International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

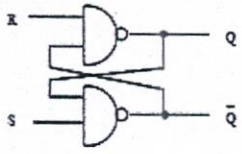
Final Examination-Spring 2023

Course Code: **CSE 2323** Course Title: **Digital Logic Design**

Time: **2 hours 30 minutes** Full Marks: **50**

(i) The figures in the right-hand margin indicate full marks

[Answer the questions from the followings. Parts of the same question must be answered serially]

		Part A	**CO**	**DL**	**Marks**
1.	a)	The figure below shows an RS latch made out of NAND gates (rather than NOR gates). How do Q and Q'*(Prime)* depend on the RS inputs? i.e. verify that the circuit can indeed be used as a RS latch. 	CO2	A	5
	Or,	Design a SR Flip Flop using NAND gate.			
1.	b)	What is flip-flop triggering problem? Describe the master-slave D flip.	CO1	U	5
2.	a)	Differentiate between combinational logic and sequential logic. List some applications of sequential logic. What are the major differences between latch and flip?	CO1	U	5
2.	b)	Design a bus system that would take 4-bits input from two input devices namely keyboard and mouse using multiplexer.	CO3	A	5
	Or,	How does *JK* flip-flop remove the indeterminate states of *S-R* flip-flop? Design a *JK* flip-flop and show its characteristic equation, characteristic table, logic diagram and timing diagram.			
		Part B			
3.	a)	Design the sequential circuit described by the following state equations using *JK* flip-flops. $A(t+1) = xAB + yA'C + xy$ $B(t+1) = xAC + y'BC'$ $C(t+1) = x'B + yAB'$	CO2	A	5
3.	b)	Design BCD counter with proper timing diagram.	CO3	A	5
4.	a)	Design a *4-bit* Up counter with *T* flip-flop.	CO2	A	5
4.	b)	What are the basic difference between ring counter and Johnson counter? Explain with Block diagram.	CO3	R	5
5.	a)	Using sequence generator generates sequence of 11010 and also draw proper circuit diagram.	CO2	A	5
	Or,	Design a multiplexer using the following Boolean Equation. $F(A,B,C) = \sum(1,3,4,5,6,7)$			
5.	b)	If counter is having 10FF. It is initially 0. What count will it hold after 2060 pulses? Design D latch with truth table and proper circuit diagram.	CO2	A	5
	Or,	What is a memory cell? Design a 4x4 RAM and describe its operation with example.			