Introduction to Electronics (Practice Paper – 7A)

Topic: Digital Electronics

1. Convert the following hexadecimal numbers to their decimal and binary equivalents:

(a) $(13AF)_{16}$ (b) $(25E6)_{16}$ (c) $(B4.C9)_{16}$ (d) $(45)_{16}$

2. Convert the following octal number to their decimal and binary equivalents:

(a) $(56.2)_8$ (b) $(16.2)_8$ (c) $(20.45)_8$

3. Draw a combinational logic circuit that uses only one AND gate and one OR gate to realize each of the following functions:

(a) (A + B + C + D) (A + B + C + E) (A + B + C + F)

(b) WXYZ + VXYZ + UXYZ

4. Factor each of the following expressions to obtain a product of sums:

(a) AB + C′D′ (b) WX + WY′X + ZYX

(c) A′BC + EF + DEF′ (d) XYZ + W′Z + XQ′Z

5. Simplify each of the following expressions by applying one of the theorems.

(a) (X + Y′Z) + (X + Y′Z)′
(b) [W + X′(Y + Z)][W′ + X′(Y + Z)]
(c) (V′W + UX)′(UX + Y + Z + V′W)

6. Express the following function in POS (Product of Sums) and SOP (Sum of Products) forms:

F = xy + z’

7. Draw a circuit that uses two OR gates and two AND gates to realize the following function:

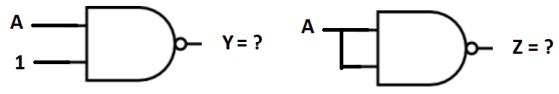
F = (V + W + X) (V + X + Y) (V + Z)

8. Simplify the following expressions:

(a) AB′CD′ + A′BCD+CD′ (b) AB′C′+CD′+BC′D′

(c) (A+B′) (A′+B′+D) (B′+C+D′) (d) (A′+B+C′+D) (A′+C′+D+E)(A′+C′+D+E′)

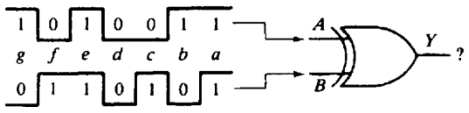
9. Find Y and Z. Identify the logic operation.

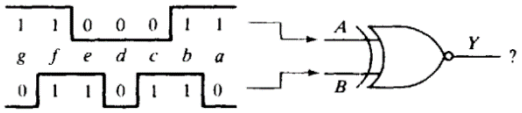


10. Implement NOR operation using only NAND gates.

Implement NAND operation using only NOR gates.

11. Draw the output waveform Y.





12. Express F in product of sum (POS) form or max. term form.

$F = a'(b' + d) + cd'(a+b')$

$F = AB+A'BC'$