Sadat Academy for Management Sciences
Faculty of Computers and Information
Examiner: Prof. Dr. Osama Khozium
Time Allowed: 2 hours

Ac. Year: 2020/2021
Class: 1st year
Score: 15 marks
Date: 25 /11/2021

Answer

Logical Design (CS 221) Mid-Term Exam

1 - **Execute the following conversions** (3 marks)

Decimal	Binary	Octal	Hexadecimal
35	100011	43	23
21	**10101**	25	15
18	10010	**22**	12
27	11011	33	**1B**

2 - (5 marks)

a) Convert each of the following BCD numbers to Decimal

10000111 = **87**

1001010101110000 = **9570**

b) Add the following BCD numbers

1) 1001 + 0100 = 1101 + 0110 = 10011 = **00010011** = 13

2) 01100111 + 01010011 = (67 = 53) 10111010 + 01100110 =
100100000 = **000100100000** = 120

c) convert the binary number 1101110110 to gray code.

= **1011001101**

d) convert the gray code number 10100101 to binary

= **11000110**

e) What is $-18_{(10)}$ expressed as an 8-bit binary number in 2's complement notation ?

18 = 10010 = 00010010 = 11101110 (2's complement) = **11101110**

3 - Simplify the following Boolean expression using Boolean algebra :

$[\, wx\,(\, y + \overline{xz}\,) + \overline{wx}\,]\, yz$ (3 marks)

$$[\, wx\,(\, y + \overline{x} + \overline{z}\,) + \overline{wx}\,]\, yz$$

$$= [\, wxy + wx\overline{x} + wx\overline{z} + \overline{wx}\,]\, yz$$

$$= [\, wxy + wx\overline{z} + \overline{wx}\,]\, yz$$

$$= [\, wxyyz + wx\overline{z}yz + \overline{wx}yz\,]$$

$$= [\, wxyz + \overline{wx}yz\,]$$

$$= yz\,(\, wx + \overline{wx}\,)$$

$$= yz$$

4 - Express the Boolean function F = A' + BC' in sum of product using algebraic method and prove your answer by truth table method. (4 marks)

F = A' (B'C' + B'C + BC' + BC) + BC' (A' + A)

F = A' B'C' + A' B'C + A' B C' + A' B C + A'B C' + A B C'

0 0 0 001 011 010 110

F (A,B,C) = $\sum$ ($m0, m1, m2, m3, m6$)

A	B	C	A'	C'	BC'	F = A'+BC'
0	0	0	1	1	0	1 m0
0	0	1	1	0	0	1 m1
0	1	0	1	1	1	1 m2
0	1	1	1	0	0	1 m3
1	0	0	0	1	0	0
1	0	1	0	0	0	0
1	1	0	0	1	1	1 m6
1	1	1	0	0	0	0

Course Coordinator

Good Luck .... Prof. Khozium