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DEPARTMENT OF ELECTRONICS ENGINEERING
ELECTRONIC CIRCUITS
Power Amplifier Circuits

- Q1. In a class AB push pull power amplifier, load is 16Ω , supply voltage $V_{CC} = 16V$, $V_{EE} = -16V$. AC input is $14V$ peak, frequency is $1000Hz$. Calculate the efficiency of the circuit. Select suitable power transistor having rating: $I_C = 5A$ and $V_{CEO} = 30V$

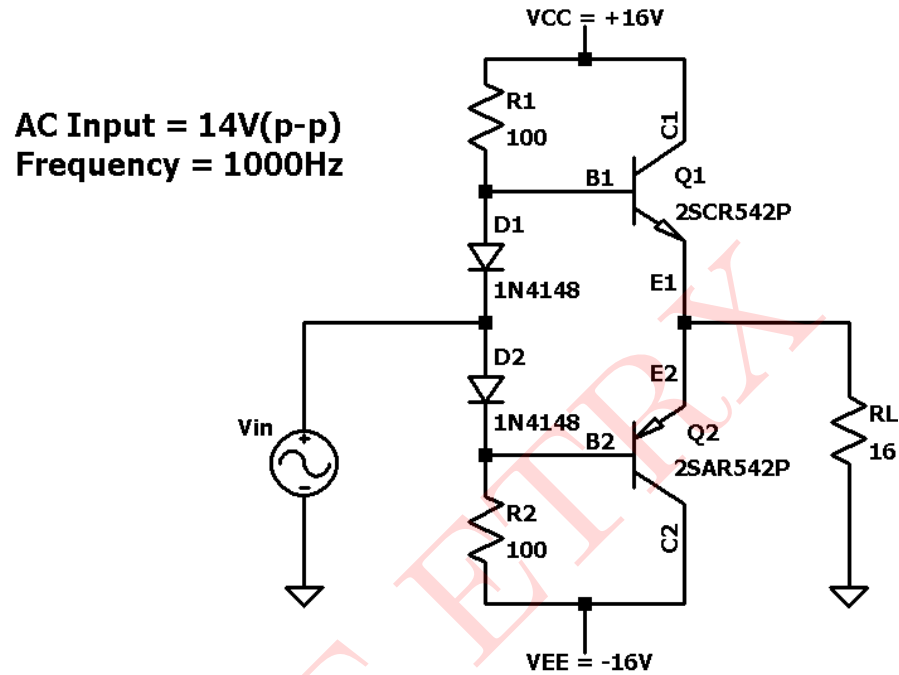


Figure 1: Circuit 1

Solution:

R_1 and R_2 are used to improve efficiency of the power amplifier $V_m = 14V$

$$P_{out(AC)} = \frac{V_m^2}{2R_L} = \frac{14^2}{32} = \mathbf{6.125W}$$

$$\text{Also, } I_m = \frac{V_m}{R_L} = 14/16 = \mathbf{0.875A}$$

Now, DC input power is given as

$$P_{in(DC)} = \frac{2V_{CC} \times I_m}{\pi} = \frac{32 \times 0.875}{\pi} = \mathbf{8.9126W}$$

$$\text{Efficiency(\%)} = \frac{P_{out(AC)}}{P_{in(DC)}} \times 100 = \frac{6.125}{8.9125} \times 100 = \mathbf{68.7229\%}$$

SIMULATED RESULTS:

Above circuit is simulated in LTspice and results are as follows

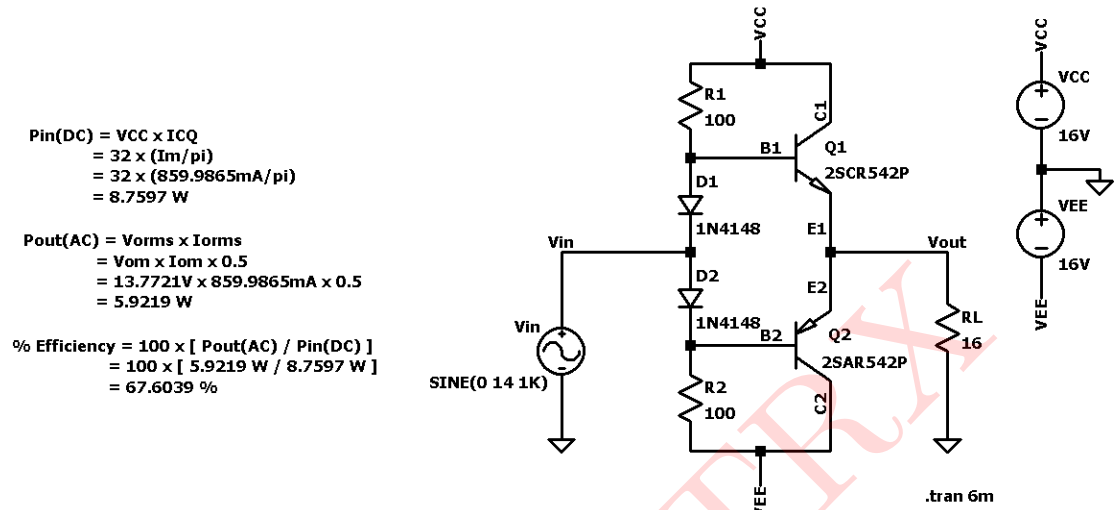


Figure 2: Circuit schematic 1

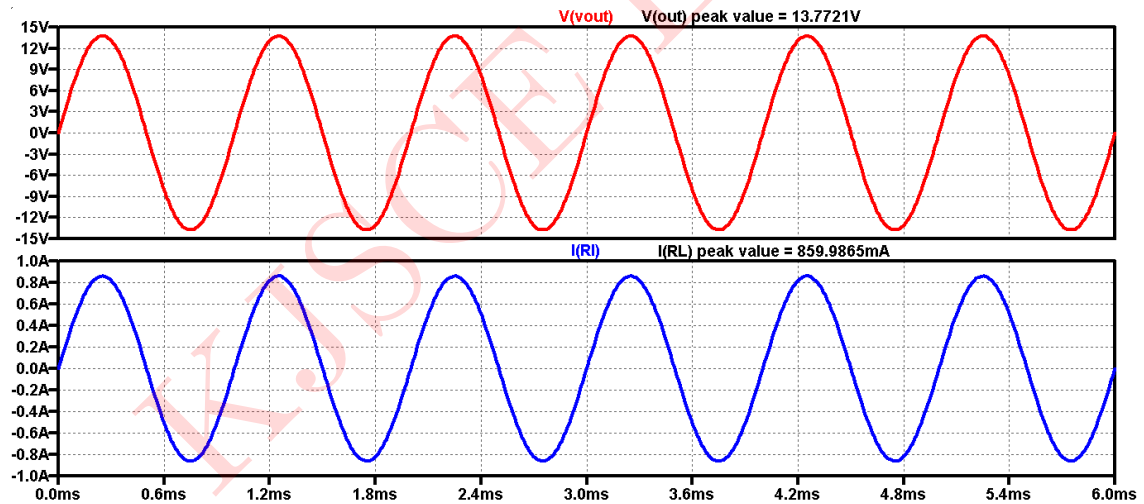


Figure 3: Output load voltage and load current Waveform

Comparsion between Simulated and theoretical values :

Parameters	Simulated	Theoretical
Input DC power	8.7797W	8.9126W
Output AC power	5.9219W	6.125W
Efficiency	67.6039%	68.7229%

Table 1: Numerical 1

KJSCE ETRX