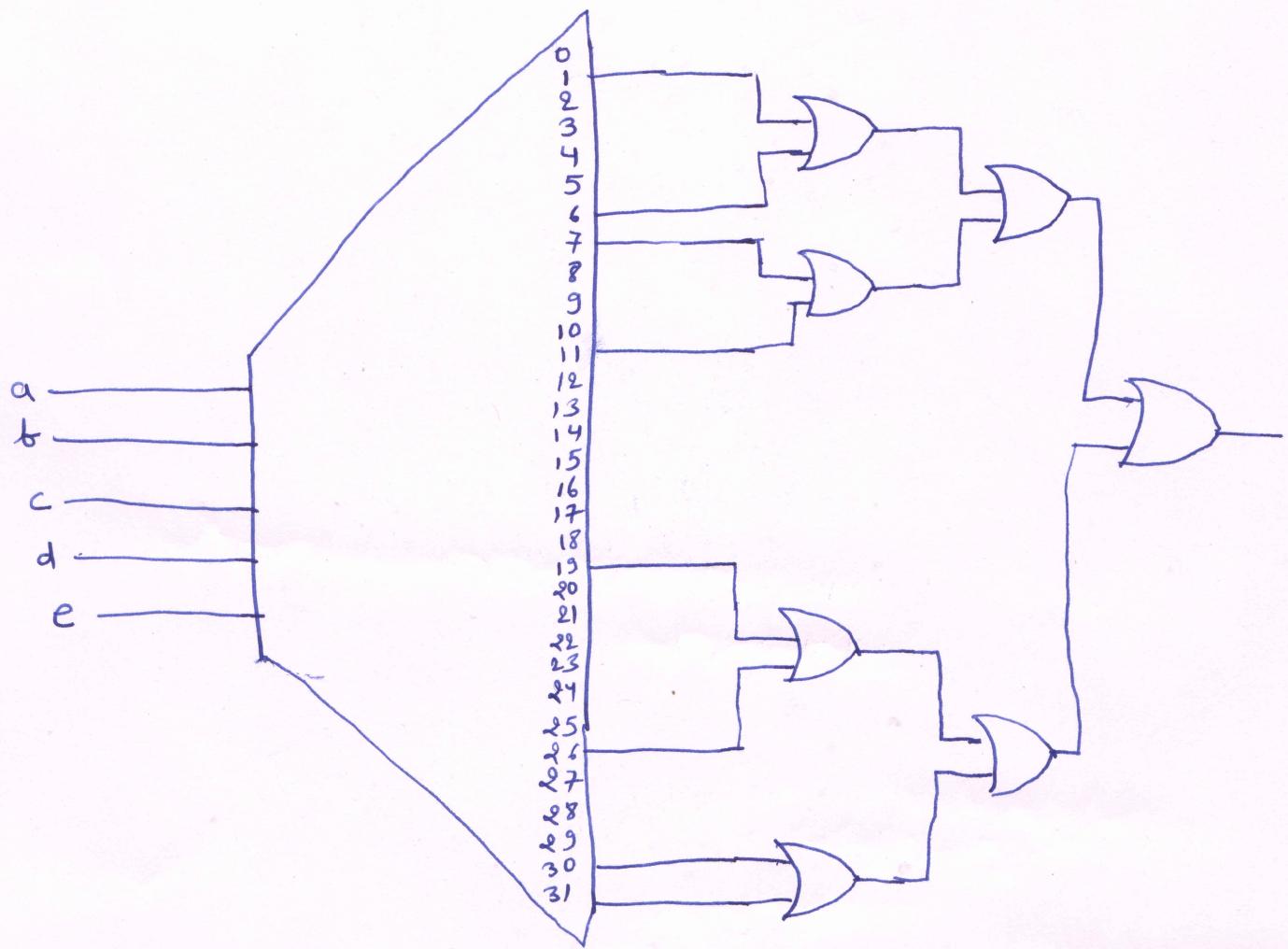


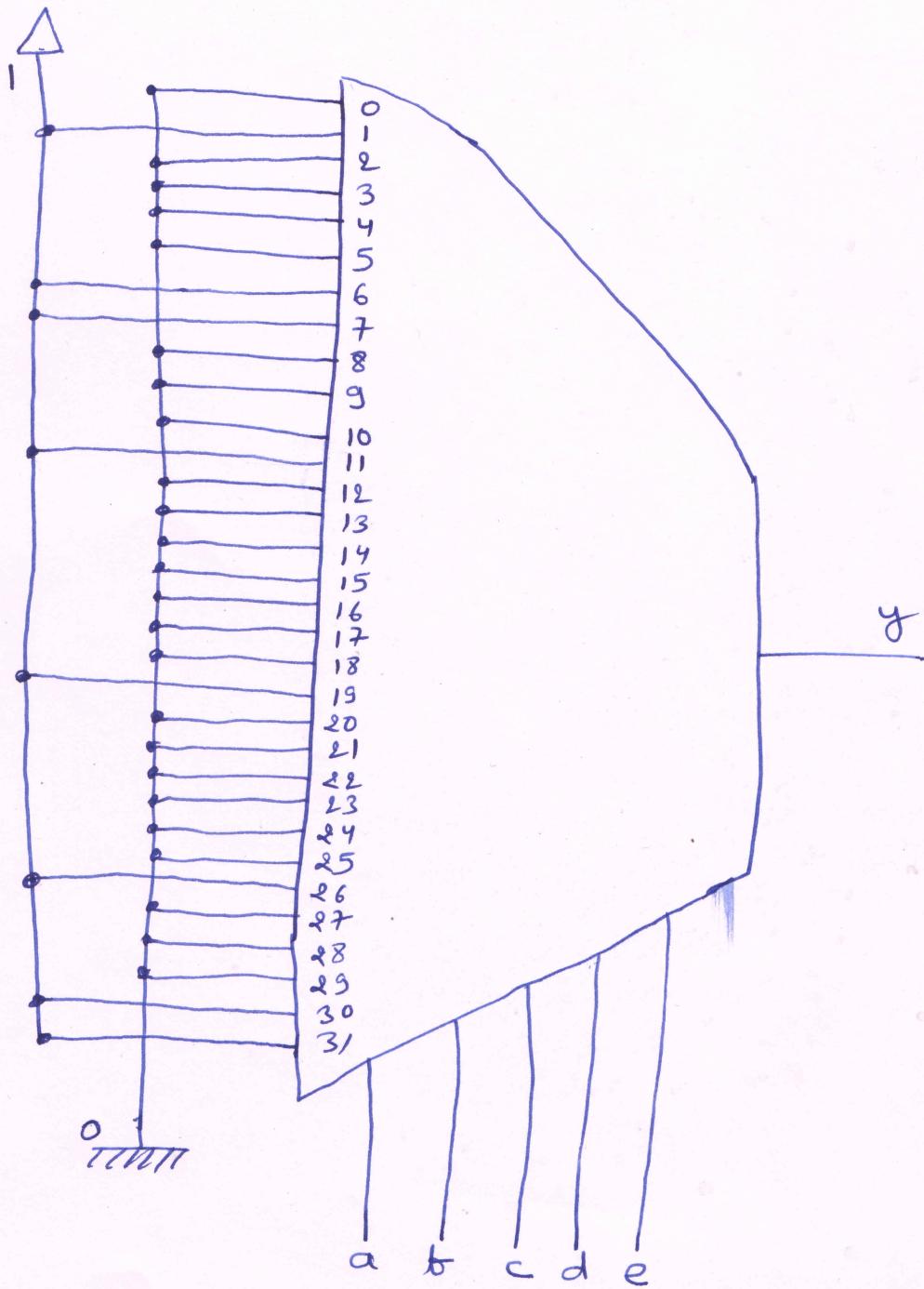
Tutorial - 3

$$y = f(a, b, c, d, e) = \sum m(1, 6, 7, 11, 19, 26, 30, 31)$$

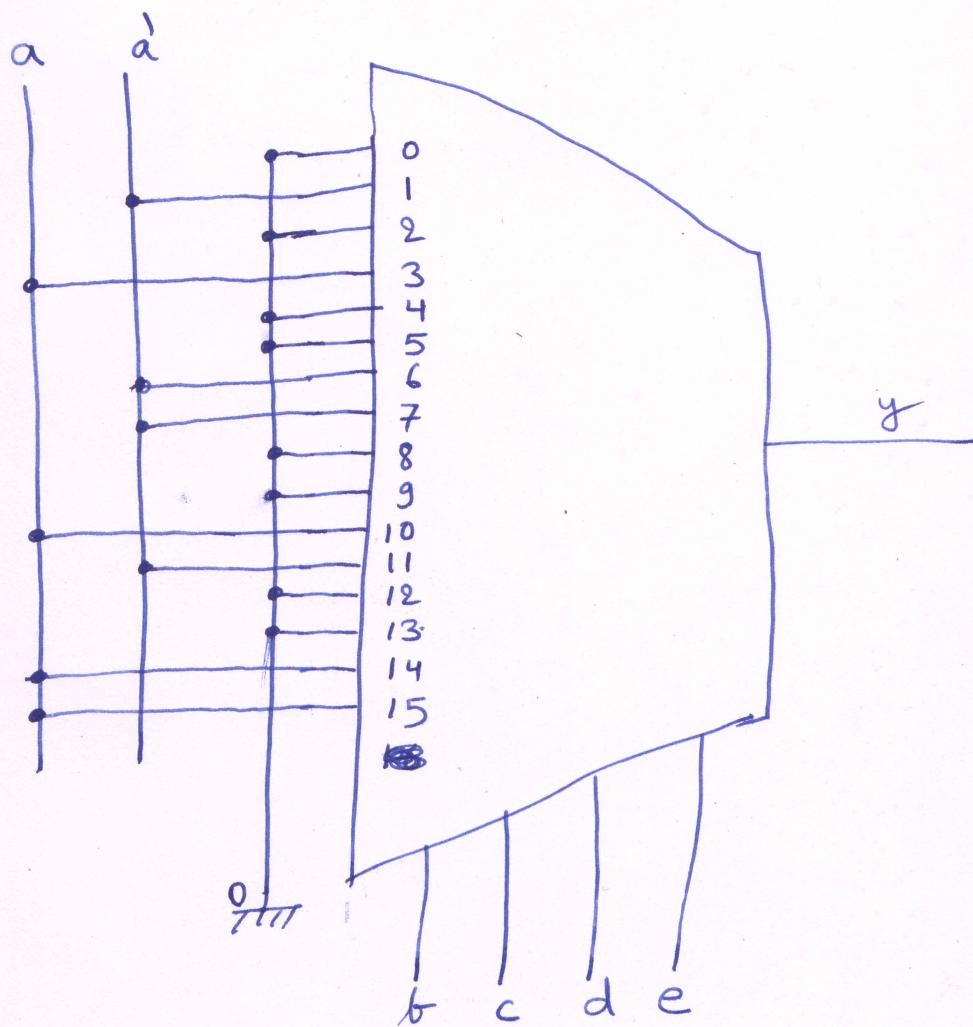
① 5 to 32 decoder with 2-input OR gates



② 32 to 1 multiplexer



③ 16 to 1 multiplexer



a	bcd	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	0	0	1	0	0	0	0	1	1	0	0	0	1	0	0	0
1	0001	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1
2	0010	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0011	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0100	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0101	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6	0110	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7	0111	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
8	1000	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
9	1001	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
10	1010	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
11	1011	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
12	1100	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
13	1101	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
14	1110	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
15	1111	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0

④ ~~$y = f(a, b, c, d, e)$~~ 4 to 1 Multiplexer

$$\Rightarrow f = a'b'c'd'e + a'b'cd'e' + a'b'c'de + a'b'c'de' \\ + ab'c'de + ab'c'de' + abcde' + abcde$$

$$\Rightarrow f = f_0 d'e' + f_1 d'e + f_2 de' + f_3 de$$

$$f_0 = 0 = f_{00} b'c' + f_{01} b'c + f_{02} b'c' + f_{03} bc$$

$$f_1 = a'b'c' = f_{10} b'c' + f_{11} b'c + f_{12} b'c' + f_{13} bc$$

$$f_2 = a'b'c + ab'c' + abc = f_{20} b'c' + f_{21} b'c + f_{22} bc' + f_{23} bc$$

$$f_3 = a'b'c + a'b'c' + ab'c' + abc$$

$$\Rightarrow f_3 = a \cdot b'c' + a \cdot b'c + a \cdot b'c' + a \cdot bc$$

$$\Rightarrow f_3 = f_{30} b'c' + f_{31} b'c + f_{32} bc' + f_{33} bc$$

$$f_{00} = 0$$

$$f_{01} = 0$$

$$f_{02} = 0$$

$$f_{03} = 0$$

$$f_{10} = a'$$

$$f_{11} = 0$$

$$f_{12} = 0$$

$$f_{13} = 0$$

$$f_{20} = a$$

$$f_{21} = a'$$

$$f_{22} = a$$

$$f_{23} = a$$

$$f_{30} = a$$

$$f_{31} = a'$$

$$f_{32} = a'$$

$$f_{33} = a$$

