

**National University**



of Computer

and

Emerging Sciences

Chiniot

-

Faisalabad Campus



**EE1005 – Digital Logic Design**

**Quiz# 3**

**Instructor:** Muhammad Adeel Tahir **Section:** SE – 2A **Time**: 20 Minutes

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Roll No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Total:** 20 Marks

***Note:*** *Use the back side of the page if needed. Make sure the handwriting is neat while drawing the circuit, quiz will be marked as 0 if attempted in a writing that is not readable at all.* ***Cutting will result in negative marking.***

**Q1: Draw a NAND logic diagram that implements the complement of the following function, use 2 input NAND gate for your implementation, label each output of gate carefully to avoid deduction of marks.**

**(10 marks)**

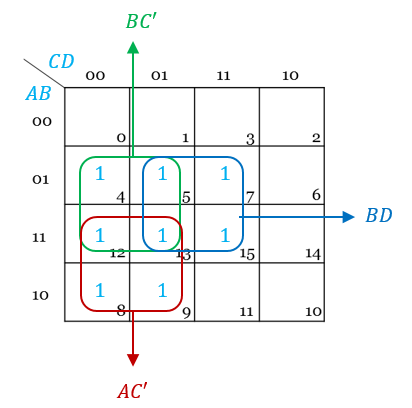
**Solution:**

**Marking Criteria is as followed:**

* **For correctly identifying the equation 5 marks are awarded.**
* **For correctly identifying the circuit 5 marks are awarded.**
* **Binary checking is followed in the question , no partial marking whatsoever if the truth table has a wrong value.**

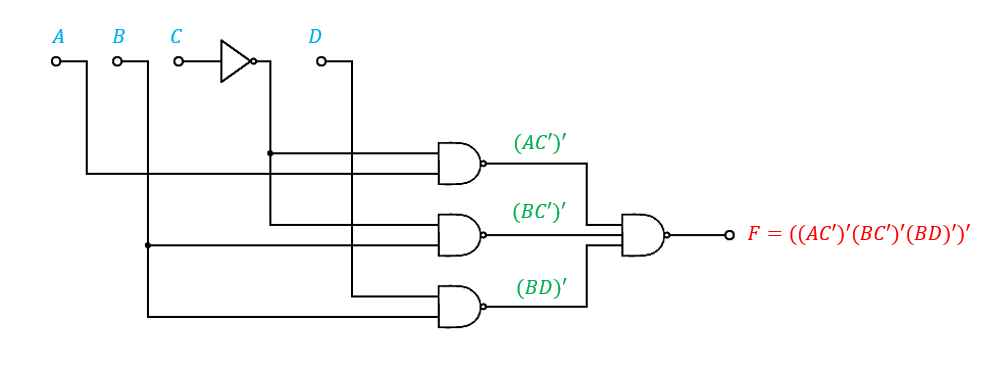
The complement of the given function:

We plot and simplify the function *G* (the complement of *F*) using a 4-variable k-map as shown below. The simplified function is



The simplified function *G* can be expressed as

Therefore, we implement this function using a two-level NAND gate circuit as shown below.



**Q2: Implement the following Boolean function F, together with the don’t-care conditions d , using no more than two NOR gates: (10 marks)**

**Solution:**

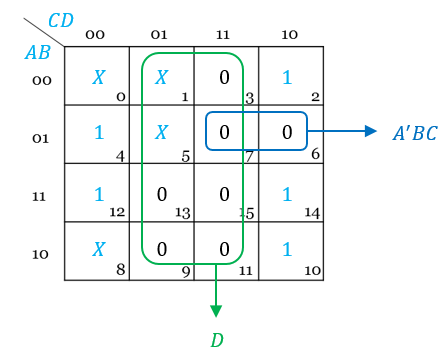
**Marking Criteria is as followed:**

* **For correctly identifying the equation 5 marks are awarded. Incase k-map is wrong, 0 is awarded.**
* **For correctly identifying (with steps) the circuit 5 marks are awarded.**
* **Binary checking is followed if the truth table has a wrong value, no partial marking whatsoever.**

First, the 1's and X's of the given function:

From the 0's and X's, we obtain the simplified-complemented function:

Thus, the minimum product of sums for *F* is



We reformulate the function *F* so that it can be implemented using NOR gates as follows:

