$$-I_2 R + I_3\left(2R + \frac{1}{jwC}\right) = 0$$

$$-I_2 R = -I_3 R\left(2 + \frac{1}{jwRC}\right)$$

$$\therefore \quad I_2 = I_3\left(2 + \frac{1}{j}\alpha\right)$$

$$\because \quad \alpha = \frac{1}{wRC}$$

$$\text{or} \quad I_2 = I_3(2 - j\alpha)$$

$$-I_1 R + I_2\left(2R + \frac{1}{jwC}\right) - I_3 R = 0$$

$$-I_1 R + I_3(2 - j\alpha)\left(2R + \frac{1}{jwC}\right) - I_3 R = 0$$

$$-I_1 R + I_3\left[4R + \frac{2}{jwC} - j2\alpha R - \frac{\alpha}{wC}\right] - I_3 R = 0$$

$$-I_1 R + I_3\left(3R + \frac{2}{jwC} - j2\alpha R - \frac{\alpha}{wC}\right) = 0$$

$$I_1 R = I_3 R\left(3 + \frac{2}{jwRC} - j2\alpha\frac{R}{R} - \frac{\alpha}{wRC}\right) = 0$$

$$I_1 = I_3\left(3 + \frac{2\alpha}{j} - j2\alpha - \alpha^2\right)$$

$$I_1 = I_3\left(3 - j2\alpha - j2\alpha - \alpha^2\right)$$

$$I_1 = I_3\left(3 - \alpha^2 - j4\alpha\right)$$

$$I_1\left(R_c + R + \frac{1}{j\omega C}\right) - I_2 R = -h_{fe} R_c I_b$$

$$I_1 R\left(\frac{R_c}{R} + 1 + \frac{1}{j\omega CR}\right) - I_2 R = -h_{fe} K.R.I_b$$

$$I_1\left(\frac{R_c}{R} + 1 + \frac{1}{j\omega CR}\right) - I_2 = -h_{fe} K.I_b$$

$$I_1\left(K + 1 + \frac{1.\alpha}{j}\right) - I_2 = -h_{fe} K.I_b$$

$$I_3(3-\alpha^2-j4\alpha)\left(K+1+\frac{\alpha}{j}\right) - I_3(2-j\alpha) = -h_{fe} K.I_b$$

$$I_3\left(3K+3+\frac{3\alpha}{j}-\alpha^2K-\alpha^2-\frac{\alpha^3}{j}-j4K\alpha\right.$$
$$\left.-j4\alpha-4\alpha^2-2+j\alpha\right) = -h_{fe} K.I_b$$

$$I_3\left(1+3K-j3\alpha-\alpha^2K-5\alpha^2+j\alpha^3-j4K\alpha\right.$$
$$\left.-j4\alpha+j\alpha\right) = -h_{fe} K.I_b$$

$$I_3\left(1+3K-(5+K)\alpha^2-j\left[(6+4K)\alpha-\alpha^3\right]\right) = -h_{fe} K.I_b$$

$$\frac{I_3}{I_b} = \frac{-h_{fe}.K}{1+3K-(5+K)\alpha^2-j\left[(6+4K)\alpha-\alpha^3\right]}$$