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Question: 4-5 The FET input voltmeter circuit in Figure 4-4 has the followi...

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4-5 The FET input voltmeter circuit in Figure 4-4 has the following components:  $R_1 = 6.8\text{ k}\Omega$ ,  $R_2 = R_3 = 4.7\text{ k}\Omega$ ,  $R_4 = 1.5\text{ k}\Omega$ ,  $R_5 = 500\text{ }\Omega$ ,  $R_6 = 3.3\text{ k}\Omega$ ,  $R_f + R_m = 20\text{ k}\Omega$ . The meter full-scale current is  $50\text{ }\mu\text{A}$ , the supply voltage is  $\pm 10\text{ V}$ , the transistors

have  $h_{FE} = 80$ , and the FET gate-source voltage is  $V_{GS} = -3\text{ V}$ . Determine  $V_p$ ,  $I_1$ ,  $I_2$ ,  $I_3$ , and  $I_4$  when  $E = 0$ . Also, calculate the range of adjustment for  $V_p$ .

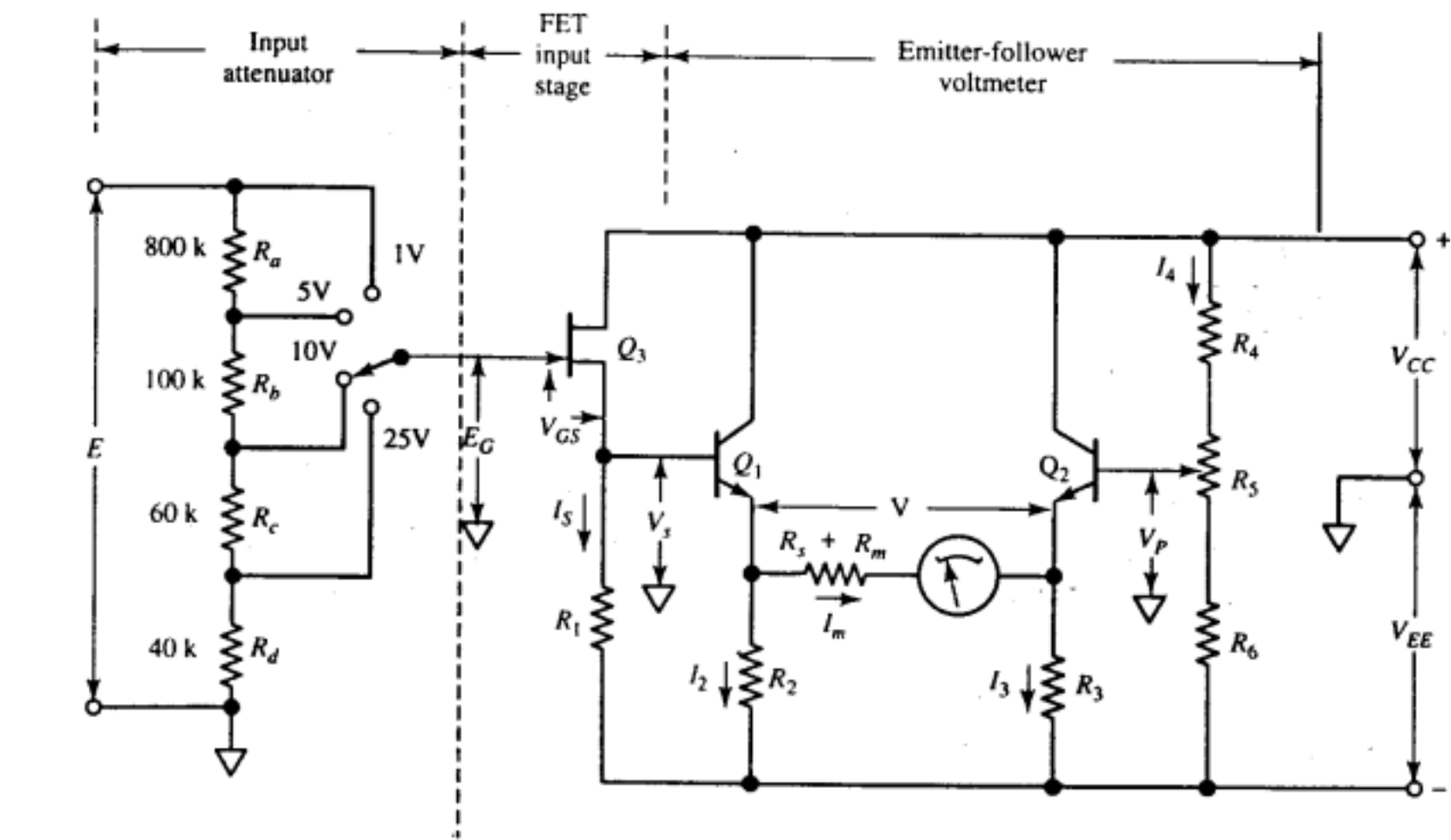


Figure 4-4 A voltmeter input attenuator is simply a potential divider that accurately divides the voltage to be measured. The FET input stage ( $Q_1$ ) gives the emitter follower a very high input resistance.

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Expert Answer



Anonymous answered this  
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When  $E = 0$

$R_1 = 6.8\text{ k}\Omega$   
 $R_2 = R_3 = 4.7\text{ k}\Omega$   
 $R_4 = 1.5\text{ k}\Omega$ ,  $R_5 = 500\text{ }\Omega$ ,  $R_6 = 3.3\text{ k}\Omega$   
 $R_f + R_m = 20\text{ k}\Omega$ ,  $50\text{ }\mu\text{A}$ ,  $\pm 10\text{ V}$

$V_{GS} = -3\text{ V}$   
 $V_{GS} = -2\text{ V}$

$V_{GS} + I_3 R_1 = 0$   
 $I_3 = \frac{-V_{GS}}{R_1} = \frac{-3}{6.8} \times 10^{-3}\text{ A} = -0.441 \times 10^{-3}\text{ A}$

$V_{GS} = -2\text{ V}$   
 $I_2 = \frac{2.3}{4.7} \times 10^{-3}\text{ A} = 0.49 \times 10^{-3}\text{ A}$

$I_4 = 0$   
 $I_4 = \frac{20}{1.5 + 5 + 3.3} = \frac{20}{9.8} \times 10^{-3}\text{ A}$   
 $I_4 = 3.77\text{ mA}$

$V_p$  when potentiometer  
 $V_p = I_4 R_4 = 3.77 \times 10^{-3} \times 1.5 \times 10^3 = 5.655$   
 $V_p = I_4 (R_4 + R_5) = 3.77 \times 2 \times 10^3 = 7.54$

$V_p - V_{GS} = I_3 R_3$   
 $I_3 = \frac{V_p - V_{GS}}{R_3}$   
 $I_3 = \frac{6.59 - 0.7}{4.7} \times 10^{-3} = 1.25\text{ mA}$

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Q: The FET input voltmeter circuit has the following components.  $R = 6.8\text{ K}$ ,  $R_2 = R_3 = 4.7\text{ K}$ ,  $R_4 = 1.5\text{ K}$ ,  $R_5 = 500\text{ }\Omega$ ,  $R_6 = 3.3\text{ K}$ . The meter's full-scale current is  $40\text{ }\mu\text{A}$ , the supply voltage ( $V_{CC}$ ) is  $15\text{ V}$ , and the FET gate-source voltage is  $V_{GS} = -2\text{ V}$ . A  $3.5\text{ V}$  input ( $E$ ) is applied to the input attenuator shown. Calculate the voltage  $E_G$  on each range selection (2 marks) Determine the value of  $R_s$ .  $R_m$ ...

A: See answer

Q: EE 303 solve all this problem please

A: See answer 

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