1.

$C_{W_i} = 4\ pF$ $C_{gd} = 8\ pF$
$C_{W_o} = 6\ pF$ $C_{gs} = 12\ pF$
                    $C_{ds} = 3\ pF$

20 V

3.9 kΩ

220 kΩ

6.8 μF

1.5 kΩ V_i

$I_{DSS} = 10\ mA$
$V_P = -6\ V$

1 μF

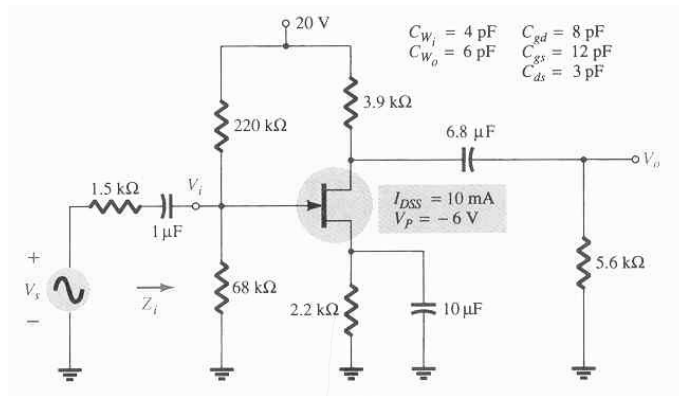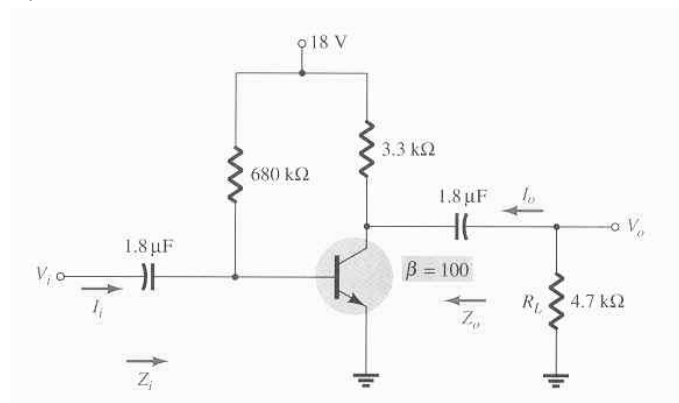V_s

Z_i

68 kΩ

2.2 kΩ

10 μF

5.6 kΩ

V_o

a) Determine V_{GSQ} and I_{DQ}.
b) Find g_{mo} and g_m.
c) Calculate the midband gain of $A_v = V_o/V_i$.
d) Determine Z_i.
e) Calculate $A_{vs} = V_o/V_s$.
f) Determine f_{LG}, f_{LC} and f_{LS} for the capacitors $1\mu F$, $6.8\mu F$ and $10\mu F$, respectively.
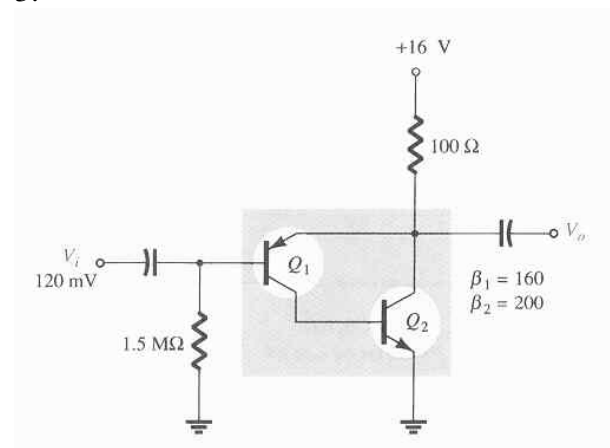g) Determine the low-cutoff frequency.
h) Sketch the low-frequency response for the amplifier using the results of part (f).
i) Determine f_{Hi} and f_{Ho}.
j) Determine the high-cutoff frequency.
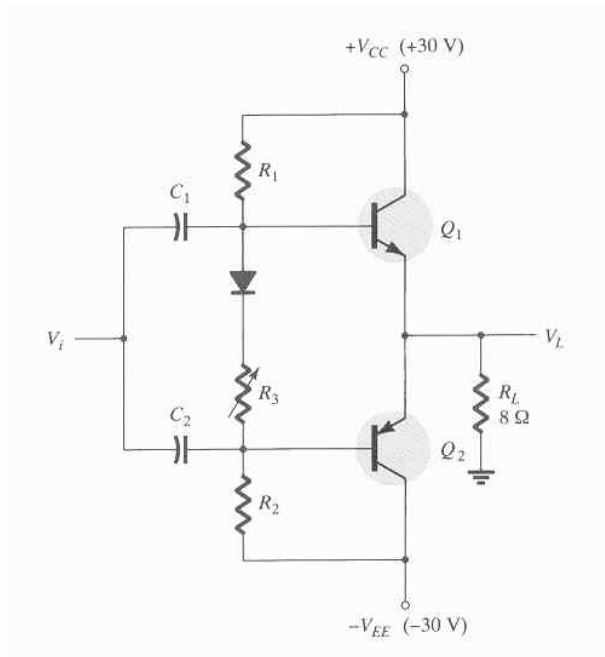k) Sketch the frequency response for the high-frequency region using the results of part (i).

2.

18 V

3.3 kΩ

680 kΩ

1.8 μF I_o

1.8 μF

V_i

I_i

$\beta = 100$

Z_o

R_L 4.7 kΩ

V_o

Z_i

a) Determine A_{VNL}, Z_i and Z_o.
b) Calculate the gain A_{VL}.
c) Determine the current gain A_{iL}.
d) Determine A_{VL}, A_{iL}, Z_i and Z_o using the r_e model.
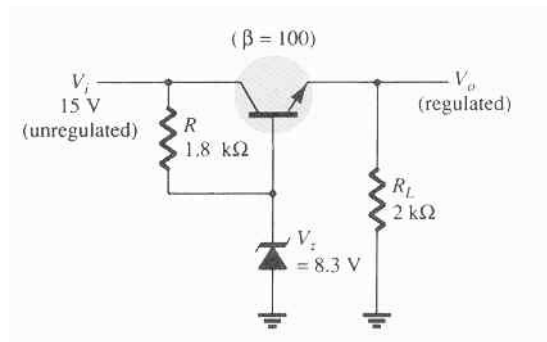
3.

+16 V

100 Ω

V_i
120 mV

Q_1

V_o

$\beta_1 = 160$
$\beta_2 = 200$

Q_2

1.5 MΩ

a) Calculate the dc bias values of V_{B1}, V_{C2} and I_C.
b) Calculate the output ac voltage.

4.

+V_{CC} (+30 V)

C_1

R_1

Q_1

V_i

V_L

R_3

C_2

R_L
8 Ω

Q_2

R_2

−V_{EE} (−30 V)

a) $P_i(dc)$.

b) $P_o(ac)$

c) %η

d) Power dissipated by both power output transistors.

5.

($\beta = 100$)

V_i
15 V
(unregulated)

V_o
(regulated)

R
1.8 kΩ

R_L
2 kΩ

V_z
= 8.3 V

Calculate the output voltage and Zener diode current in the regulator circuit.