

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**

**EE 200      DIGITAL LOGIC CIRCUIT DESIGN**

**EXAMINATION I**

**March 22, 2007**

<b>NAME :</b>	
<b>I.D. # :</b>	
<b>SECTION :</b>	

<b>PROBLEM #</b>	<b>SCORE</b>	<b>MAXIMUM</b>
<b>1.</b>		<b>15</b>
<b>2.</b>		<b>20</b>
<b>3.</b>		<b>20</b>
<b>4.</b>		<b>20</b>
<b>TOTAL</b>		<b>75</b>

Q.# 1)

- a. Convert the following octal number  $(270.4)_8$  to decimal.
  - b. Convert the decimal number  $(45.0625)_{10}$  to binary, octal and hexadecimal.
  - c. Convert the octal number  $(750.24)_8$  to base 4.
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Q # 2)

- a. Find the  $(r-1)'$  and  $r'$  complements of the following numbers in the indicated bases:
    1.  $(4190.528)_{10}$ ,
    2.  $(654.5)_8$ ,
    3.  $(11011000)_2$
  - b. Perform the following subtractions in the indicated bases by using the  $r$ 's complement of the subtrahend. Express the result in decimal.
    1.  $(2300 - 2305)_{10}$
    2.  $(11010.11 - 1101.011)_2$
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Q # 3)

- a. The binary numbers listed have a sign bit in the left most position and, if negative, are in the 2's complement form. Perform the following arithmetic operations and then express the results in decimal form.

1.  $001110 + 110010$
2.  $111001 - 100110$

- b. Fill the spaces in the following table:

	Equivalent Decimal if the code is:			
Code	BCD	2 4 2 1	Excess 3	8 4 -2 -1
1100 0111				
1000 1001				

- c. Simplify the following Boolean expression to the minimum number of literals (**4 literals**), by algebraic manipulations:

$$AB + A'BC + AB'C'$$

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Q # 4)

- a. Construct truth table for the following function

$$F(a,b,c) = (ab + a'c)' + bc$$

- b. From the truth table of (a) write the minterm canonical formula of "g" in  $m$ -notation
- c. Expand the function  $F(x,y,z) = y + x'z$  to product of Maxterms form.
- d. Simplify the following function using Karnaugh map.

$$F(w,x,y,z) = w'z + xz + x'y + wx'z$$

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