

EE101:Electrical Sciences, Tutorial-12

DEPARTMENT OF ELECTRONICS & ELECTRICAL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

[Q-1 is for pre-tutorial. Solve it in the space provided and submit at beginning of tutorial]

Name:

Roll No.:

Tutorial Group:

Q-1. Assuming Si pn junction diodes with a cut-in voltage of 0.7 V, find out the output dc voltage V_{OUT} in the circuit shown in Fig. Q1. Consider only the case where the peak value of v_s is greater than 1.4 V.

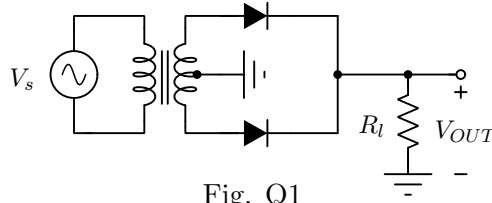


Fig. Q1

Basic Electronics

Q-2. A common emitter (CE) amplifier is shown in Fig. Q2. Assume a Si BJT with $\beta = 100$. In Fig. Q2, C_∞ represents a large capacitor which acts as a short-circuit for all ac-signals.

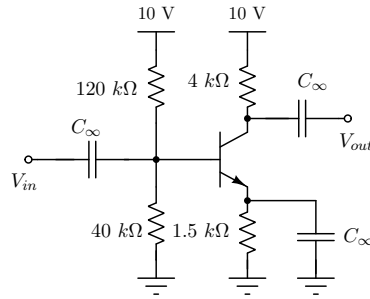


Fig. Q2 A CE Amplifier

- (a) Draw the DC equivalent circuit. Determine all the node voltages and the currents through all branches.
- (b) Draw the AC equivalent circuit and determine the voltage gain. Neglect the collector-to-emitter resistance.

Frequency Response

Q-3. For the network shown in Fig. Q3, find-

- (a) The resonant frequency ω_0 ,
- (b) $Z_{in}(j\omega_0)$

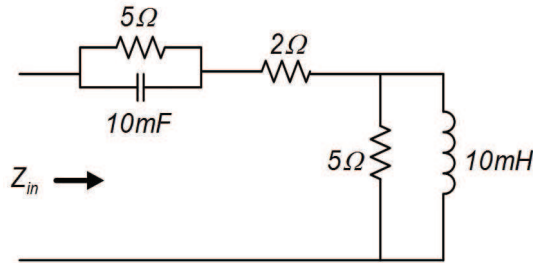


Fig. Q3

Q-4. A series resonant network consists of 50Ω resistor, 4 mH inductor and a $0.1\mu\text{F}$ capacitor. Calculate the values of: (a) ω_0 and f_0 , (b) Q_0 , (c) bandwidth, (d) lower and higher cut off frequencies (ω_1 and ω_2), (e) Z_{in} at $\omega = 45\text{ krad/s}$ and the ratio of magnitudes of capacitor impedance to resistor at $\omega = 45\text{ krad/s}$.