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Q] =)

L = 0.1H , R = 10Ω , C = 0.1 μF

$Q = \frac{\omega L}{R}$ $\omega = \frac{X}{\sqrt{LC}} = \frac{1}{\sqrt{0.1 \times 0.1 \times 10^{-6}}}$

$Q = \frac{0.01 \times 0.1}{10}$ $\omega = \frac{1}{10^2} = 0.01 = \frac{1}{0.000} = 1000$

$Q = \frac{1}{0.01 \times 10 \times 0.1 \times 10^{6}} = \frac{1000 \times 0.1}{10}$

$Q = \frac{1}{R}\sqrt{\frac{L}{C}} = \frac{1}{10}\sqrt{\frac{0.1}{0.1 \times 10^{-6}}} = 100$

Q] =) R = 12Ω C = 40 μF L = 8 mH

$f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2 \times 3.14\sqrt{8 \times 10^{-3} \times 40 \times 10^{-6}}}$

$f = \frac{1}{6.28\sqrt{320 \times 10^{-9}}} = \frac{1}{6.28 \times 17.88 \times 0.00003162}$

$f = \frac{1}{0.00355}$ $\boxed{f = 218.6\ Hz}$

Q] ⇒ Given, $\Delta V = 3.1 - 3 = 0.1V$.

$\Delta I = 1.3 - 1 = 0.3mA$

$\therefore g_m = \frac{\Delta I}{\Delta V_{GS}} = \frac{0.3 \times 10^{-3}}{0.1} = 3\ mA/V^2$

$= \underline{3000\ \mu mho}$

Q] ⇒ Given

$I_{DSS} = 3mA$, $V_{GS(off)} = -6V$. $g_{m(max)} = 5000\mu s$

$g_m = ?$ for $V_{GS} = -4V$. $I_D = ?$

$$g_m = g_{mo}\left(1 - \frac{V_{GS}}{V_{GS(off)}}\right) = 5000\mu s\left(1 - \frac{-4V}{-6}\right)$$

$$= 5000\mu s\,(1/3) = \underline{1667\mu s.}$$

also,

$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_{GS(off)}}\right)^2 = 3mA\left(1 - \frac{(-4)}{-6}\right)^2$$

$$= \underline{333\mu A.}$$

Q] ⇒

$I_{DSS} = 10mA$, $V_P = 4V$. $I_D = ?$ for $V_{GS} = 1V$.

$$I_D = 10 \times 10^{-3}\left(1 - \frac{1}{4}\right)^2 = \underline{5.6mA}$$

as $I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^2$

Q] ⇒ $V_P = 4V$. $V_{GS} = 1V$.

$V_{DS} = V_P - V_{GS}$

$\boxed{V_{DS} = 3V}$

Q] ⇒ Given

$I_{DSS} = 2mA \quad V_P = -4V \;, V_{GS} = -2V.$

$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^2 = 2\times10^{-3}\left(1 - \frac{-2}{-4}\right)^2$$

$$= 2\times10^{-3}\,(-2/-4)^2 = 2\times10^{-3}\times\frac{4}{16}$$

$$= 2\times10^{-3}\times0.25$$

$$= \underline{0.5mA}$$

Q] ⇒ Given,

$I_D = 5mA, \quad I_{DSS} = 10mA \quad V_{GS(off)} = -6V.$

$V_{GS} = ?, \quad V_P = ?$

$$I_D = I_{DSS}\left[1 - \frac{V_{GS}}{V_{GS(off)}}\right]^2$$

$$5 = 10\left[1 + \frac{V_{GS}}{6}\right]^2 \qquad \boxed{V_{GS} = -1.76V}$$

$$V_P = -V_{GS(off)} = -(-6)$$

$$\boxed{V_P = 6V}$$