**Faculty of Computers and Artificial Intelligence**
**Information Technology Department**
**SIT213 / IT212 / Logic Design**

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**Four pages**
**60 minutes / 30 Marks**

# Midterm (Makeup)
# (10/6/2021)

**1.** $(23.5)_{10}$ = ( 0010 0011 . 0101 ) BCD *(0.5 mark)*

= ( 0101 0110 . 1000 ) Excess-3 *(0.5 mark)*

= ( 0110 0101 . 1011 ) 84-2-1 *(0.5 mark)*

= ( 011 010 . 011 ) 3-bit gray code *(1.5 marks)*

**2.** Using Tabular method to simplify the following Boolean function as a Product of Sum (PoS):

$F(A,B,C,D)=\Pi_M(0,1,2,3,5,11,15)$ *(6.75 marks)*

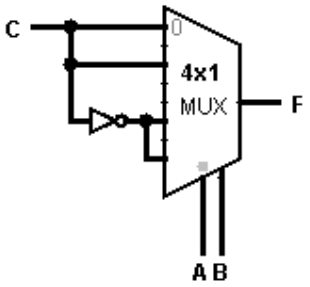
**3.** Using k-map to simplify the following Boolean function as a Sum of Product (SoP). *(4 marks)*

$$F(A,B,C,D,E)=\sum m(1,2,3,4,7,10,16,17,20,23,31) + d(0,9,15,18,19,25)$$

**4.** Subtract the following two BCD codes: 0110 1000.0001 and 0010 0101.0111 *(5 marks)*

**5.** Use only two 4-bit adders and an inverter, design a circuit that add two 4-bit numbers A & B represented in a special code, known that a correction is needed after adding the two numbers with a 4-bit binary adder as follows: The complement of the output carry from the first binary adder is the input to the second adder. Also, if this output carry = 1, then add 0011, and if it is = 0, then add 1101. *(3.25 marks)*

**6.** Derive a function F(A,B,C) using a single gate. *(3.5 marks)*



**7.** Design a combinational circuit that accepts-four bits number ABCD and generates three outputs (X,Y,Z). The number XYZ represents the number ABCD mod 8 (i.e. the remainder after dividing the number ABCD by 8, for example 13/8= 1 and the remainder is 5, so 13 mod 8 = 5).

*(4.5 marks)*

***Good Luck***
***Prof. Imane Aly Saroit Ismail***
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