**CMSE222 Work Sheet 1**

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Q1) Answer the following:

(a) Convert the decimal number $(231.875)_{10}$ to Binary system

$(231.875)_{10}$=(.....)$_2$

(b) Convert the decimal number $(231.875)_{10}$ to Octal system

$(231.875)_{10}$=(.....)$_8$

(c) Convert the decimal number $(231.875)_{10}$ to Hexadecimal system

$(231.875)_{10}$=(.....)$_{16}$

(d) What is the decimal equivalent of the following signed 2's complement number 1111 0110

……

(e) Noting that $2^2$=4, convert $(11110.111)_2$ to base-4 system

Result=(.....)$_4$

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Q2) Using 7-bit 2's complement representations perform the following operation:

$(-13)_{16}+(3A)_{16}$ ..... .....

..... .....

..... .....

Result=(.....)$_2$ Overflow (Yes/No), reason: .....

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Q3) Using Boolean algebraic manipulation, simplify the following Boolean function:

$F(A,B,C)=A'B'C'+AC'+BC'$

F=……

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Q4) Consider the following Boolean function: $F(A,B,C,D)=[(A'B+C)+D']$.B

(a) Find the dual of F

Fdual=……

(b) Find the complement of F using the DeMorgan theorem

$F'$=……

Q5) Given the following $\mathbf{F'(A,B,C,D)=\sum m(0, 2, 4, 5, 6, 7, 8, 10)}$, find the canonical

a) Fsop? ……

c) Fpos? ……

d) $F'$pos? ……

**Q6)** Simplify the following Boolean function F together with the don't care condition in SOP form: $\mathbf{F(A,B,C,D)=\sum m(1,3,5,7,9,15),\ d(A,B,C,D)=\sum m(4,6,12,13)}$

**F(A,B,C,D)=**……

**Q7)** A logic circuit implements the following Boolean function:

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

It is found that the circuit input combination A=C=1 can never occur. It is required t find simpler expression for F using the proper don't-care conditions.

**a)** Fill up the following truth table:

| A | B | C | D | F |
|---|---|---|---|---|
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**b)** Find the simplicit form of F.

**c)** Implement the minimized F using the minimum number of two-input gates.
[complements are not available]

**Q8)** Given the following **F(A,B,C,D)=$\prod$M(0, 1, 4, 8, 10, 11, 12, 14, 15)**

Find all possible forms of minimal F

……

……

**Q9)** Assume that it is required to design a car safety alarm system with four inputs (D, K,S,B), where D is represents Door closed, K is Key in, S is Seat Pressure, and B is Seat belt closed. The alarm (A) should sound if

– The key is in and the door is not closed, or

– The door is closed and the key is in and the driver is in the seat and the seat belt is not Closed.

**A/** Fill in the given truth table,

| D | K | S | B | A |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 1 | |
| 0 | 0 | 1 | 0 | |
| 0 | 0 | 1 | 1 | |
| 0 | 1 | 0 | 0 | |
| 0 | 1 | 0 | 1 | |
| 0 | 1 | 1 | 0 | |
| 0 | 1 | 1 | 1 | |
| 1 | 0 | 0 | 0 | |
| 1 | 0 | 0 | 1 | |
| 1 | 0 | 1 | 0 | |
| 1 | 0 | 1 | 1 | |
| 1 | 1 | 0 | 0 | |
| 1 | 1 | 0 | 1 | |
| 1 | 1 | 1 | 0 | |
| 1 | 1 | 1 | 1 | |

**B/** Find the minmal F in SOP form

F=……

**C/** Constrcut and AND-OR implementation of F (Complements ar available).

**D/** Find minimal F in POS form.