Tutorial 5

Topics

- BJT Biasing techniques
- JFET current equation
- CE amplifier

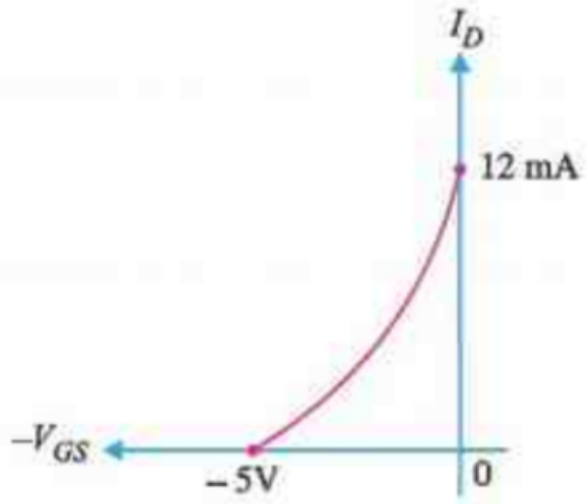
(1)

A JFET has the following parameters: I_{DSS} = 32 mA ;
$V_{GS\,(off)} = -8V$; $V_{GS} = -4.5$ V. Find the value of drain current.

(2) Fig shows the transfer characteristic curve of a JFET.

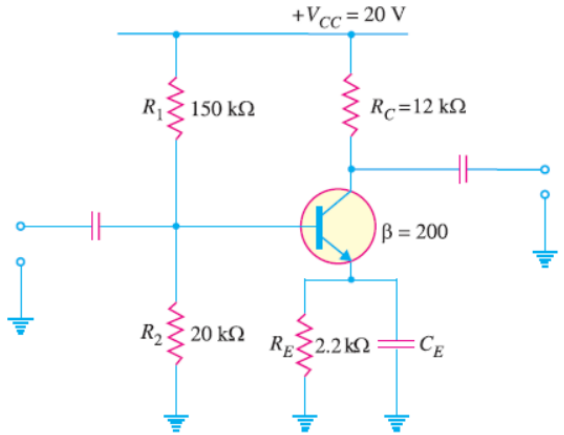
Write the equation for drain current.

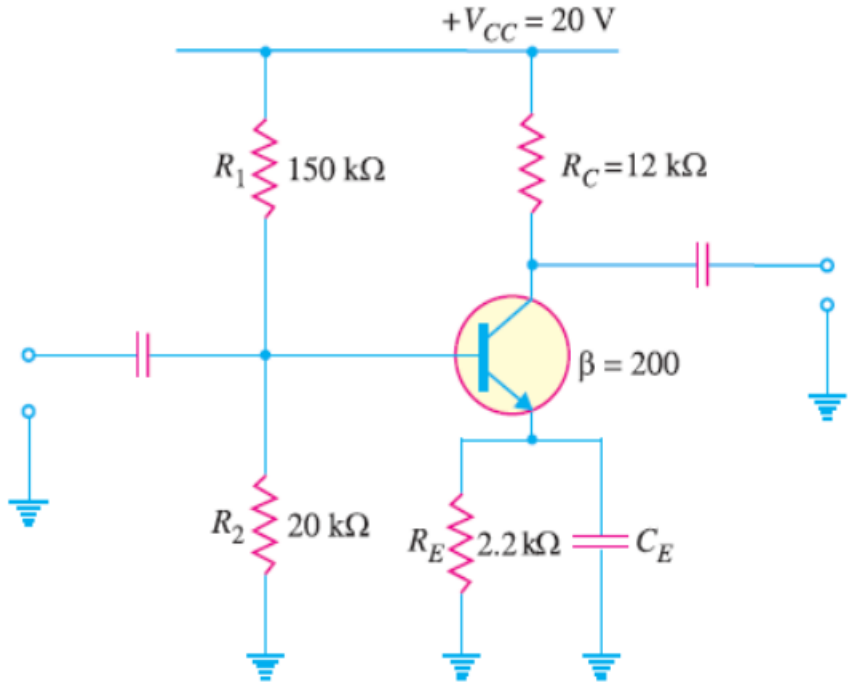
$$I_{DSS} = 12\ \text{mA}$$
$$V_{GS\,(off)} = -5\ \text{V}$$



(3) A JFET has a drain current of 5 mA. If I_{DSS} = 10 mA and $V_{GS\,(off)}$ = – 6 V, find the value of (i) V_{GS} and (ii) V_P.

(4) For the amplifier circuit shown find the voltage gain of the amplifier with (i) CE connected in the circuit (ii) CE removed from the circuit





(4)

We shall first find D.C. I_E and hence r_e'.

In order to find D.C. I_E, we shall proceed as under :

$$\text{D.C. voltage across } R_2,\ V_2 = \frac{V_{CC}}{R_1 + R_2} \times R_2 = \frac{20}{150 + 20} \times 20 = 2.35 \text{ V}$$

$$\text{D.C. voltage across } R_E,\ V_E = V_2 - V_{BE} = 2.35 - 0.7 = 1.65 \text{ V}$$

$$\therefore \quad \text{D.C. emitter current, } I_E = \frac{V_E}{R_E} = \frac{1.65\,V}{2.2\ \text{k}\Omega} = 0.75 \text{ mA}$$

$$\therefore \quad \text{AC emitter resistance, } r_e' = \frac{25 \text{ mV}}{I_E} = \frac{25 \text{ mV}}{0.75 \text{ mA}} = 33.3\ \Omega$$

(i) With CE connected :

$$\text{Voltage gain, } A_v = \frac{R_C}{r_e'} = \frac{12\ \text{k}\Omega}{33.3\ \Omega} = \mathbf{360}$$

(ii) Without CE :

$$\text{Voltage gain, } A_v = \frac{R_C}{r_e' + R_E} = \frac{12\ \text{k}\Omega}{33.3\ \Omega + 2.2\ \text{k}\Omega} = \mathbf{5.38}$$

(5) In the circuit shown find the voltage gain. Given that β=60 and input resistance Rin=1 k

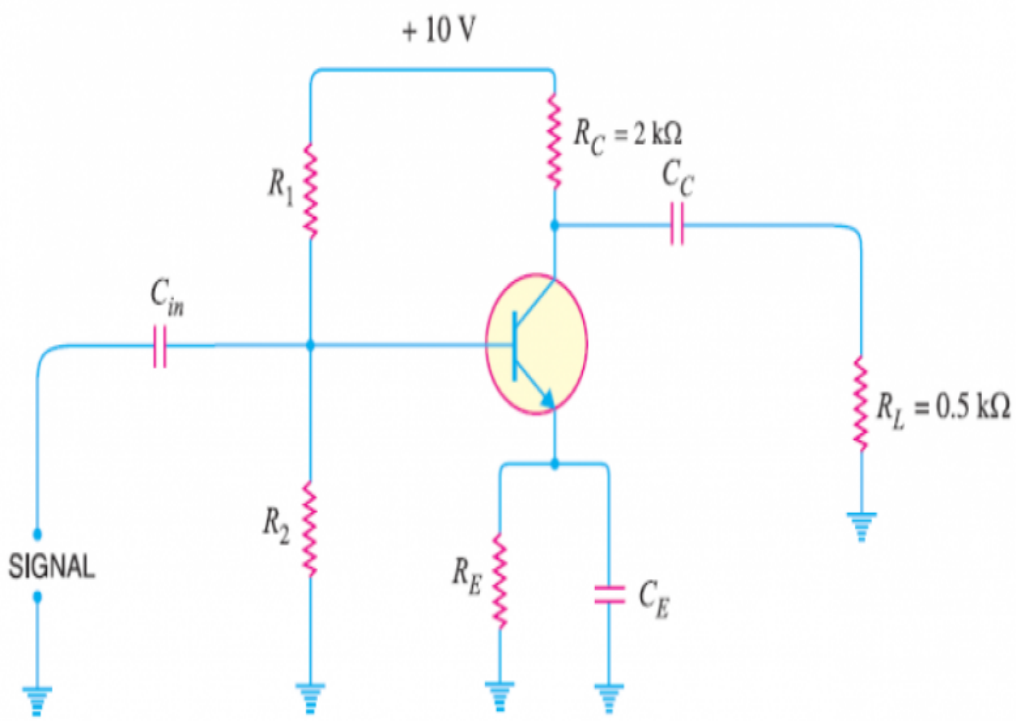
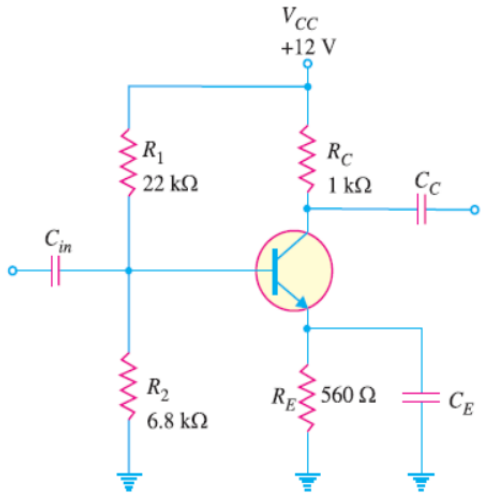


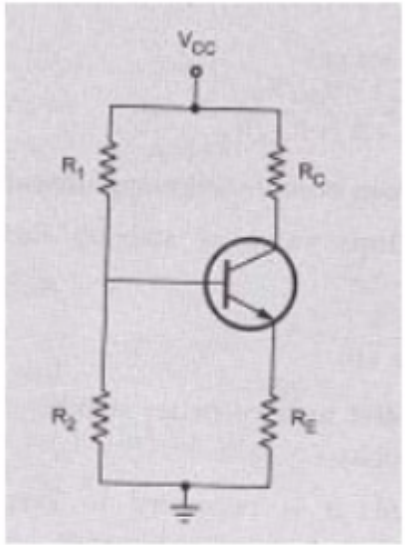
Fig. 7

(6) Select a suitable value for emitter bypass capacitor in Fig shown if the amplifier is to operate over a frequency range from 2 kHz TO 10 kHz



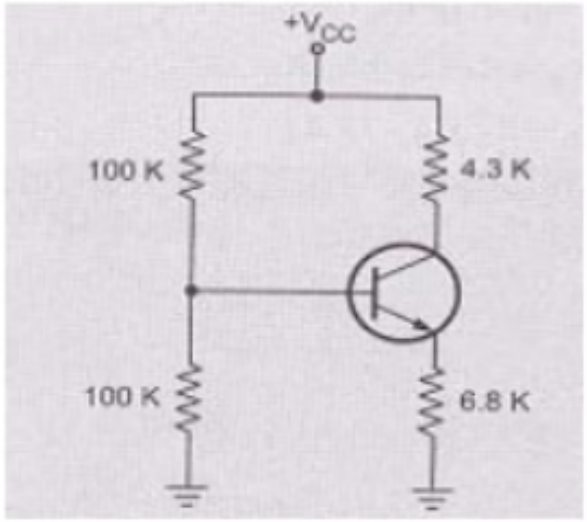
(7)

For the given circuit, V_{CC} = 20V, R_C = 2KΩ, β = 50, V_{BE} = 0.2V, R_1 = 100KΩ, R_E = 100Ω. Calculate I_B, V_{CE}, I_C and stability factor S.



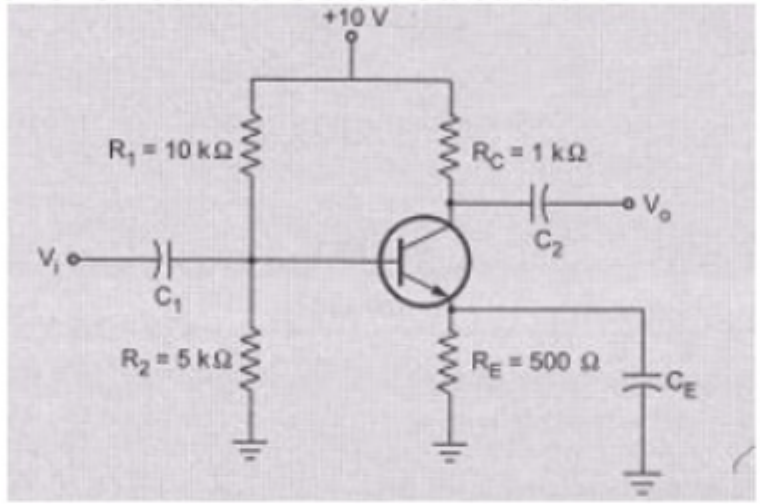
(8)

For the given figure find Q point with $V_{CC} = 15V$, $V_{BE} = 0.7V$ and $\beta = 100$.



(9)

For the given circuit β=100 for silicon transistor. Calculate V_{CE} and I_C.



(10) For the emitter biased circuit shown Find IE, IC, VC, and VCE for β= 85 and VBE=0.7V