A grounded emitter circuit using the 2N222A BJT is shown (where $V_{BB} = V_{CC} = 10$ V and $R_C = 1.0$ kΩ). Perform a graphical analysis to determine the operating point of the transistor, related DC and hybrid $\pi$ parameters, small signal equivalent circuit, and small signal voltage gain. Follow the steps given below.

1. Draw the load line on the 2N222A transistor characteristics shown on the reverse side and select a midrange operating point voltage ($V_{CEQ} = V_{CC}/2$) that will allow essentially equal positive and negative voltage swings. Identify the corresponding operating point (Q point) currents.

   $V_{CEQ} = \underline{\underline{}}$
   $I_{CQ} = \underline{\underline{}}$
   $I_{BQ} = \underline{\underline{}}$

2. Calculate the base resistance $R_B$ required to obtain the operating base current $I_B$.

   $R_B = \underline{\underline{}}$

3. Find the grounded emitter DC current gain ($\beta_{DC} = I_C/I_B$) at the Q point.

   $\beta_{DC} = \underline{\underline{}}$

4. Find the small signal hybrid $\pi$ parameters assuming the operating temperature is 27°C.

   $\beta_{AC} = \underline{\underline{}}$
   $r_{oc} = \underline{\underline{}}$
   $r_\pi = \underline{\underline{}}$

5. Draw the small signal equivalent circuit for the amplifier in the space below.

6. Find the associated small signal voltage gain ($A_V = v_o/v_{in}$) for the circuit.

   $A_V = \underline{\underline{}}$
TEKTRONIX 571 Curve Tracer

ACQUISITION

Pmax = .1 Watt  Ix/step = 5 uA  Nr of steps = 10
Rload = .25 Ohm

1 mA/div

Screen copy (since power up) 92