Assignment-1

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ECE A

Analog and linear equation

1) input independence $= \frac{5-0.7}{10K\Omega} = 0.0238\ \Omega$

$V_{CE} = V_{CC} - I_C R_L$

$= 9 - 0.02 \cdot 3.2 = 01$

2)

a) Transistor parameter

$100 \cdot V_A = 100$

to calculate small signal parameters for each transistor we need 1 PNP

$V_O = g_m V_A (V_o \| r_o \| R_L)$

$V_\pi = \frac{-V_c r_\pi}{R_S + r_\pi}$. $A_V = \frac{V_O}{V_S} \frac{(g_m v_\pi)(r_o \| R_C)}{\beta_B + r_\pi}$

$= \frac{-\beta}{12\beta + V_\pi}$

b) g_m, r_π, r_o

$g_m = I_C / V_T$ for each transistor

$r_\pi = \frac{\beta}{g_m}$ do is output resistance

$g_m = V_O / V_\pi \quad \| R_o \| R_C$

c) Small signal voltage gain A_{V1}

$A_{V1} = -g_m$ for their transistor current to Vo1

d) Small signed voltage gain A_{V2}

$A_{V2} = -g_m / K_T$ II for trasistor between

c) OVGrall Small Signal Voltage gain A_V

$A_V = A_{V1} \times A_{V2}$

3)

a) To calculate voltage across Speakes using Power and resistance relation S_P

$$P = \frac{U^2}{R} = \frac{2y^2}{10.8} = \frac{576}{2} = 288 \text{ watt}$$

b) To flect transistor type and biasing

* close and appropriate transistor based on application
* Determin the biasing condition for the transistor

c) Calculate the Volleter current (I_C)

$I_C B = I_S / B$ where I_S Real current through Speaker $I_C = \frac{I_S}{P} = \frac{100}{20} = 5$

d). $RC = \frac{V_C}{I_C} = \frac{2y}{10 \times 3} = 3/10 = 0.3\Omega$

e) Power reating

$P_C = I_C^2 \times RC$ where transistor can be handle the Colleter current and Power

$P_C = I_C^2 \times RC = 0.3 \times 10^2 = 30$ watt

$$AV = \left(\frac{RCRC}{RE}\right)$$

linear that $B = 125$, $RC = 4K\Omega$, $Rt = 3K\Omega$

$$AV = 125 \times 4/3 = 41.6 \times 4$$

$$= -166 - 4$$

~~Reverse $125 \times 4/3 = -41$~~

$$AV = \frac{VCC - IcRC}{RC}$$

$$= \frac{B4 - 3}{10} = 0.96 \text{ Voltage gain}$$