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Department of Computer Engineering
Final Examination
EGCI 234: Digital Circuit Design (T2/2021-22)

WebEx Q4

Date: 4 April 2022
Time: 2 Hours

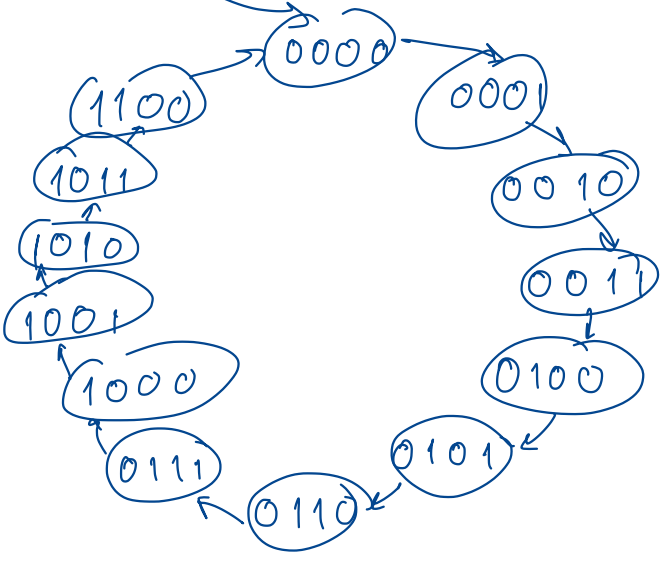
Total Mark: 50 marks

Instruction: Answer all questions and submit to our Google Classroom

Questions 1 & 2 25 minutes/ 5 & 9 marks (1000-1025) **MSI & Arithmetic Circuits**
- 5 min break -
Questions 3 15 minutes/ 3 & 5 marks (1030-1045) **Flip Flops**
- 5 min break -
Questions 4 20 minutes/ 10 marks (1050-1110) **Sequential Circuit Design**
- 5 min break -
Questions 5 20 minutes/ 4 & 8 marks (1115-1135) **ADC & DAC**
- 5 min break -
Questions 6 10 minutes/ 6 marks (1140-1150) **Digital Circuit Design**

Explanation
Examination will start at 1000. Questions 1 & 2 will be released via Google classroom. Students have 25 minutes to answer the question and submit to Google classroom before deadline (ie. 1025). Followed by 5-minute break. Then questions 2 will be released ..

(10 marks) Sequential Circuit Design
(10 marks) Q4 Show how to design a MOD-13 synchronous up counter using JK FFs.



$J_A = K_A = 1$

PS				NS											
D	C	B	A	D	C	B	A	J_D	K_D	J_C	K_C	J_B	K_B	J_A	K_A
0	0	0	0	0	0	0	1	0	X	0	X	0	X	1	X
0	0	0	1	0	0	1	0	0	X	0	X	1	X	X	1
0	0	1	0	0	0	1	1	0	X	0	X	X	0	1	X
0	0	1	1	0	1	0	0	0	X	1	X	X	1	X	1
0	1	0	0	0	1	0	1	0	X	X	0	0	X	1	X
0	1	0	1	0	1	1	0	0	X	X	0	1	X	X	1
0	1	1	0	0	1	1	1	0	X	X	0	X	0	1	X
0	1	1	1	1	0	0	0	1	X	X	1	X	1	X	1
1	0	0	0	1	0	0	1	X	0	0	X	0	X	1	X
1	0	0	1	1	0	1	0	X	0	0	X	1	X	X	1
1	0	1	0	1	0	1	1	X	0	0	X	X	0	1	X
1	0	1	1	1	1	0	0	X	0	1	X	X	1	X	1
1	1	0	0	0	0	0	0	X	1	X	1	0	X	1	X
1	1	0	1	1	1	1	0	X	0	X	0	1	X	X	1
1	1	1	0	1	1	1	1	X	0	X	0	X	0	1	X
1	1	1	1	0	0	0	0	X	1	X	1	X	1	X	1

$K_B = A$
$J_B = A$

K_C

DC \ BA	00	01	11	10
00	X	X	X	X
01	0	0	1	0
11	X	X	X	X
10	1	0	1	0

$D\bar{B}\bar{A}$

$K_C = BA + D\bar{B}\bar{A}$

J_C

DC \ BA	00	01	11	10
00	0	0	1	0
01	X	X	X	X
11	X	X	X	X
10	0	0	1	0

$J_C = BA$

K_D

DC \ BA	00	01	11	10
00	X	X	X	X
01	X	X	X	X
11	1	0	1	0
10	0	0	0	0

$K_D = C\bar{B}\bar{A} + CBA$

$J_D = CBA$