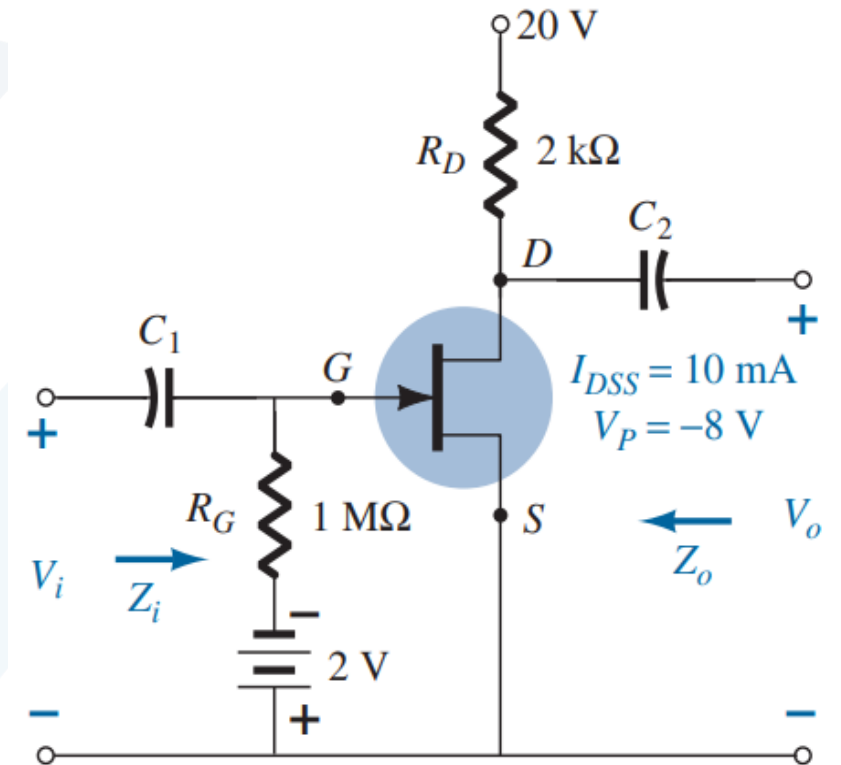# دارات الكترونية
المحاضرة /6/ ـ عملي
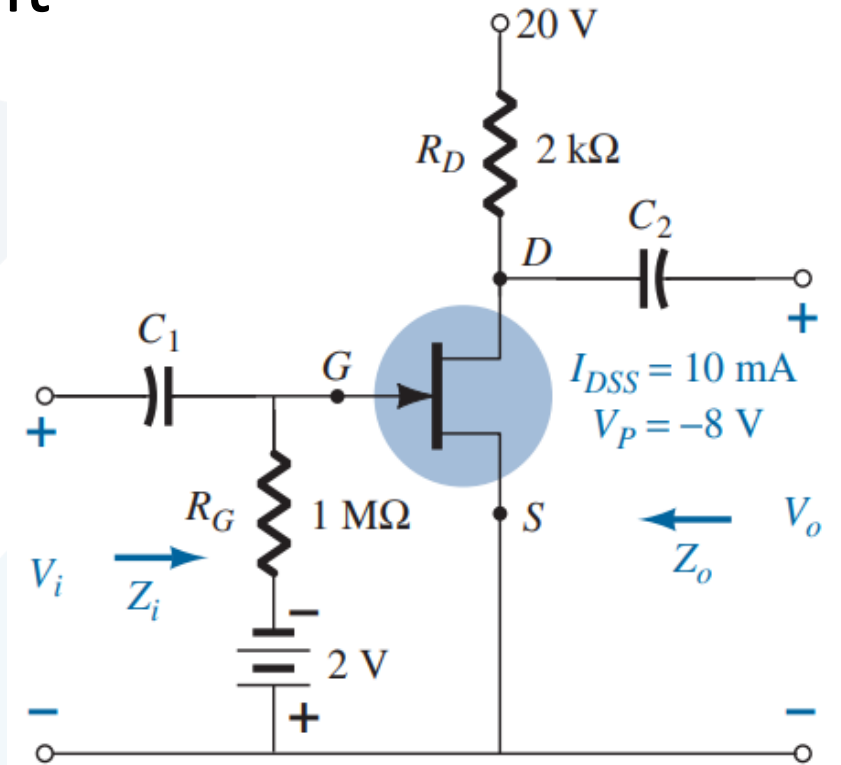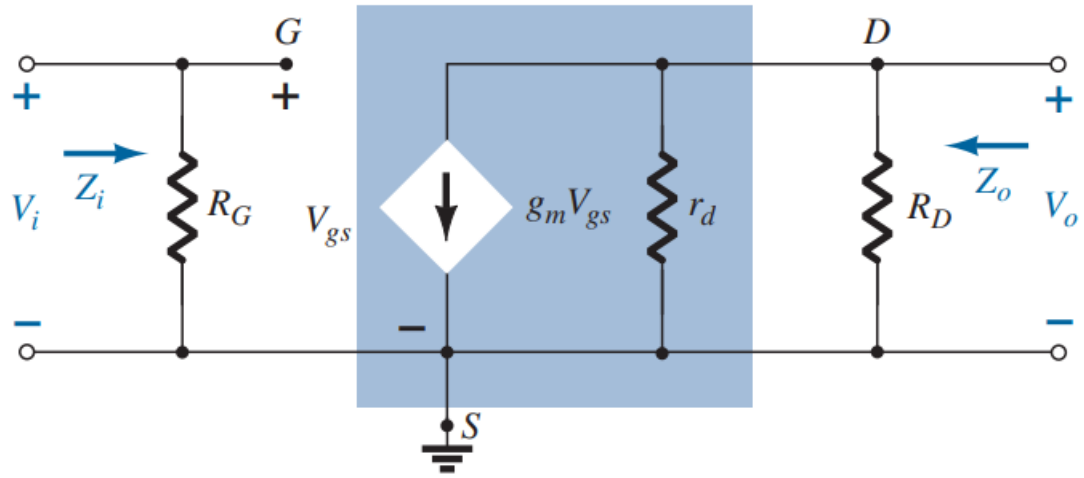
الدكتور السموءل صالح
المهندس جبران خليل
المهندسة ايه خيربك

AC Equivalent circuit

- The fixed-bias configuration of JFET transistor have an

  operating point defined by: V_{GSQ} = -2 V and

  I_{DQ} = 5.625 mA, with I_{DSS} = 10 mA and V_p = -8 V.

  The network is drawn as the following Fig.

  with an applied signal V_I .

- The value of y_{os} is provided as 40 mS

AC Equivalent circuit

AC Equivalent circuit

a. $\qquad g_{m0} = \dfrac{I_{DSS}}{|V_P|} = \dfrac{2(10mA)}{8\ V}$ = 2.5 mS

$g_m = g_{m0}(1\text{-}\dfrac{V_{GSQ}}{V_P}) = 2.5mS(1\text{-}\dfrac{-2v}{-8v}) = 1.88mS$

b. $\quad r_b = \dfrac{1}{y_{os}} = \dfrac{1}{40\mu S} = 25k\Omega$

c. $\quad Z_i = R_G = 1M\Omega$

d. $\quad Z_o = R_D || r_d = 2k\Omega || 25k\Omega$

e. $\quad A_v = -g_m(R_D || r_d) = -(1.88mS)(1.85k\Omega) = -3.48$

f. $\quad A_v = -g_m R_D = -(1.88mS)(2k\Omega) = -3.76$

As demonstrated in part (f), a ratio of 25 kΩ:2 kΩ = 12.5:1 between r_d and R_D results in a difference of 8% in the solution.