دارات الكترونية 1
المحاضرة /3/ - عملي

الدكتور السموءل صالح
المهندس جبران خليل
المهندسة ايه خيربك

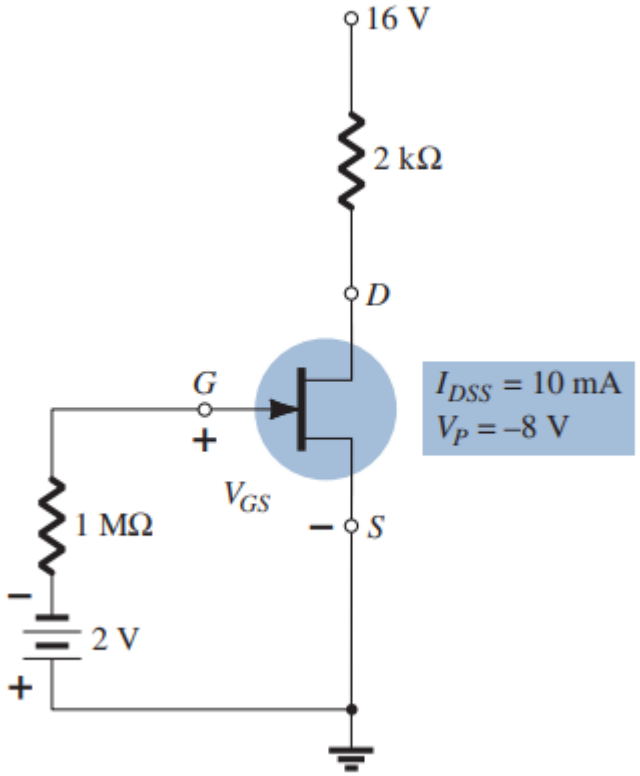
Example

المطلوب :

1. مانوع الترانزستور وما نوع الوصلة
2. احسب

V_S=?
V_G=?
V_D=?
V_{DS}=?
I_{DQ}=?
V_{GSQ}=?

Example



Example

a. $V_G = -2v$

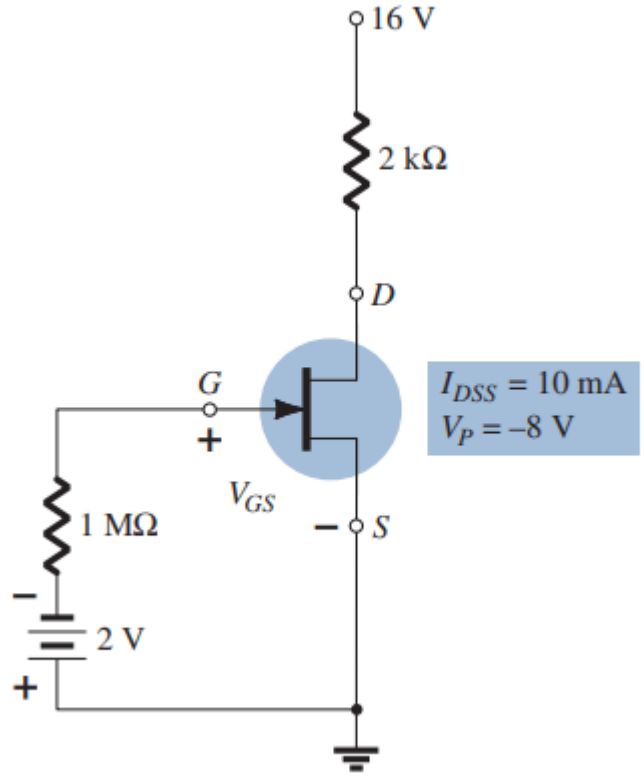
$V_S = 0\ v$

$V_{GS} = V_G - V_S = -2 - 0 = -2\text{v}$

b. $I_{DQ} = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^2 = 10\text{ mA}\left(1 - \frac{-2\ V}{-8\ V}\right)^2 = 5.625\text{ mA}$

c. $V_{DS} = V_{DD} - I_D R_D = 16\text{ V} - (5.625\text{ mA})(2\text{ kV}) = 16\text{ V} - 11.25\text{ V} = 4.75\text{ V}$

d. $V_D = V_{DS} = 4.75\text{ V}$



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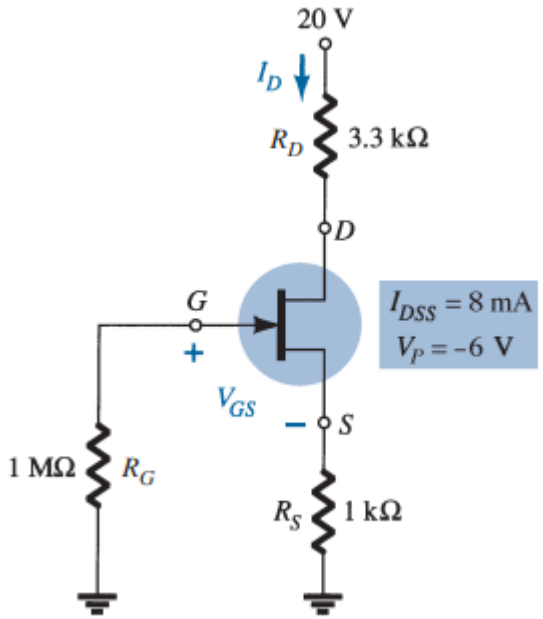

a. The gate-to-source voltage is determined by

$$V_{GS} = -I_D R_S$$

Choosing I_D = 4 mA, we obtain V_{GS} = -(4 mA)(1 kV) = -4 V The result is th plot of Fig.1 as defined by the network If we happen to choose ID = 8 m/ the resulting value of VGS would be -8 V, as shown on the same graph. In either case, the same straight line will result, clearly demonstrating that any appropriate value of ID can be chosen as long as the corresponding value of VGS. In addition, keep in mind that the value of VGS could be chosen and the value of ID determined graphically.

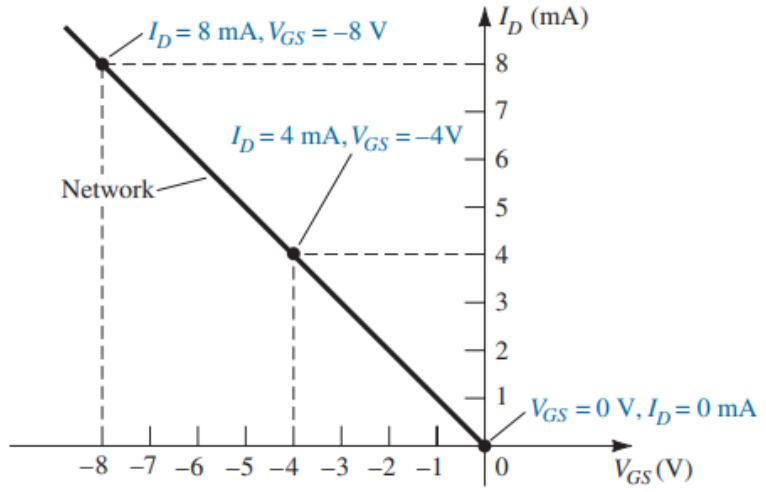

Fig.1

Example

For Shockley's equation, if we choose VGS = VP>2 = -3 V, we find that ID = IDSS>4 = 8 mA>4 = 2 mA, and the plot of Fig. 2 will result, representing the characteristics of the device. The solution is obtained by superimposing the network characteristics defined by Fig. 1 on the device characteristics of Fig. 2 and finding the point of intersection of the two as indicated on Fig. 3. The resulting operating point results in a quiescent value of gate-to-source voltage of

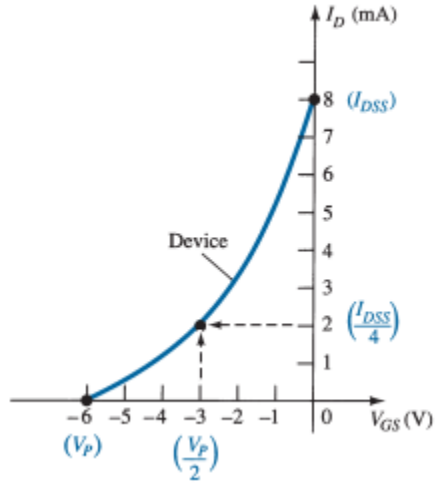

Fig.2

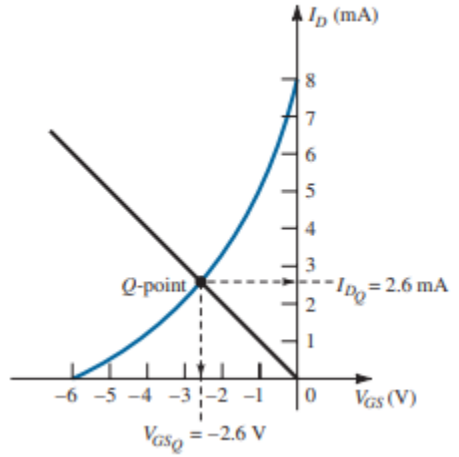

Fig.3

Example

b. At the quiescent point

IDQ = 2.6 mA

c. VDS = VDD - ID(RS + RD) = 20 V - (2.6 mA)(1 kV + 3.3 kV) =

20 V - 11.18 V = 8.82 V

d. VS = IDRS = (2.6 mA)(1 kV) = 2.6 V

e. VG = 0 V

f. VD = VDS + VS = 8.82 V + 2.6 V = 11.42 V

or VD = VDD - IDRD = 20 V - (2.6 mA)(3.3 kV) = 11.42 V