JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech.-III Semester (CSE/IT/ECE/CE/BT/BI)

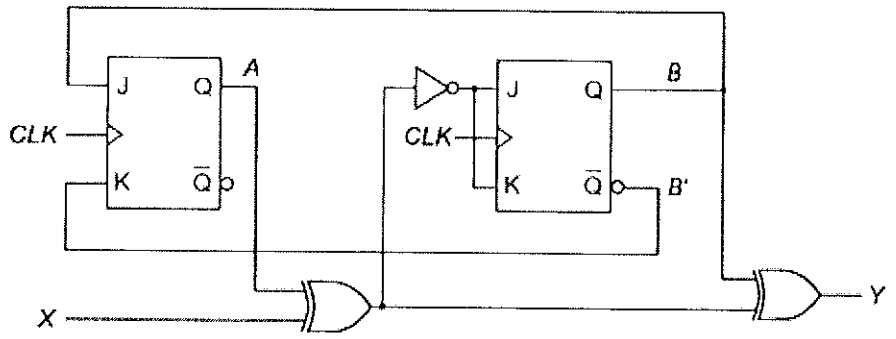
COURSE CODE (CREDITS): 18B11EC312 (4) MAX. MARKS: 35

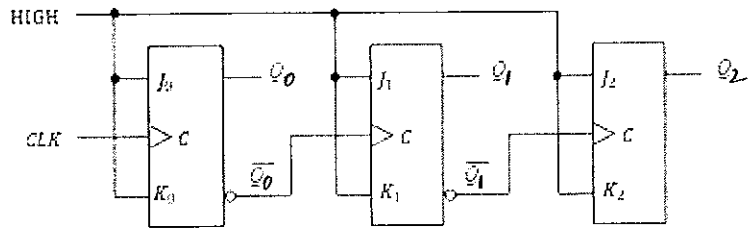
COURSE NAME: DIGITAL ELECTRONICS AND LOGIC DESIGN

COURSE INSTRUCTORS: Dr. HARSH SOHAL MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q. No.	Question	CO	Marks
Q1	a) Differentiate between Moore and Mealy machines? [2] b) What is race around condition? [1]	CO2	3
Q2	A sequential circuit uses two JK flip-flops as memory elements. One input X and one input Y. A and B are the Q outputs of flip flop A and flip flop B respectively.  Derive the state table and draw the state diagram of the circuit.	CO3	4
Q3	Design a sequential circuit using D flip flop that goes through states 0, 1, 2, 4, 0. The undesired (unused) states must always go to zero (000) on the next clock pulse.	CO4	5
Q4	(a)Implement the following functions using a suitable decoder. [3] $f_1(A,B,C) = \sum m(0,4,7) \cdot d(2,3)$ $f_2(A, B, C) = \sum m(1,5,6, 7)$ $f_3(A, B, C) = \sum M(1,3,4)$ (b) Differentiate between combinational circuits and sequential circuits.	CO2	5

	Can we say combinational circuits can be subset to sequential circuits? Why or why not? [2]		
Q5	(a) Convert an **SR flipflop to a T flip flop** with the help of state transition table and k map simplification method. Draw the circuit using relevant symbols.[3] (b) To shift a hexadecimal number A into a 4 flip flop serial in serial out (SISO) shift register, evaluate time if frequency is 5 MHz. [2]	CO3	5
Q6	Differentiate between synchronous and asynchronous counters. Mention at least 4 differences.	CO4	3
Q7	(a) A MOD-16 ripple counter is holding the binary count 1001. What will the count be after 31 clock pulses? [1] (b) For the circuit below: (i) Is it a synchronous or asynchronous circuit explain.) Draw the well labeled input and output waveforms for the circuit. [1+2] 	CO5	4
Q8	(a) Given X= (11000011)2 and Y = (10101001)2, i) find X+Y ii) find X-Y using 2's complement. [1] (b) Reduce the following Boolean expression to a minimum number of literals using Boolean algebra postulates and theorems. [2] i) (CD`+B`A)(BC`+DA`) ii) ABC+A`B+ABC` (c) Design a BCD to Gray Code converter circuit using unused combinations of the code as don't care conditions, with the help of K map method. Also Implement the circuit diagram using logic gates. [3]	CO1	6