

## Well Structured Problem Solving Instructional Strategy

The well-structured application problems require the application of a finite number of concepts, rules, and principles being studied to a constrained problem situation. The laboratory experiment can be designed as a well-structured problem solving activity. In order to design your own experiment with the Well Structured Problem Solving Instructional Strategy please use the template available in the online SDVice tool at the link - [http://vlabs.iitb.ac.in/vlab\\_tool\\_beta/](http://vlabs.iitb.ac.in/vlab_tool_beta/)  
Example from Basic Electronics of Structured Problem Solving Instructional Strategy

### Learning objectives

1. Student should be able to analyse the high gain amplifier circuits with and without a resistive load
2. Student should be able to describe the effect of the resistive load on the various parameters of amplifier.

### Problem

For this problem, you should use the following parameters:  $R_1 = 250\text{k}\Omega$ ,  $\beta = 100$ ,  $I_{co} = 10\text{fA}$ ,  $V_A = 100\text{V}$ ,  $V_{dd} = 5\text{V}$ .

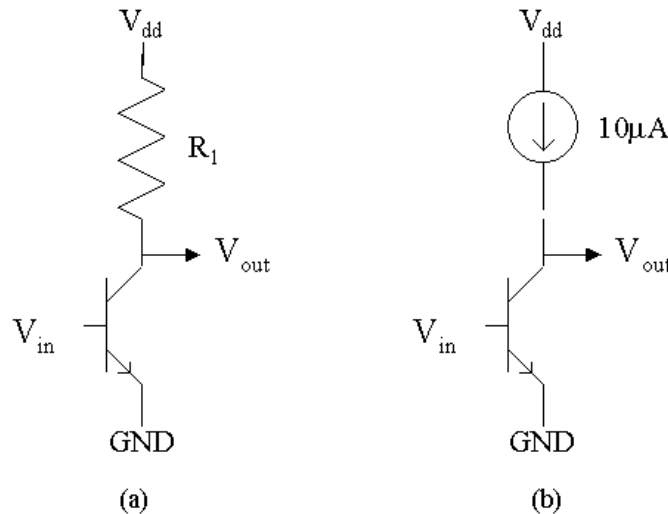


Figure 1: Two high-gain amplifiers. (a) Amplifier with a resistive load. (b) Amplifier with a current-source load.

- (a) Considering the amplifier with a resistive load in Fig. 1a, with the help of a suitable experiment find out what value of  $V_{in}$  results in an output voltage of  $2.5\text{V}$ ?
- (b) Considering the small-signal model corresponding in Fig. 1a below, experimentally find out the resulting DC small signal parameters.
- (c) Find out the gain from  $V_{in}$  to  $V_{out}$ ?
- (d) If we modify the amplifier in Fig. 1a with the amplifier in Fig. 1b, how will the DC small-signal BJT parameters change? How does the bias point change?
- (e) With the help of a suitable experiment find out the gain from  $V_{in}$  to  $V_{out}$  for the amplifier in Fig. 1b.
- (f) Calculate the gains of amplifier in Fig1(a) and Fig1(b) using suitable formulae.
- (g) Compare the values obtained from the experiment and theoretically calculated.

(h) Are the values exactly same? Why?