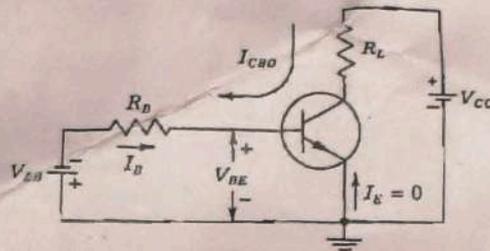


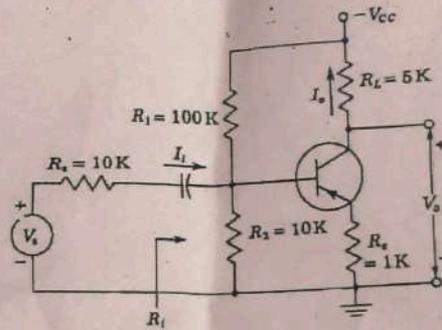
1. Explain why the energy levels of an atom become energy bands in a solid. Illustrate with the help of neat schematic this process and its implications.
2. The reverse saturation current of the germanium transistor shown in the Fig below is $2\mu\text{A}$ at room temperature (25°C) and increases by a factor of 2 for each temperature increase of 10°C . The bias $V_{BB} = 5\text{V}$. Find the maximum allowable value for R_B if the transistor is to remain cut off at a temperature of 75°C . Further, if $V_{BB} = 1\text{V}$ and $R_B = 50\text{K}$, how high may the temperature increase before the transistor comes out of cutoff?



3. For the amplifier shown in the Fig below, compute $A_i = \frac{I_o}{I_i}$, A_v , A_{v_s} and R_i for the parameters of the used transistor as mentioned in the Table 8.2

TABLE 8-2 Typical h -parameter values for a transistor (at $I_B = 1.3\text{ mA}$)

Parameter	CE	CC	CB
$h_{11} = h_i$	$1,100\ \Omega$	$1,100\ \Omega$	$21.8\ \Omega$
$h_{12} = h_r$	2.5×10^{-4}	~ 1	2.9×10^{-4}
$h_{21} = h_f$	50	-51	-0.98
$h_{22} = h_o$	$24\ \mu\text{A/V}$	$25\ \mu\text{A/V}$	$0.49\ \mu\text{A/V}$
$1/h_o$	40 K	40 K	2.04 M



4. Show that the overall h parameters of the accompanying two-stage cascaded amplifier are i) $h_{11} = h'_{11} - \frac{h'_{12}h'_{21}}{1 + h'_{22}h''_{11}} h''_{11}$ ii) $h_{12} = \frac{h'_{12}h''_{12}}{1 + h'_{22}h''_{11}}$ iii) $h_{21} = -\frac{h'_{21}h''_{21}}{1 + h'_{22}h''_{11}}$

iv) $h_{22} = h''_{22} - \frac{h'_{12}h''_{21}}{1 + h'_{22}h''_{11}} h'_{22}$

