**Department of ECE, Bennett University**

EECE105L: Fundamentals of Electrical and Electronics Engineering

Tutorial Sheet-15

Topics Covered: Number System and Digital Logic

1. Convert the following number in to binary:

   i) 125   ii) 89   iii) 24   iv) 56   v) 12.9   vi) 9.286   vii) 17.987   viii) 0.987
   ix) 0.575   x) 0.485   xi) 0.355   xii) 0.245   xiii) 0.075

2. Represent the numbers as used in a computer using sign bit representation, 1's complement and 2's complement.

   i) -12   ii) -38   iii) -189   iv) -267

3. Simplify the following by converting the numbers in to binary:

   i) 128 + 29   ii) 287 -128   iii) 217 – 317   iv) 77 – 84   v) 92 -13

4. Draw the logic circuit represented by the following expressions:

   i) $\bar{A}B + A\bar{B}$ ii) $AB + \overline{AB} + \bar{A}BC$ iii) $\bar{A}B(C + \bar{D})$

5. Using Boolean algebra, simplify the following expressions as much as possible and draw the resultant logic function using universal gates.

   i) $A\bar{B}C + \bar{A}BC + \bar{A}\bar{B}C$ ii) $A(A + \bar{A}B)$ iii) $\bar{A}\bar{B}C + \overline{(A + B + \bar{C})} + \bar{A}\bar{B}\bar{C}D$

   iv) $(B + BC)(B + \bar{B}C)(B + D)$

6. Convert the following expressions to standard SOP form.

   i) $(A + B)(C + \bar{B})$ ii) $(C\bar{B} + A)C$

7. Convert the following expressions to standard POS form.

   i) $AB + CD(A\bar{B} + CD)$ ii) $AB(\bar{B}\bar{C} + BD)$

8. Determine which of the following logic circuits are equivalent.

$\overline{B}$
A

A
$\overline{D}$
C

Y

$\overline{B}$
A

A
$\overline{D}$
C

A
$\overline{B}$
C

Y
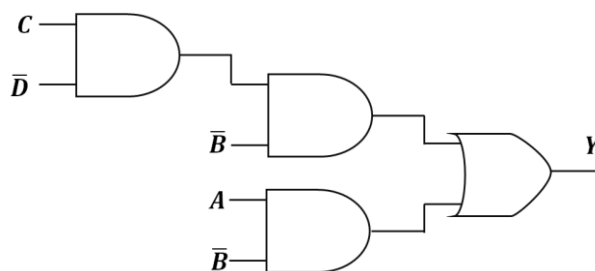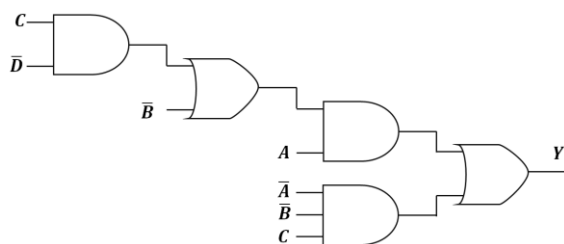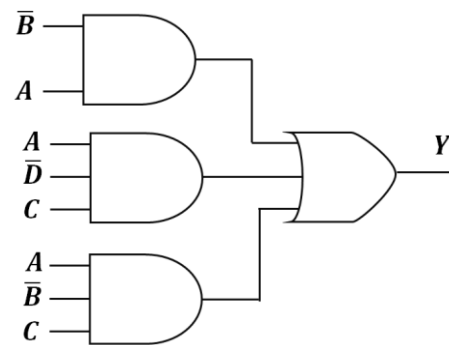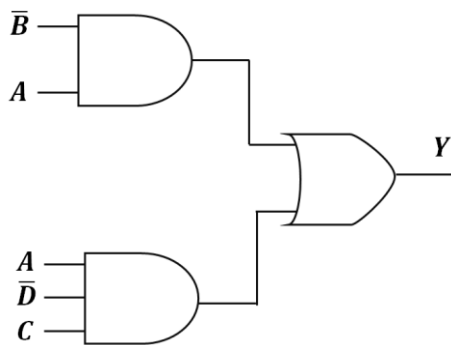
9. For the truth tables given below, derive a standard SOP and POS form.

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

------------- END OF QUESTIONS -------------

Think:

How to represent negative fractions in binary (2's complement form)?