Solution : Exercice 1

$$C = C_{OX} \cdot A = C_{OX} \cdot L \cdot W$$

$$C_{M1} = 4\frac{fF}{\mu m^2} \cdot 4\mu m \cdot 4\mu m = 64fF$$

$$C_{M2} = 4\frac{fF}{\mu m^2} \cdot 3\mu m \cdot 3\mu m = 36fF$$

$$C_{M3} = 4\frac{fF}{\mu m^2} \cdot 6\mu m \cdot 2\mu m = 48fF$$

$$C_{M4} = 4\frac{fF}{\mu m^2} \cdot 12\mu m \cdot 1\mu m = 48fF$$

$$C_{M5} = 4\frac{fF}{\mu m^2} \cdot 2\mu m \cdot 6\mu m = 48fF$$

$$C_{M6} = 4\frac{fF}{\mu m^2} \cdot 6\mu m \cdot 6\mu m = 144fF$$

$$C_{M7} = 4\frac{fF}{\mu m^2} \cdot 3\mu m \cdot 9\mu m = 108fF$$

Solution : Exercice 2

Capacité en parallel :

$$C_{EQ} = C_1 + C_2$$

Capacité en série :

$$\frac{1}{C_{EQ}} = \frac{1}{C_1} + \frac{1}{C_2}$$

(A)

$$C_{EQ} = 1\mu F$$

(B)

$$C_{EQ} = C + C = 1\mu F + 1\mu F = 2\mu F$$

(C)

$$C_{EQ} = \frac{C \cdot C}{C + C} = \frac{1\mu F \cdot 1\mu F}{1\mu F + 1\mu F} = 0.5\mu F$$

(D)

$$C_{EQ} = C + C + C = 1\mu F + 1\mu F + 1\mu F = 3\mu F$$

(E)

$$C_{EQ} = C + \frac{C \cdot C}{C + C} = 1\mu F + \frac{1\mu F \cdot 1\mu F}{1\mu F + 1\mu F} = 1\mu F + 0.5\mu F = 1.5\mu F$$

(F)

$$C_{EQ} = \frac{C \cdot 2C}{C + 2C} = \frac{1\mu F \cdot 2\mu F}{1\mu F + 2\mu F} = 0.667\ muF$$

(G)

$$C_{EQ} = \frac{C \cdot \frac{C \cdot C}{C+C}}{C + \frac{C \cdot C}{C+C}} = \frac{C \cdot 0.5C}{C + 0.5C} = \frac{1\mu F \cdot 0.5\mu F}{1\mu F + 0.5\mu F} = 0.333\mu F$$

Solution : Exercice 3

Inductance en série :

$$L_{EQ} = L_1 + L_2$$

Inductance en parallel :

$$\frac{1}{L_{EQ}} = \frac{1}{L_1} + \frac{1}{L_2}$$

(A)

$$L_{EQ} = L = 1\mu H$$

(B)

$$L_{EQ} = \frac{L \cdot L}{L + L} = \frac{1\mu H \cdot 1\mu H}{1\mu H + 1\mu H} = 0.5\mu H$$

(C)

$$L_{EQ} = L + L = 1\mu H + 1\mu H = 2\mu H$$

(D)

$$L_{EQ} = \frac{L \cdot \frac{L \cdot L}{L+L}}{L + \frac{L \cdot L}{L+L}} = \frac{L \cdot 0.5L}{L + 0.5L} = \frac{1\mu H \cdot 0.5\mu H}{1\mu H + 0.5\mu H} = 0.333\ muH$$

(E)

$$L_{EQ} = \frac{L \cdot 2L}{L + 2L} = \frac{1\mu H \cdot 2\mu H}{1\mu H + 2\mu H} = 0.667\ muH$$

(F)

$$L_{EQ} = L + \frac{L \cdot L}{L + L} = 1\mu H + \frac{1\mu H \cdot 1\mu H}{1\mu H + 1\mu H} = 1\mu H + 0.5\mu H = 1.5\mu H$$

(G)

$$L_{EQ} = L + L + L = 3\mu H$$

Solution : Exercice 4

Capacité en parallel :

$$C_{EQ} = C_1 + C_2$$

Capacité en série :

$$\frac{1}{C_{EQ}} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$C_{EQ} = \frac{2\mu F \cdot (1\mu F + 3\mu F)}{2\mu F + (1\mu F + 3\mu F)} = 1.33\mu F$$

Inductance en série :

$$L_{EQ} = L_1 + L_2$$

Inductance en parallel :

$$\frac{1}{L_{EQ}} = \frac{1}{L_1} + \frac{1}{L_2}$$

$$L_{EQ} = 1\mu H + \frac{2mH \cdot 1mH}{1mH + 2mH} = 668\mu F$$