

1(15) implement a half adder using cmos transistors

2) 15 Calculate the multiplication of all 2bit 2's complement numbers (there should be a total of four). Clearly show your work.

3) You are to design a 2bit 2's complement multiplier

a)10 Drive the truth table

b)10 drive the sop using K-map

c)10 draw the circuit

d)10 implement the truth table using a multiplexor.

4) (30) Your task is to design a system which has four one bit inputs ( $x_1, x_2, y_1, y_2$ ) and an output. You are to calculate the bit width of the output also.

Your design should calculate the manhattan distance between two points X and Y. Where  $x = x_2x_1$  and  $y = y_2y_1$ . The Manhattan Distance between two points ( $X_1, Y_1$ ) and ( $X_2, Y_2$ ) is given by  $|X_1 - X_2| + |Y_1 - Y_2|$ . For instance the Manhattan distance between the points (1, 2) and (3, 4) i.e.,  $|3 - 1| + |4 - 2| = 4$ .

drive the truth table, find sop using k-maps