Al Imam Mohammad Ibn Saud Islamic University
College of Computer and Information Sciences
Computer Science Department

Course Title:	Digital Logic
Course Code:	CS 106
Course Instructor:	Dr. Sultan S. Alqahtani
Exam:	First Midterm
Semester:	Summer semester
Date:	10/07/2019 – 07/11/1440
Duration:	60 minutes
Marks:	30
Privileges:	☐ Open Book ☐ Open Notes
	☑ Calculator Permitted ☐ Laptop Permitted

Student name:	
Student ID:	
Section No.:	

Instructions:

1. Answer all questions; there are **three** questions in **5** pages.
2. Write your answers directly on the question sheets. Use the ends of the question pages for rough work or if you need extra space for your answer.
3. If information appears to be missing from a question, make a reasonable assumption, state your assumption, and proceed.
4. **No** questions will be answered by the invigilator(s) during the exam period.

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Question	Student Marks	Question Marks
1		10
2		10
3		10
Total		30

1. Convert the hexadecimal number 64CD to binary, and then convert it from binary to octal.

2. Represent the decimal number 6,248 in BCD, and from BCD to Excess-3.

3. Find the 9's and the 10's complement of the following decimal numbers:

00000000	25,000,000
9's complement:	9's complement:
10's complement:	10's complement:

4. Perform subtraction on the given unsigned binary numbers using the 2's complement of the subtrahend. Where the result should be negative, find its 2's complement and affix a minus sign
   a) 10011 - 10010

5. Convert decimal+49 and+29 to binary, using the signed-2's-complement representation and enough digits to accommodate the numbers. Then perform the binary equivalent of (+29)+(-49), (-29)+(+49), and (-29)+(-49). Convert the answers back to decimal and verify that they are correct.

1. Simplify the following Boolean expressions to a minimum number of literals:
   a) XY + XY'
   b) (A + B)' (A' + B')

   Draw logic diagrams of the circuits that implement the original and simplified expressions in a and b.

2. Express the following function as a sum of minterms and as a product of maxterms:

$$F(A,B,C,D) = B'D + A'B + BD$$

3. Express the complement of the following functions in sum of minterms form:

a) $F(A, B, C, D) = \Sigma(2, 4, 7, 10, 12, 14)$

b) $F(x, y, z) = \Pi(3, 5, 7)$

1. Simplify the following Boolean functions using Karnaugh Maps:

c) $F(A, B, C, D) = \Sigma(2, 4, 7, 10, 12, 14)$

d) $F(x,y,z) = \Sigma(2,3,6,7)$