

Answer all Questions.

Exam Duration 1 hour 5min Examiners: Asim J. Al-Khalili,
No books / papers or electronic devices are allowed.

Question 1

- a) Given F1 and F2 below, determine $F1 \bullet F2$ and $F1 + F2$ (2 Marks)
 $F1 = AB + C$ $F2 = A'C' + B'C'$
- b) Minimize the following Boolean Function: (2 Marks)
 $F(A,B,C,D) = ABC' + BC'D' + AC'D + ABC + BCD' + ACD'$
- c) Minimize $F(A,B,C,D) = (AB+CD)' + (A'B'C'D)'$ (2 Marks)

Question 2

- 1) Given $f(A,B,C) = AB + A C' + BC$
 i) Implement f in **NOR-NOR** format (2 Marks)
 ii) Implement f in **AND-OR-INVERT** format (2 Marks)
Obtain optimum implementation.
- b Give minimal POS for $F(a,b,c,d)$ given by the K map below (2 marks)

a b \ cd	00	01	11	10
00	1	X	X	X
01		1	1	
11	1			1
10	X	X	X	X

F(a,b,c,d)

Question 3

- 3.a Give the **POS** of $F(A,B,C,D) = (A+BCD)(B+CD)$ (2 marks)
 3.b Give the **minterm list** of $F(A,B,C,D) = AB$ (2 marks)
 3.c Give the **maxterm list** of $F(A,B,C,D) = ABC+CD+CB$ (2 marks)
 3.d Minimize $F(a,b,c,d)$ given by the K-Map below. Give All Prime Implicant and Identify the Essential Prime Implicant. Give results in SOP (2 marks)

a b \ cd	00	01	11	10
00	1	X	X	X
01		1		
11	1	1		1
10	X	X	X	X

