



Final Exam

Digital Design

Computer and Syst. Dept.
Time Allowed: 2 Hrs
BME Students.
Total Marks: 50
2018 – 2019



Solve the following:

- يسمح باستخدام القلم الرصاص (شرط وضوح الخط).
- الرجاء وضوح الرسم قدر المستطاع (ليس شرطاً استخدام المسطرة)
- الامتحان في ورقتين.
- عدد الاسئلة = 3

Question 1

(A) Draw the following function using:

- (i) Using AND – NOT only.
 - (ii) Using OR – NOT only.
- $F = (A'BC' + ACD + A'B'C)BD'$

(B) Find the complement of the following function: $F = B(B'D + A'BC' + AB + A'B'C)$

(C) Using Equations, simplify the following function:

- (i) $F(X,Y,Z) = XY + X'Z + YZ$
- (ii) $F(X,Y,Z) = (X+Y)(X'+Z)(Y+Z)$

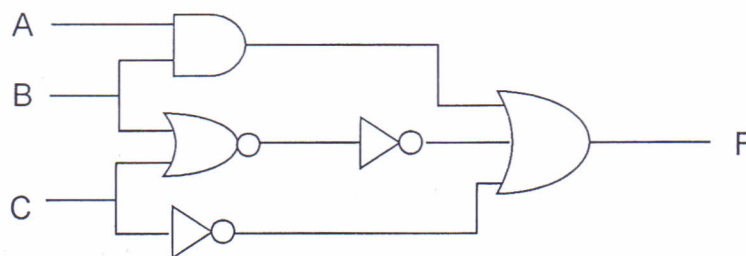
(D) Using Map, simplify the following function: $F(A,B,C,D) = BD + A'C' + A'B'D$

Use:

- Sum of product form.
- Product of sum form.

(E) Using Equations: Express the function: $F(A,B,C) = A + B'C$ in **Sum of minterms**, what are the corresponding Maxterms?

(F) Find the output ONLY for the following circuit:



(G) Assuming four variables in the order (A, B, C, D), Simplify the following functions (F1, F2) using the shown maps

x	0	x	1
x	x	1	1
0	0	0	1
1	0	0	x

F1

1	1	x	1
x	1	1	x
0	x	0	1
x	0	0	x

F2

(25 marks)

TURN THE PAGE



(A) **Design 2-bit comparator.** The circuit accepts two numbers **A and B** each of 2 bit (i.e., $A=A_1A_0$ and $B=B_1B_0$). The circuit should compare the two numbers, the circuit outputs are (X, Y, and Z) as following:

- **X=1** : if $A > B$.
- **Y=1** : if $A < B$.
- **Z=1** : if $A = B$.

(B) **Draw Parallel adder circuit.**

(C) **Design each of the following:**

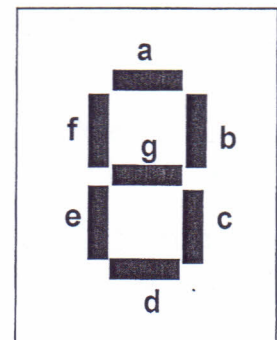
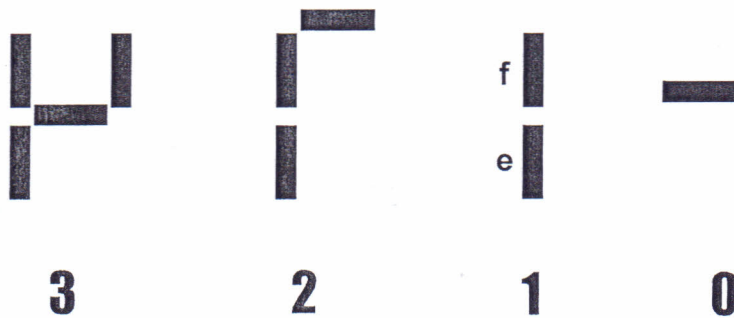
- Full Adder.
- 2X4 Decoder.
- 2X1 Multiplexer.

(D) **Using decoder and an OR gate**, implement the function $F=A'B+BC+B'D$.

(18 marks)

Question 3

Design a digital circuit that accepts 2-bit binary number and the output is the numbers from 0 to 3 appeared on the seven segments in the **Arabic fashion** as shown in the following figures.



(7 marks)

----- End of Questions -----

With Best Wishes

Prof. Dr. Ahmed Saleh

Plz, send feedback about the exam to:

aisaleh@yahoo.com

