

FET problems

- For the fixed-bias configuration of Fig. 1, determine:
 - IDQ and V_{GSQ} using a mathematical approach.
 - Repeat part (a) using a graphical approach and compare results.
 - Find V_{DS} , V_D , V_G , and V_S using the results of part (a).

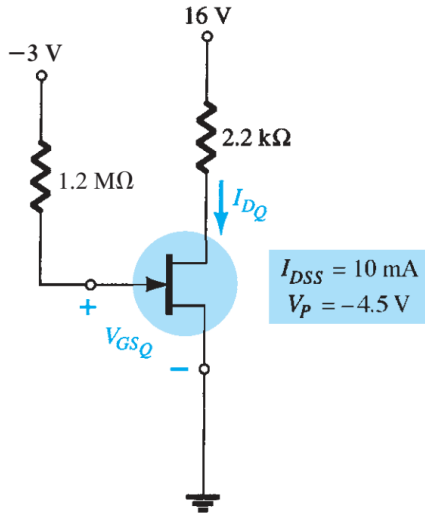


Fig.1

- For the network of Fig. 2, determine:
 - V_{GSQ} and IDQ .
 - V_{DS} , V_D , V_G , and V_S .

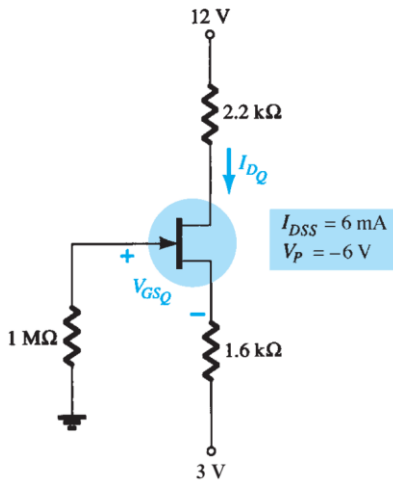


Fig.2

- For the network of Fig. 3, determine:
 - V_G .
 - IDQ and V_{GSQ} .
 - V_D and V_S .
 - V_{DSQ} .

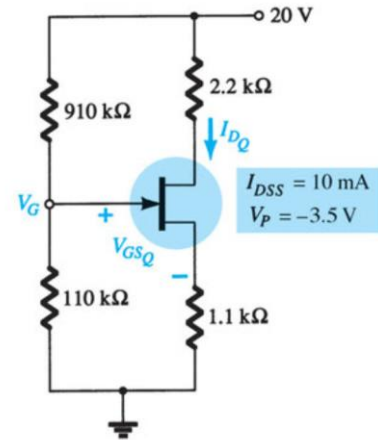


Fig. 3

- Calculate gm_0 for a JFET having device parameters $IDSS = 12$ mA and $VP = -4$ V.
- Determine the pinch-off voltage of a JFET with $gm_0 = 10$ mS and $IDSS = 12$ mA.
- For a JFET having device parameters $gm_0 = 5$ mS and $VP = -4$ V, what is the device current at $V_{GS} = 0$ V?
- Calculate the value of gm for a JFET ($IDSS = 12$ mA, $VP = -3$ V) at a bias point of $V_{GS} = -0.5$ V.
- Determine Z_i , Z_o , and A_v for the network of Fig. 4 if $IDSS = 10$ mA, $VP = -6$ V, and $rd = 40$ kΩ

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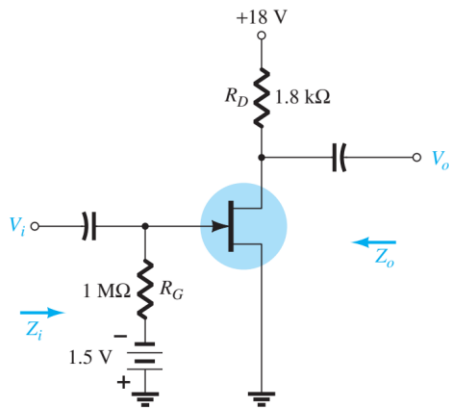


Fig. 4

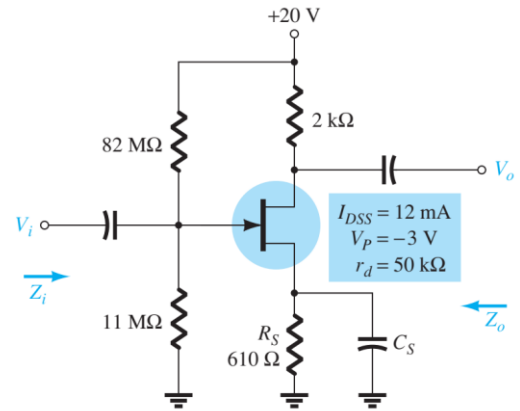


Fig.6

9. a. Find the value of R_S to obtain a voltage gain of 2 for the network of Fig. 5 using $r_d = \infty \Omega$.

b. Repeat part (a) with $r_d = 30 \text{ k}\Omega$. What was the impact of the change in r_d on the gain and the analysis?

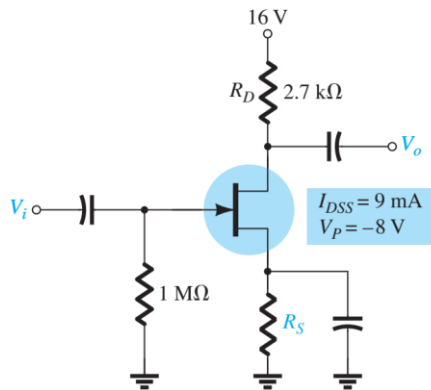


Fig.5

10. Determine Z_i , Z_o , and V_o for the network of Fig. 6 if $V_i = 20 \text{ mV}$