Basics Electronics (22EC13)

Tutorial-1

<table>
<tr><td>1</td><td>a.A silicon transistor has its I_{co}=6nA and α=0.98. If I_B=0 and V_{CE}=4V then I_C = _____.
b.An NPN transistor has I_{co}=30nA, I_B=0, V_{CE}=4V and I_C=30uA. The value of β = ___.</td></tr>
<tr><td>2</td><td>The measured terminal voltages (in Volts) of different NPN transistors are given in Table-1. For each of the transistors, find V_{BE}, V_{CB} and identify the region of operation.

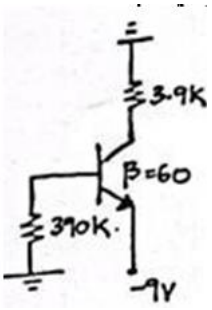
<table>
<tr><td></td><td>V_E</td><td>V_B</td><td>V_C</td></tr>
<tr><td>Q1</td><td>0</td><td>0.7</td><td>0.7</td></tr>
<tr><td>Q2</td><td>0</td><td>0.8</td><td>0.1</td></tr>
<tr><td>Q3</td><td>-2.7</td><td>-2.0</td><td>0</td></tr>
<tr><td>Q4</td><td>0</td><td>0</td><td>0.3</td></tr>
<tr><td>Q5</td><td>0.7</td><td>0.7</td><td>0</td></tr>
</table>
Table-1</td></tr>
<tr><td>3</td><td>a. Find the values of β that correspond to α value of 0.5, 0.8, 0.96, 0.98 and 0.996.
b. Find the values of α that correspond to β value of 40, 60, 80, 99, 149 and 249.</td></tr>
<tr><td>4</td><td> 

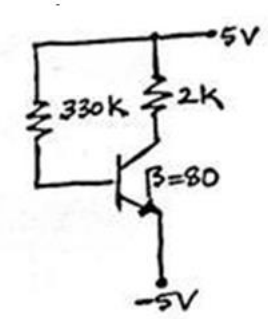
Fig 1
 

Fig 2

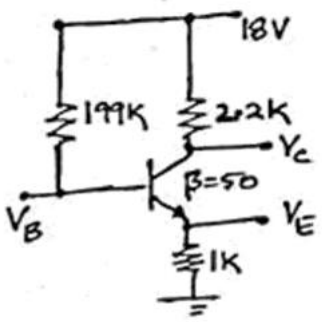
In the fixed base current biasing circuits of fig 1 and 2.Determine the operating point of the silicon transistor.</td></tr>
<tr><td>5</td><td>In the circuit of fig 3, determine V_C, V_E, V_B and I_C.
 

Fig 3</td></tr>
<tr><td>6</td><td>In the circuit of fig 4, find V_E, I_E, I_B, I_C and V_C.</td></tr>
</table>

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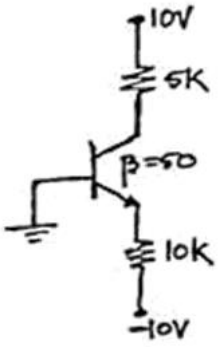
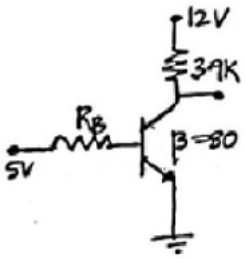
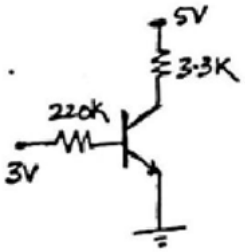
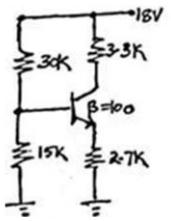
	 Fig 4
7	In the inverter circuit of fig 5, determine the maximum value of R_B, so that the circuit could be used an inverter.  Fig 5
8	In the inverter circuit of fig 6, determine the minimum value of β, so that the circuit could be used an inverter.  Fig 6
9	Determine the operating point of silicon transistor in the voltage divider biasing circuit fig 7. Also determine $S_{(ICO)}$.  Fig 7
10	In an RC coupled CE amplifier, R_1 =50KΩ, R_2 =25KΩ, R_C = R_L =2KΩ, β=99 and I_E =2mA. Determine the voltage gain, input impedance and output impedance of the amplifier.

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11	a)Three amplifiers of voltage gains 20dB, 26dB and 32dB are cascaded to obtain an outputvoltage of 2V. Calculate the input voltage needed. b) An amplifier having a power gain of 17dB delivers a power output of 40W to a load of 1KΩ. Calculate i) the input power needed and (ii) the input voltage needed, if the voltage gain of the amplifier is 38dB.
12	Calculate the voltage gain vo/vi , input impedance Zi and output impedance Zo for the circuits of fig 8 and 9

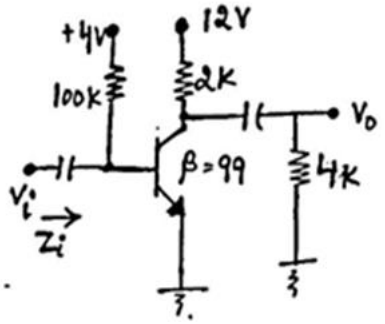

Fig 8

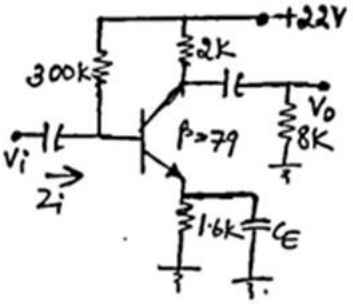

Fig 9