Experiment No. 5

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Object ⇒ To plot output and transfer characteristic of FET

Apparatus used ⇒ FET, D.C. Voltmeter, D.C milimeter, D.C power supply.

Circuit ÷ Circuit shown in figure. G is the Gate. D is the Drawn, and S is source etc.

observation

Table for output characteristic

Sr. N.	V_{GS} = -1V		V_{GS} = -2V		V_{GS} = -3V	
	V_{DS} (Volt)	I_D (m.A)	V_{DS} (Volt)	I_D (mA)	V_{DS} (Volt)	I_D (m.A)
1	1	3.8	1	2.6	1	1.2
2	2	5.4	2	3.4	2	1.8
3	3	6.2	3	4.2	3	1.8
4	4	6.2	4	4.2	4	1.8

Calculations From Graph

Drain resistance

$$r_d = \left(\frac{\Delta V_{DS}}{\Delta I_D}\right)_{V_{GS}}$$

$$= \frac{3.5 - 1.5}{(6.8 - 4.7) \times 10^{-3}}$$

$$= \frac{2.0}{1.5} \times 10^{3} = 4/5 \times 10^{5}$$

$$r_d = 0.8 \times 10^{8}\ \Omega$$

$$g_m = \left(\frac{\Delta I_D}{\Delta V_{GS}}\right)_{V_{DS}}$$

$$= \frac{7.4 - 1.8}{-2.5 + 3}$$

$$= 2.2\ \Omega^{-1}$$

$$\mu = g_m \times r_d$$

$$= 2.2 \times 0.8 \times 10^{-3}$$

$$\mu = 1.76 \times 10^{3}$$

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Table for Transfer characteristic

Sr No	V_{DS} = 3V	
	V_{GS} (Volt)	I_D (mA)
1	0	10
2	-1	6.8
3	-2	4.0
4	-3	1.8
5	-4	0.6
6	-5	0.0

Result ⇒ In the graph pinch of Voltage = -5 Volt

Drain resistance (r_d) = $0.8 \times 10^{3}\ \Omega$

$g_m = 2.2\ \Omega^{-1}$ $\mu = 1.76 \times 10^{3}$

Precaution ⇒

(1) Handle FET Gently
(2) Gate should be given a +ve Voltage
(3) Voltage being applied should not exceed the rated Values.