National University of Computer and Emerging Sciences, Lahore Campus

Course:	Digital Logic Design	Course Code:	EE227
Program:	BS(Computer Science)	Semester:	Fall 2018
Duration:	60 Minutes	Total Marks:	60
Paper Date:	1st Oct 2018	Weight	15%
Section:	ALL	Page(s):	5
Exam:	Midterm-I	Roll No.	
		Section:	

Instruction/Notes:

- *Attempt all the questions on this answer booklet. You can use extra sheets for your scratch work but **they will not be collected and marked**.*
- *Make sure you write your roll # on EVERY sheet of the booklet.*
- ***Use of calculator is not allowed.***

Question 1 [2+3+3+3+3 = 14 Marks] Short Questions

i. 1's complement of a number N is 0110 1101, 2's Complement of N will be _____

ii. If **F(X, Y, Z) = XY + X'Y'Z** then **F' = _____**

iii. **F(A,B,C,D,E) = m_{23}**. Algebraic expression for F will be **F = _____**

iv. $(10100)_2 + (30)_8 = (\_\_\_\_\_)_{10}$

v. **Dual** of Boolean expression **(X'+0+Z'). (X+Y'+Z)** will be

_____

Question 2 [10 x 3 = 30 Marks] A Boolean function is given as follows:

F(A,B,C,D) = ∑m(0,2,10,11)
d(A,B,C,D) = ∑m(1,3, 4, 6, 8, 9, 12, 14) [don't care]

Use only **given KMaps** to optimize the function into:

(i) Sum of Product (SOP) form

A \ C	00	01	11	10
00				
01				
11				
10				

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

(ii) Product of Sum (POS) form

A \ C	00	01	11	10
00				
01				
11				
10				

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

(iii) Implement the following optimized function with NAND gates ONLY. Complements of inputs are not directly available.

F(A,B,C) = AB'+(A'B)C

Question 3 [16 Marks]: We want to design a combinational circuit that computes the function f(X) =2X+2 for a 2-bit X:

(a) How many bits do we need for output? (3 points)

(b) Draw the truth table for this function. (4 points)

(c) Write Simplified Boolean Expression(s) (3 points)

(d) Draw Circuit Diagram (6)

ROUGH SHEET