K. J. SOMAIYA COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS ENGINEERING
ELECTRONIC CIRCUITS
Power Amplifier Circuits

Numerical 1

In a class AB push-pull amplifier load $R_L = 12\Omega$. Supply voltage $V_{CC} = 18V$ and $V_{EE} = -18V$, AC input voltage is 16V peak, frequency is $1000Hz$. Calculate efficiency of circuit.

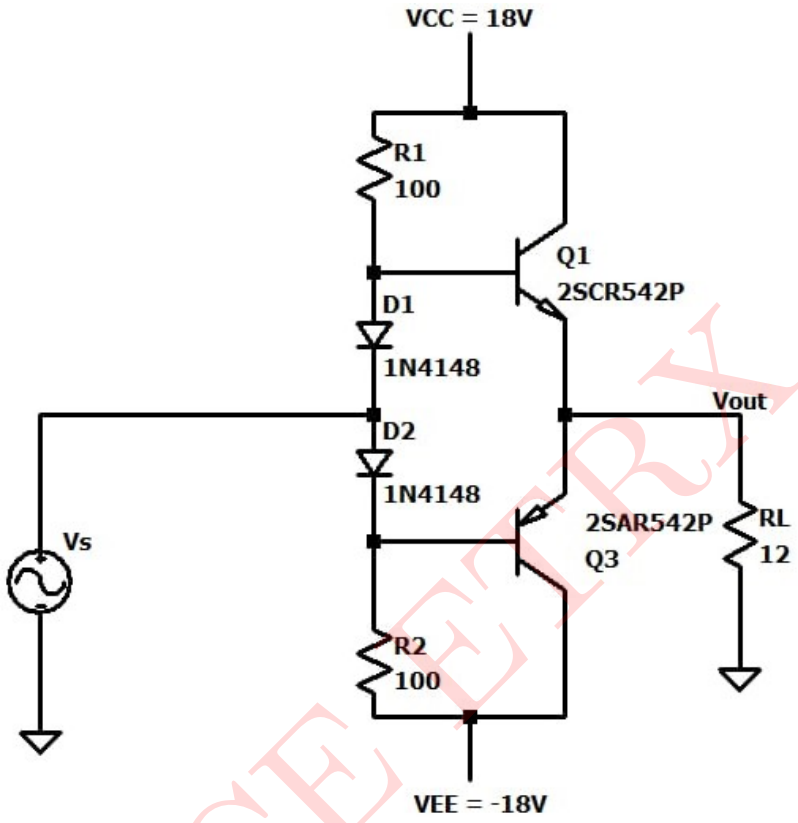

Figure 1: Circuit for Numerical 1

Solution:

$V_s = V_m sin(\omega t)$

$V_s = V_m sin(2\pi f t)$

$V_s = 16sin(2\pi \times 1000t)$

$V_m = 16V$

$$P_{ac} = \frac{V_m^2}{2R_L} = \frac{16^2}{2 \times 12}$$

$\mathbf{P_{ac} = 10.66W}$

$$I_m = \frac{V_m}{R_L} = \frac{16V}{12\Omega}$$

$I_m = 1.33A$

$$P_{dc} = \frac{2V_{CC}I_m}{\pi} = \frac{2 \times 18V \times 1.33A}{\pi}$$

$\mathbf{P_{dc} = 15.24W}$

Efficiency:

$$\eta = \frac{P_{ac}}{P_{dc}} = \frac{10.66W}{15.24W} \times 100$$

$\eta = 69.9\%$

SIMULATED RESULTS:

Above circuit is simulated in LTspice and results are as follows:

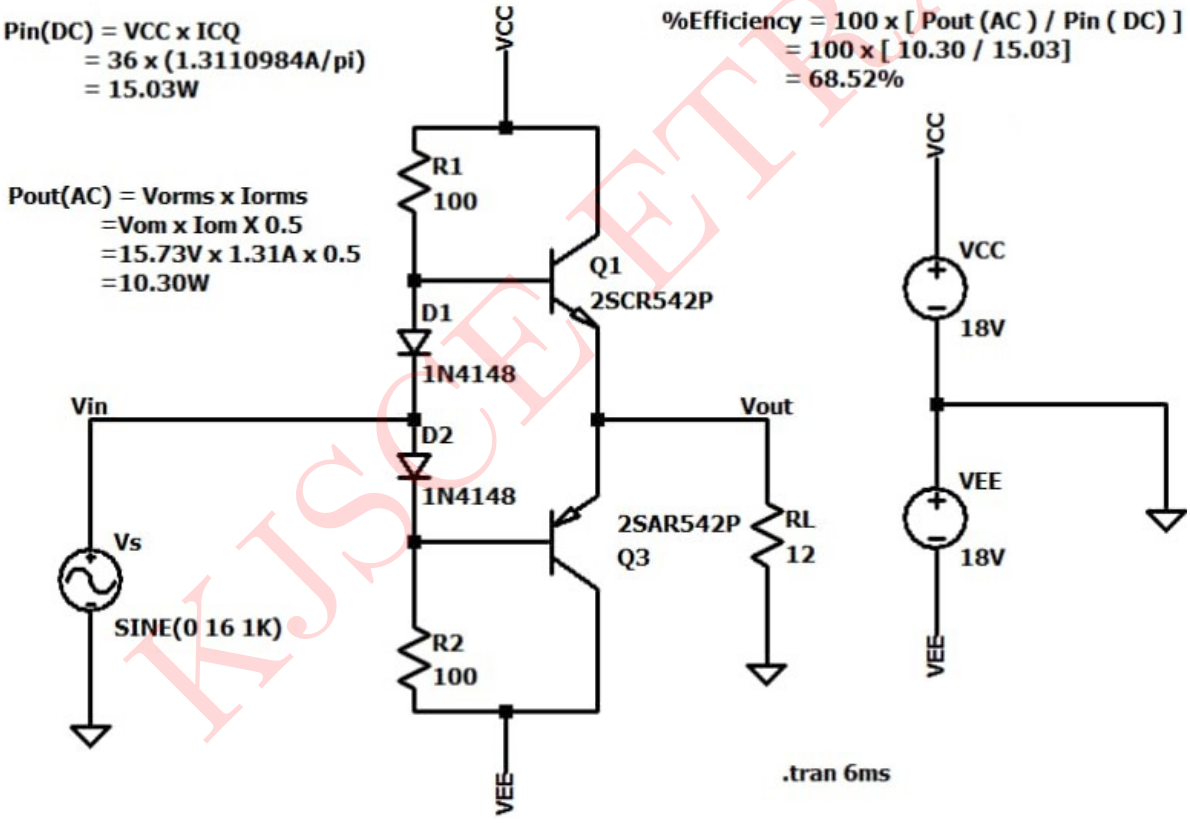

Figure 2: Circuit Schematic: Results

Output Waveforms:

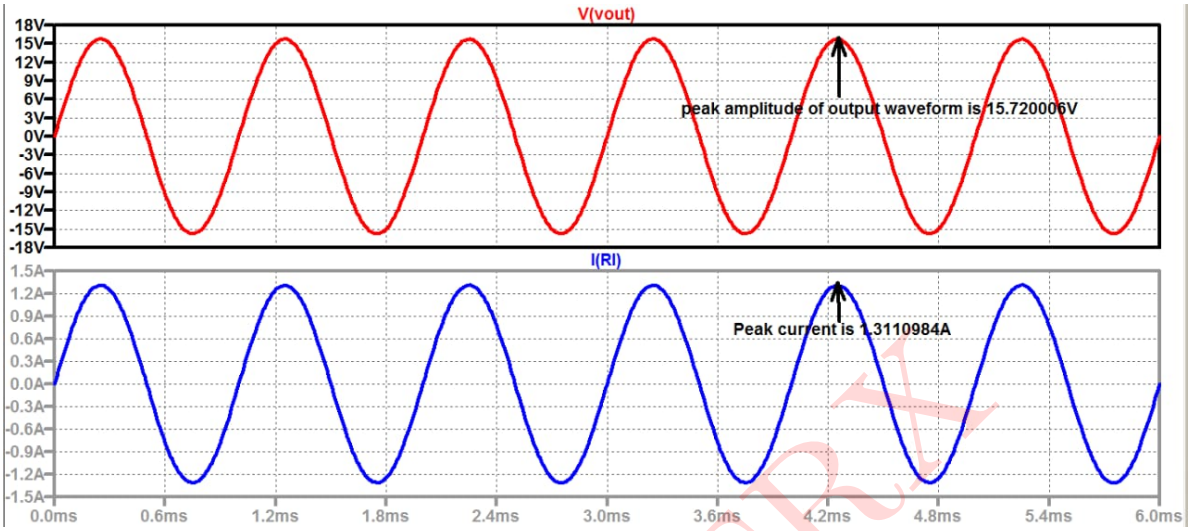

Figure 3: Output load voltage and load current waveforms

Comparison between theoretical and simulated values is given below:

Parameters	**Simulated Values**	**Theoretical Values**
Input DC Power	$15.03W$	$15.24W$
Output DC Power	$10.30W$	$10.66W$
Efficiency	68.52%	69.9%

Table 1: Numerical 1

****