

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)  
ORGANISATION OF ISLAMIC COOPERATION (OIC)Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION

DURATION: 1 Hour 30 Minutes

SUMMER SEMESTER, 2015-2016

FULL MARKS:75

**CSE 4205: Digital Logic Design**

Programmable calculators are not allowed. Do not write anything on the question paper.

There are 4 (four) questions. Answer any 3 (three) of them.

Figures in the right margin indicate marks.

1. a) Convert the decimal number 165.125 into hexadecimal and binary. 6  
 b) Perform the arithmetic operation  $(+36) + (-12)$  in binary using the signed-2's-complement representation for negative number. 7  
 c) Explain the process of *transfer of information with registers*. 12
2. a) State and explain the De Morgan's theorem. 6  
 b) Prove the distributive law using truth table. 7  
 c) For the Boolean function  $f(x,y,z) = \sum (m1, m4, m5, m6, m7)$  where m's are minterms 3×4  
 i. Write the minimized form using Boolean Algebra.  
 ii. Draw the truth table of the function.  
 iii. Write function in the form of product (Π) of maxterms.  
 iv. Draw the digital logic circuit of the minimized function and mention the number of logic gates.
3. a) What do you understand by prime implicants and essential prime implicants? 4  
 b) State different symbols for NAND, NOR and NOT gates along with their inputs and output functions. 6  
 c) For the following Boolean function  $f(a,b,c,d) = \sum (0,2,4,5,6,7,8,10,13,15)$ , 3×5  
 i. Draw its Karnaugh map.  
 ii. Write its minimized function.  
 iii. Draw the logic circuit by using only NAND gates.
4. a) What do you understand by universal gates? 2  
 b) For the following functions  $f(w,x,y,z) = \sum (0, 1,2,3,4,8,9,12)$ , 5  
 i. Write its minimized product of maxterms by using Karnaugh's map. 5  
 ii. Draw its AND-OR-NOT logic diagram. 10  
 iii. Implement the minimized function with the following two-level forms:  
     NAND-AND and NOR-OR. 3  
 c) Write short notes on VHDL.