National University of Computer and Emerging Sciences, Lahore Campus

	Course:	Digital Logic Design	Course Code:	EE1005
	Program:	BS(Computer Science/ Data Science)	Semester:	Spring 2023
	Duration:	60 Minutes	Total Marks:	30
	Paper Date:	28/02/2022	Weight	15%
	Section:	ALL	Page(s):	5
	Exam:	Midterm-I	Roll No.	_____
			Section:	

Instruction/Notes:
- *Attempt all the questions on this answer booklet.*
- *Make sure to write down your roll # on EVERY sheet in the given space.*
- ***Use of calculator is not allowed.***

Question 1 [5+5 = 10Marks]: Number System [CLO 1]

a) $(365)_7 + (423)_5 = ($ 307 $)_{10}$

$(365)_7 + (423)_5$

$= (194)_{10} + (113)_{10}$

$= 307$

b) Subtract the following signed numbers using 2's complement method.

$(1010101)_2 - (1101)_2 = ($ 1001000 $)_2$

Question 2 [4 + 4= 8 Marks]: Designing [CLO 3]

Candidates are applying for admission in a certain degree. The passing criteria is such that the total aggregate should be greater or equal to 50%. Design a circuit that gives you an indication of the true value of the passing candidate based on below mentioned criteria.

Weightage of each parameter is as follows.

A-level result	25%
Entry test result	25%
Interview	50%

Hint: If the value of "***A level result***" is 1, it means that the candidate is able to attain 25% marks and 0 means unable to attain any mark.

(a) Fill-in the entries for the outputs in the truth table shown below:

Input			Output
A-level result	**Entry test result**	**Interview**	**Pass Candidate**
A	**B**	**C**	**F**
0	0	0	**0**
0	0	1	**1**
0	1	0	**0**
0	1	1	**1**
1	0	0	**0**
1	0	1	**1**
1	1	0	**1**
1	1	1	**1**

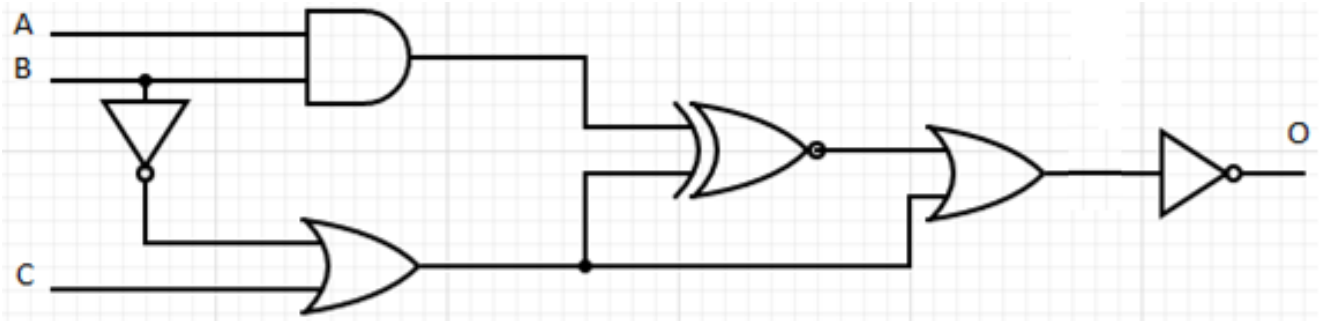
(b) Write the function F in Sum of Minterms form and Product of Maxterm form.

F (A,B,C) = ∑m (**m1, m3, m5, m6, m7**)

F (A,B,C) = ∏M (**M0, M2, M4**)

Question 3 [5 Marks]: Gates [CLO 2]

Analyze the following circuit and give its equation (no need for an optimized equation).



O (A, B, C) =____[[(B'+ C) ⊕ (A . B)] ' + (B'+ C)]'

Question 4[7 Marks]: K-map Simplification [CLO 3]

A Boolean function is given as follows:

F (A, B, C, D) = Π M (4, 7, 11, 10)

Don't care: **d (A, B, C, D) = Σ m (2, 3, 6, 12, 14, 15)**

Minimize the function **F** in Product of Sums form using K-maps shown below:

CD \ AB	00	10	11	01
00	0	8	X 12	0 4
10	X 2	0 10	X 14	X 6
11	X 3	0 11	X 15	0 7
01	1	9	13	5

F (A, B, C, D) = _____ C' (D + B')_____

Note: No marks will be given if K-map is not properly filled.

Rough Work