Mid-Term Test
First Semester 2018/2019
Boolean Algebra and Logical Circuit – FEH2H3
Tuesday, 16 October 2018, 15.45 – 17.00 (75 minutes)
Team Teaching: RTP, DHA, IAH,INC, MHO, RIW, VST, NYB

= CLOSE ALL, calculator is NOT allowed, turn off the mobile phone =
= No cheating. Cheating will be considered as a violation the university policy =

Do the test on these sheets. Additional sheet is not available.
For calculation, use the empty space based on the corresponding number and don't move to other sheet.

Name:	**Student ID Number:**	**Class:**	**Room:**	**Score:**
………………………………..	………………………….	……………	…………..	

Copy this statement:
I completed this test honestly and by my self. If I cheat, I will accept the concequencies.

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Signature:

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No	PROGRAM LEARNING OUTCOME (PLO)
1	Believe in the absoluteness of God and show a religious attitude
2	Has the ability to apply basic knowledge of mathematics, science, and engineering
3	Has the ability to design a system, component, or process to meet the expected needs set within a realistic scope, including broadband content transmission using engineering methods in the field of telecommunications
4	Has the ability to design and conduct experiments including analyzing and interpreting data using scientific methods
5	Has the ability to identify, formulate, and solve the telecommunication engineering problems
6	Has the ability to operate hardware and utilize software applications, as well as programming skills that relate to information technology and telecommunications
7	Has the ability to communicate effectively, both oral and written communication
8	Has the ability to plan, execute, and evaluate assigned tasks according to the requirements
9	Has the ability to function on multidisciplinary and cross-cultural teams
10	Has the ability to be responsible according to the professional ethics
11	Has the ability to recognize the need for life-long learning including current issues in telecommunication and entrepreneurial knowledge

COURSE LEARNING OUTCOME (CLO)		PROGRAM LEARNING OUTCOME (PLO)										
		1	2	3	4	5	6	7	8	9	10	11
CLO 1	Students understand binary system, and use Boolean Algebra and K-Map to simplify function		X									
CLO 2	Students able to analyze and design logical circuit, combinational and sequential			X								
CLO 3	Students able to use software tool to design logical circuit						X					

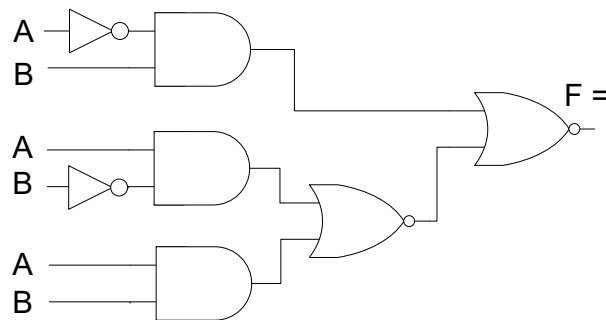| CLO 1: Students understand binary system, and use Boolean Algebra and K-Map to simplify function |
|---|
| PLO 2: Has the ability to apply basic knowledge of mathematics, science, and engineering |

A. Set and Boolean Algebra

1. Prove below logical equation is TRUE by drawing its Venn Diagram

$$\overline{A}BC + A\overline{B}\,\overline{C} + A\overline{B}C + AB\overline{C} + ABC = A + BC$$

Answer :

2. From below Circuit:

   a) Identify Function F
   b) Simplify Function F using Boolean Algebra
   c) Draw the circuit from the simplified Function F

Answer :

3. From below Truth Table:

Input			Output	
A	B	C	S	T
0	0	0	1	0
0	0	1	1	1
0	1	0	0	1
0	1	1	1	0
1	0	0	1	1
1	0	1	0	0
1	1	0	1	0
1	1	1	0	1

a) Identify Function S using Sum of Product (SoP)
b) Identify Function T using Product of Sum (PoS)
c) Simplify Function S using Boolean Algebra

Answer :

B. K-MAP

1. Simplify below equation using K-Map (d = don't care):

   a. $G(R,S,T,U) = \sum m\,(0,2,4,8,10,13,15) + d(6,9,11,12,14)$

   b. $F(G,H,K) = \overline{G}H\overline{K} + \overline{G}\,\overline{H}\,\overline{K} + GHK + \overline{G}H + H\overline{K}$

   Answer :

2. Identify Function F1 using below K-Map

   $F_1 =$..

AB \ CD	00	01	11	10
00	1	1	1	0
01	x	1	0	1
11	x	x	1	0
10	0	x	1	0

C. Numeric System

1. Fill below table

	Decimal	Binary	Octal	Hexadecimal
1	678,375			
2			45,36	
3		10110101011		
4				5C,3

2. Calculate using 2's complement:

   a) Input: Decimal, Output: Binary

$$78_{10}$$
$$-\ 44_{10}$$
$$-------- +$$
$$....\,_2$$

   b) Input: Hexadecimal, Output: Binary

$$-\ AD,1_{16}$$
$$6F,3_{16}$$
$$--------+$$
$$.......\,_2$$

3. Calculate using BCD:

$$0111\ 1000\ 0110_{BCD}$$
$$0110\ 0011\ 1001_{BCD}$$
$$\rule{3cm}{0.4pt}\ +$$
…………………………………