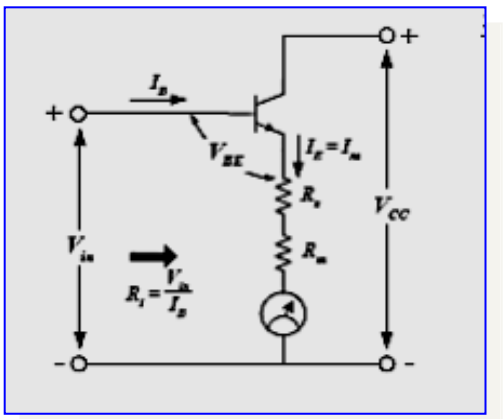
Faculty of Engineering–Shoubra
Electrical Engineering Department
2nd year communication
Sheet (4)

Review Questions

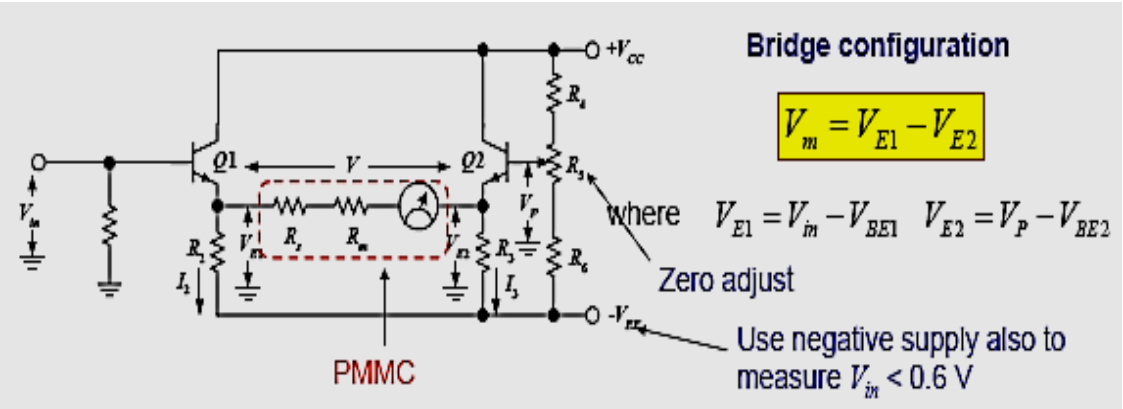
1 Sketch the circuit of a simple BJT emitter-follower voltmeter circuit and compare it to a non-electronic voltmeter.
2 Sketch the circuit of an emitter-follower voltmeter using two transistors. Carefully explain the circuit operation.
3 Draw a circuit diagram for an FET-input voltmeter with an input attenuator. Explain the circuit operation.

Problems

1 A simple emitter-follower voltmeter circuit as shown in Fig1. has V_{cc} = 12 V, R_m = 1 kΩ, a 2 mA meter, and a transistor with h_{FE} = 80. Calculate a suitable resistance for Rs to give FSD when Vin = 5 V. Also, determine the voltmeter input resistance.



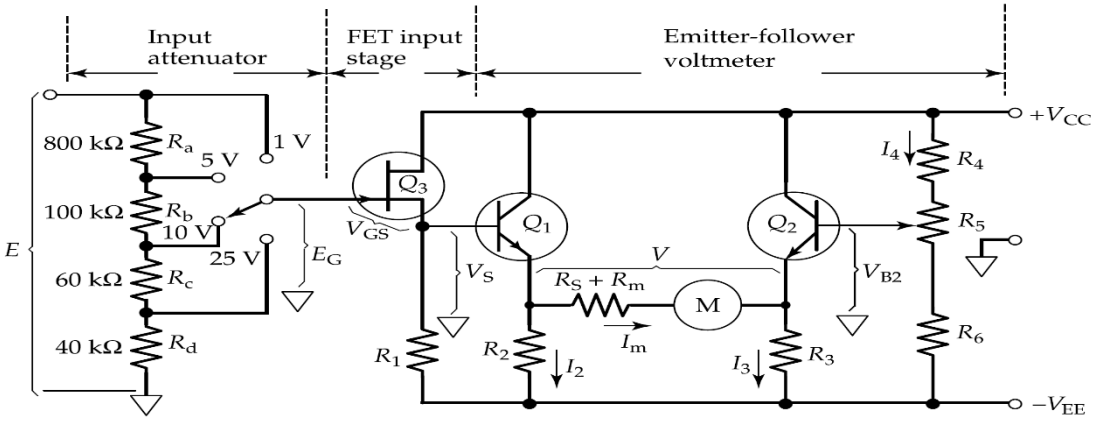
2 A Practical emitter-follower voltmeter circuit, as in Fig. 2, has the following components: R_1=12 kΩ, R_2=R_3=2.7 kΩ, R_4=R_6=3.3 kΩ, R_5 = 500 Ω, and Rs+ Rm = 10 kΩ. A 100 μA meter is used, the supply voltage is ± 9 V, and the transistors have h_{FE} =75. Determine V_p, I_2, I_3, I_{B1}, I_{B2}, and I_4 when V_{in} = 0.



3 Calculate the meter deflections (Im) for the circuit in Problem 5-2 when the input voltage levels are 0.6 V, 0.75 V, and 1 V.

4 The FET-input voltmeter circuit fig. 3 with an input attenuator has V_{GS}= -3 V, V_{B2} = +3 V, (R_s +R_m)= 10kΩ, and I_m = 100 μA at full scale. Determine the meter current when E = 3.5 V and the input attenuator is set to 5 V range?

Fig.3



5 The FET input voltmeter circuit in Fig. 3 has the following components:

R_1 =6.8 kΩ, R_2= R_3 = 4.7 kΩ, R_4= 1.5 kΩ, R_5= 500 Ω, R_6= 3.3 kΩ, R_s+ R_m= 20 kΩ. The meter full-scale current is 50 μA, the supply voltage is ± 10 V, the BJTs have h_{FE} = 80, and the FET gate-source voltage is V_{GS} = -3 V. Determine V_{B2}, I_s, I_2, I_3, and I_4 when E = 0. Also, calculate the range of adjustment for V_{B2}