

Appendix Solution

Q1. Solution

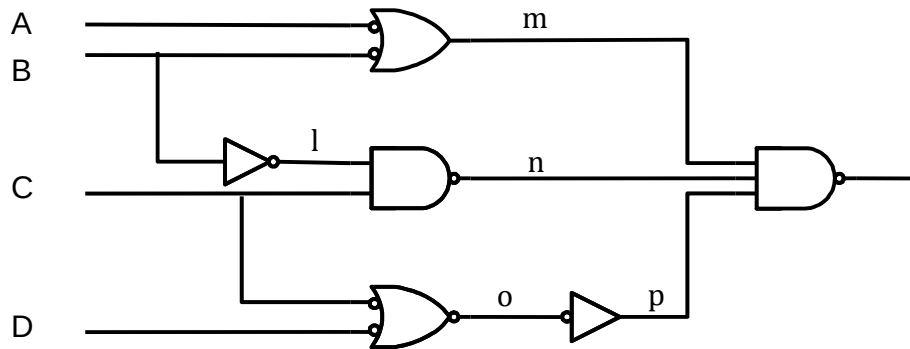
Truth Table

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>F</i>
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

$$Z_{SOP} = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + \bar{A}BCD \\ + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D$$

$$Z_{POS} = (A + \bar{B} + \bar{C} + \bar{D}).(\bar{A} + B + \bar{C} + D).(\bar{A} + B + \bar{C} + \bar{D}).(\bar{A} + \bar{B} + C + \bar{D}).(\bar{A} \\ + \bar{B} + \bar{C} + D).(\bar{A} + \bar{B} + \bar{C} + \bar{D})$$

Q2. Solution



```
Module Q2 (A,B,C,D,Z);
```

```
input A, B, C, D;
```

```
output Z;
```

```
not (a1,A);
```

```
not (b1,B);
```

```
or (m,a1,b1);
```

```
// above 3 lines can be replaced by nand (m, A, B);
```

```
not (l,B);
```

```
nand(n,l,C);
```

```
not(c1,C);
```

```
not(d1,D);
```

```
nor (o,c1,d1);
```

```
//above 3 lines can be replaced by and(o,C,D);
```

```
not (p,o);
```

```
// also can be written as not(o1,o); buf (p,o1);
```

```
nand (Z,m,n,o);
```

```
endmodule
```

Q3. Solution

$$Z = \overline{A} \overline{B} C \overline{D}$$

