Question (1):
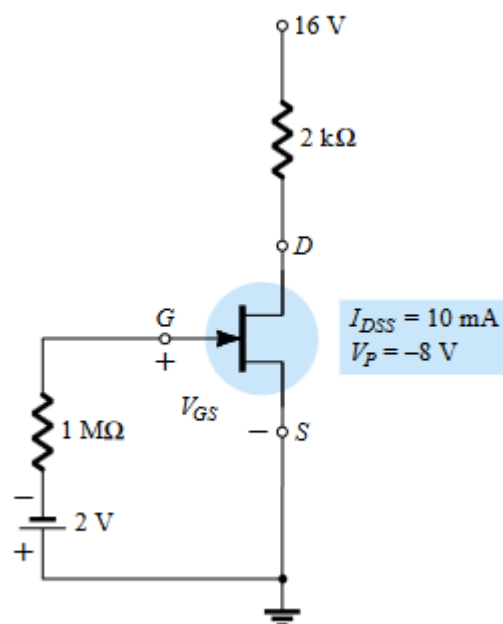
Using the data provided on the specification sheet of Fig. 5.39
and an average thresh-old voltage of VGS(Th) = 3 V, $V_{GS(on)}= 10$, $I_{D(on)=3}$
 determine:

(a) The resulting value of k for the MOSFET.

(b) The transfer characteristics.

Question (2):

Determine the following for the network of figure.

(a) VGS Q. (b) ID Q.(c) VDS. (d) VD. (e) VG.

Question (3):

The fixed-bias configuration of Example 6.1 had an operating point defined by V_{GS_Q} = −2 V and I_{D_Q} = 5.625 mA, with I_{DSS} = 10 mA and V_P = −8 V. The network is redrawn as Fig. 9.14 with an applied signal V_i. The value of y_{os} is provided as 40 μS.

(a) Determine g_m.

(b) Find r_d.

(c) Determine Z_i.

(d) Calculate Z_o.

(e) Determine the voltage gain A_v.

(f) Determine A_v ignoring the effects of r_d.

$20\ V$

$2\ k\Omega$

C_2

D

C_1

G

$I_{DSS} = 10\ mA$

$V_P = -8\ V$

$1\ M\Omega$ S

V_o

Z_o

V_i Z_i

$2\ V$
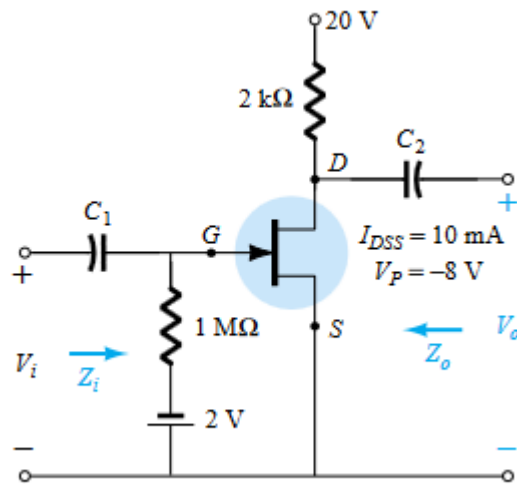
Question (4):

The self-bias configuration of Example 6.2 has an operating point defined by $V_{GS_Q} = -2.6\ V$ and $I_{D_Q} = 2.6\ mA$, with $I_{DSS} = 8\ mA$ and $V_P = -6\ V$. The network is re-drawn as Fig. 9.20 with an applied signal V_i. The value of y_{os} is given as $20\ \mu S$.
(a) Determine g_m.
(b) Find r_d.
(c) Find Z_i.
(d) Calculate Z_o with and without the effects of r_d. Compare the results.
(e) Calculate A_v with and without the effects of r_d. Compare the results.

$20\ V$

$3.3\ k\Omega$

C_2

V_o

C_1

V_i

$I_{DSS} = 10\ mA$

$V_P = -6\ V$

Z_i

Z_o

$1\ M\Omega$ $1\ k\Omega$
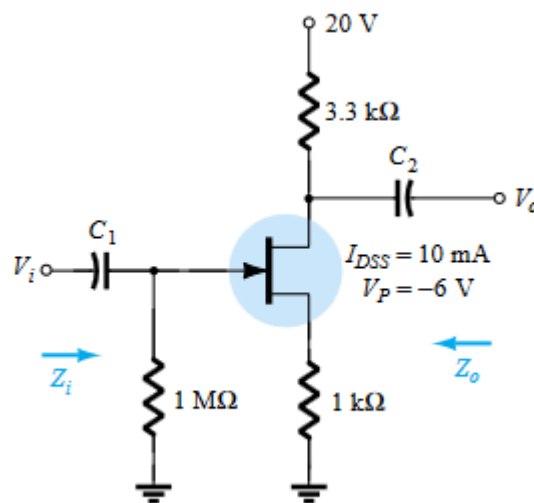
Question (5):
Sketch the transfer characteristics for an n-channel depletion-type MOSFET with

IDSS = 10 mA and VP = - 4 V.

Question (6):

$I_{D(on)}=3\ mA$, $V_{GS(on)}=10\ v$, VGS(Th) = 3 V, determine:
(a) The resulting value of k for the MOSFET.
(b) The transfer characteristics

Question (7):

Given ID =14 mA and VGS = 1 V, determine VP if IDSS = 9.5 mA for a depletion-type MOS-FET.

Question (8):
Given ID = 4 mA at VGS = -2 V, determine IDSS if VP = -5 V.

Question (9):

a) What is the significant difference between the construction of an enhancement-type MOS-FET and a depletion-type MOSFET?

b) Given k = 0.4 *10^{-3}A/V 2 and ID (on) = 3 mA with VGS (on)= 4 V, determine VT.

c) E-MOSFET of figure K= 0.24*10^{-3} AV^2, $V_{GQ=6.4}$ v, and $I_{DQ=2.75}$ mA.
1) Determine g_m
(c) Calculate Z_i with and without r_d. Compare results.
(d) Find Z_o with and without r_d. Compare results.
(e) Find A_v with and without r_d. Compare results.

$\circ$ 12 V

2 kΩ

V_o

1 μF

Z_o

10 MΩ

$V_i \circ$

1 μF

Z_i

$I_{D(on)} = 6$ mA
$V_{GS(on)} = 8$ V
$V_{GS(Th)} = 3$ V
$y_{os} = 20$ μS