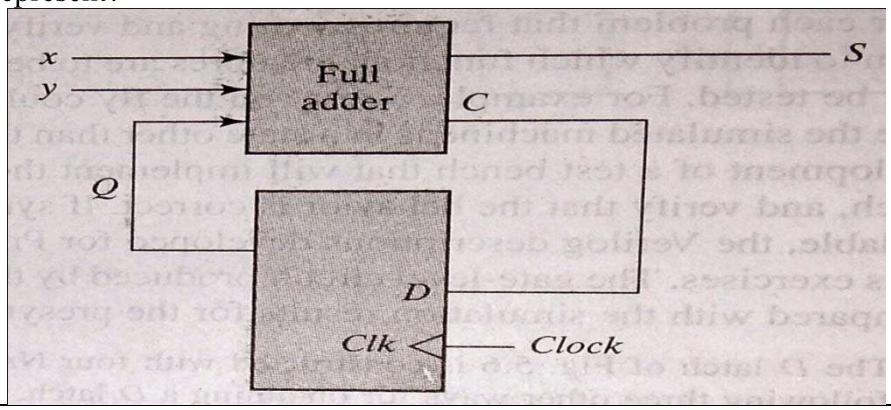
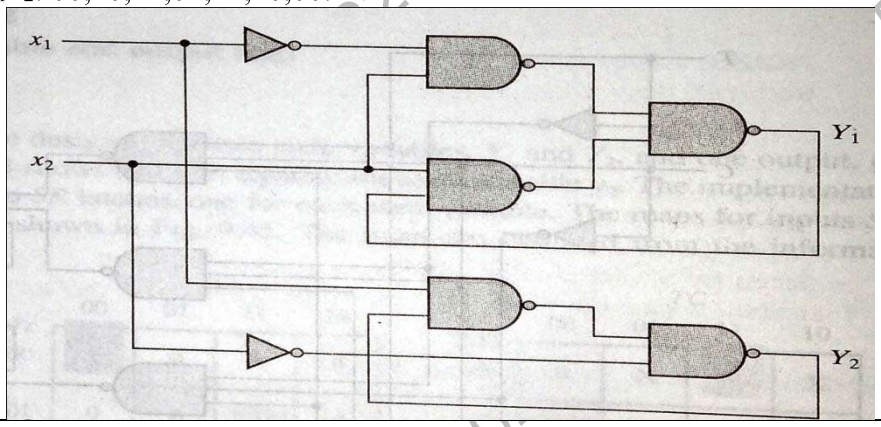
SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	CO
Q5(a)	A sequential circuit has one flip-flop Q, two inputs x and y, and one output S. It consists of a full-adder circuit connected to a D flip-flop, as shown in given figure. Derive the state table and state diagram of the sequential circuit. What does this circuit represent? 		3
Q5(b)	Design a 3-bit UP/DOWN counter with a direction control M, using JK flip-flops.		3

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	CO
Q6(a)	Derive the transition table for the asynchronous sequential circuit shown in given figure. Determine the sequence of internal states Y_1Y_2 for the following sequence of inputs x_1x_2: 00,10,11,01,11,10,00. 		4
Q6(b)	(i)Distinguish between static and dynamic hazard. How will you determine hazard in combinational circuits? (ii)Draw the logic diagram of the product-of-sums expression$Y= (x_1+x_2') (x_2+x_3)$ Show that there is a static 0-hazard when x_1 and x_3 are equal to 0 and x_2 goes from 0 to 1. Find a way to remove the hazard by adding one more OR gate.		4

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	CO
Q7(a)	Design a BCD to Excess-3 code converter and implement it using a suitable PLA.		5
Q7(b)	Draw a neat diagram of TTL NAND gate and explain its operation.		5