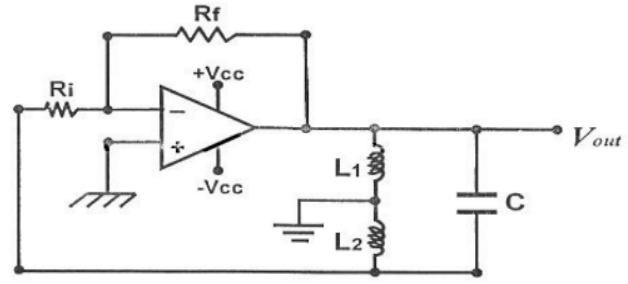


ساعة (A)

Q.1. For the **Hartley oscillator** shown in the Fig., Calculate the frequency of oscillation (f_o) if :

$$C = 2 \text{ pF}, L_1 = 5 \text{ mH}, L_2 = 8 \text{ mH}, \\ R_f = 1 \text{ M}\Omega, R_i = 100 \text{ K}\Omega.$$



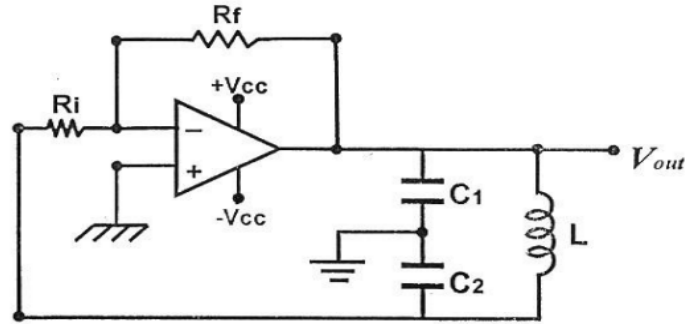
Q.2. What are the main manufacturing steps of the integrated circuit ?

ساعة (B)

Q.1. There are many steps to manufacture the integrated circuit , State them .

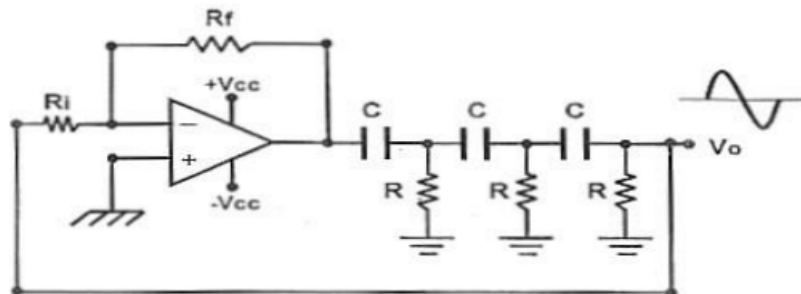
Q.2. For the **Colpitts oscillator** shown in the Fig., Calculate the frequency of oscillation (f_o) if :

$$L = 2 \text{ mH}, C_1 = 5 \text{ }\mu\text{F}, C_2 = 8 \text{ }\mu\text{F}, \\ R_f = 1 \text{ M}\Omega, R_i = 100 \text{ K}\Omega.$$



ساعة (C)

- Q.1. For the ***Phase Shift oscillator*** shown in the Fig., Calculate the frequency of oscillation (f_o) if :
 $R = 2 \text{ K}\Omega$, $C = 5 \text{ pF}$,
 $R_f = 1 \text{ M}\Omega$, $R_i = 100 \text{ K}\Omega$.

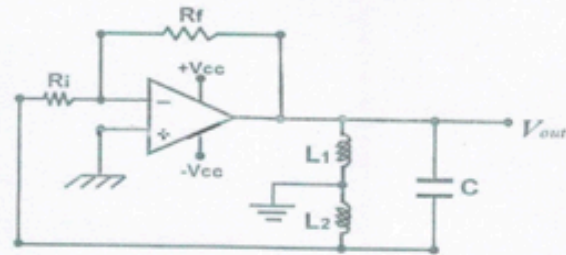


- Q.2. Silicon is used to manufacture the integrated circuits, Write the main steps of manufacturing the (IC).

الحلول

(A) امتحان شهري - الالكترونيات - الفصل الثاني ٢٠٢٤/٢٠٢٣ الثلاثاء ٢٠٢٤/٤/٣٠ الوقت: ١ ساعة

- Q.1. For the **Hartley oscillator** shown in the Fig., Calculate the frequency of oscillation (f_o) if:
 $C = 2 \text{ pF}$, $L_1 = 5 \text{ mH}$, $L_2 = 8 \text{ mH}$,
 $R_f = 1 \text{ M}\Omega$, $R_i = 100 \text{ K}\Omega$.



- Q.2. What are the main manufacturing steps of the integrated circuit ?

الفر

$$L_{eq} = L_1 + L_2 = 5 \times 10^{-3} + 8 \times 10^{-3} = 13 \times 10^{-3} \text{ H}$$

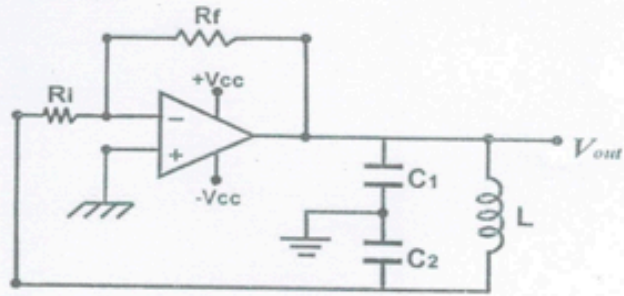
$$f_o = \frac{1}{2\pi\sqrt{L_{eq}C}} = \frac{1}{2\pi\sqrt{13 \times 10^{-3} \times 2 \times 10^{-12}}} = \frac{1}{2\pi\sqrt{26 \times 10^{-15}}} = \frac{1}{2\pi \times 1.612 \times 10^{-7}} = \frac{1}{1.01 \times 10^{-6}}$$

$$= 9.87 \times 10^5 \approx 10 \times 10^5 \approx \underline{1 \text{ MHz}}$$

(B) امتحان شهري - الالكترونيات - الفصل الثاني ٢٠٢٤/٢٠٢٣ الثلاثاء ٢٠٢٤/٤/٣٠ الوقت: ١ ساعة

- Q.1. There are many steps to manufacture the integrated circuit, State them.

- Q.2. For the **Colpitts oscillator** shown in the Fig., Calculate the frequency of oscillation (f_o) if:
 $L = 2 \text{ mH}$, $C_1 = 5 \text{ }\mu\text{F}$, $C_2 = 8 \text{ }\mu\text{F}$,
 $R_f = 1 \text{ M}\Omega$, $R_i = 100 \text{ K}\Omega$.



Sol. $f_o = \frac{1}{2\pi\sqrt{LC_{eq}}}$

&

$$C_{eq} = \frac{C_1 \cdot C_2}{C_1 + C_2} = \frac{5 \times 10^{-6} \times 8 \times 10^{-6}}{5 \times 10^{-6} + 8 \times 10^{-6}} = \frac{40 \times 10^{-12}}{13 \times 10^{-6}} \approx 3 \times 10^{-6} \approx 3 \text{ }\mu\text{F}$$

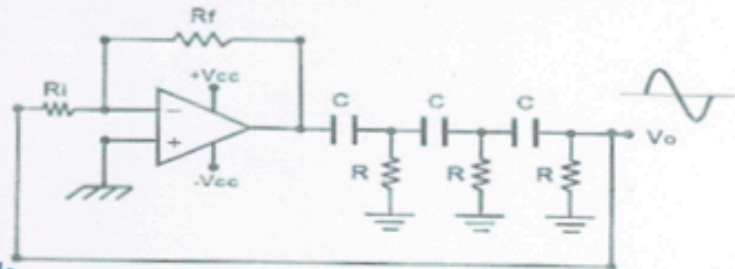
$$\therefore f_o = \frac{1}{2\pi\sqrt{LC_{eq}}} = \frac{1}{2\pi\sqrt{2 \times 10^{-3} \times 3 \times 10^{-6}}} = \frac{1}{2\pi\sqrt{6 \times 10^{-9}}} = \frac{1}{2\pi \times 7.7 \times 10^{-5}} = \frac{1}{4.867 \times 10^{-4}} = 2.05 \times 10^3 = \underline{2.05 \text{ KHz}}$$

(C) امتحان شهري - الالكترونيات - الفصل الثاني ٢٠٢٤/٢٠٢٣ الثلاثاء ٢٠٢٤/٤/٣٠ الوقت: ١ ساعة

- Q.1. For the **Phase Shift oscillator** shown in the Fig., Calculate the frequency of oscillation (f_o) if:
 $R = 2 \text{ K}\Omega$, $C = 5 \text{ pF}$,
 $R_f = 1 \text{ M}\Omega$, $R_i = 100 \text{ K}\Omega$.

Sol. $f_o = \frac{1}{2\pi\sqrt{6}RC} = \frac{1}{2\pi\sqrt{6} \times 2 \times 10^3 \times 5 \times 10^{-12}}$

$$= \frac{1}{153.91 \times 10^{-9}} = \frac{10^9}{153.91} \approx 6.5 \times 10^6 \approx \underline{6.5 \text{ MHz}}$$



- Q.2. Silicon is used to manufacture the integrated circuits, Write the main steps of manufacturing the (IC).