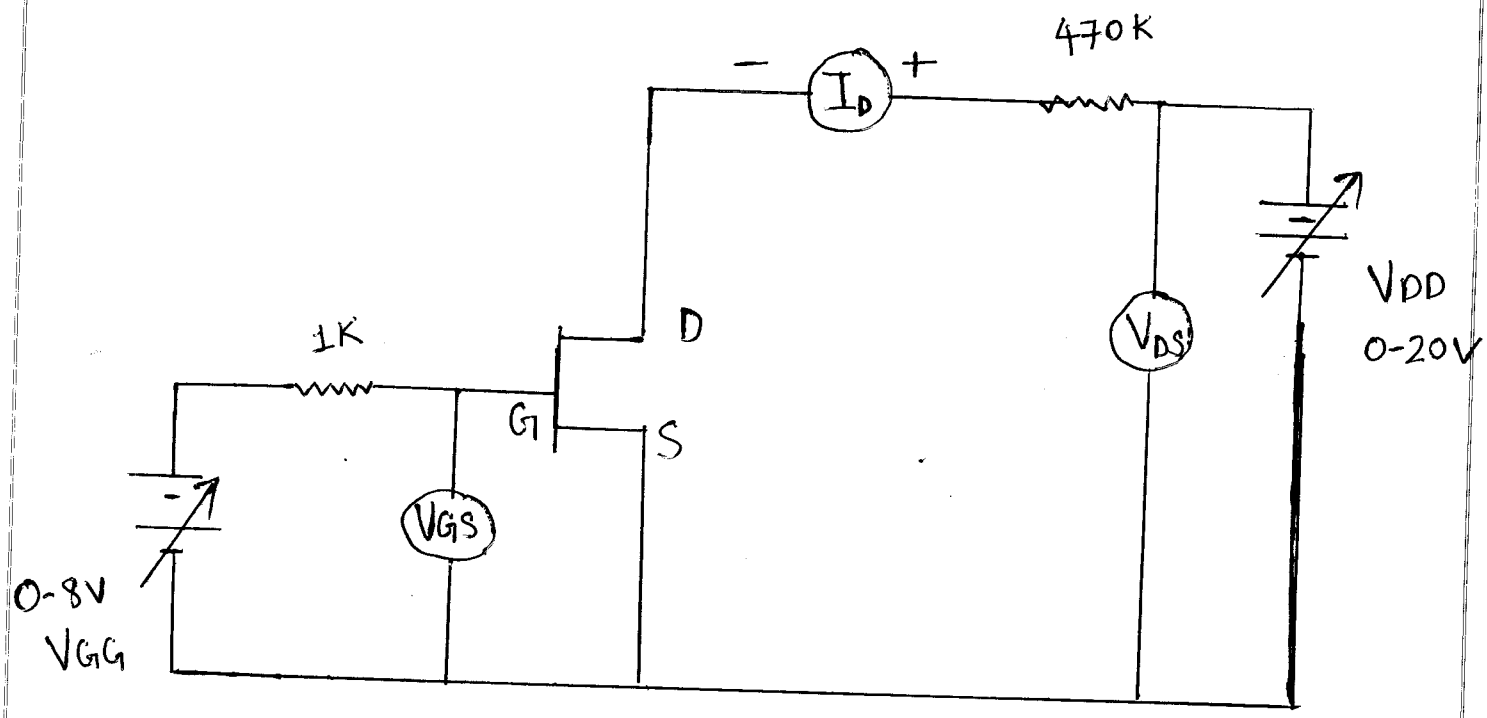
# CHARACTERISTICS OF MOSFET

# N-CHANNEL MOSFET OUTPUT AND TRANSFER CHARACTERISTICS

**Aim:** - To Study Transfer and Output Characteristics of an N- Channel MOSFET in common N Source Configuration.

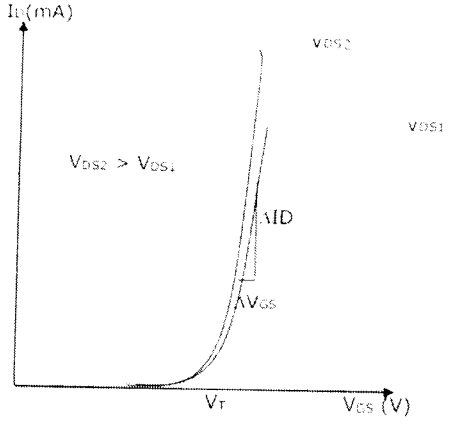
**Apparatus:** - MOSFET (IRF 540), Bread Board, Resistor (RD), Connecting Wires, Ammeter (mA), DC Power Supply (0-15 Volt), Voltmeter

**Circuit Diagram:** -

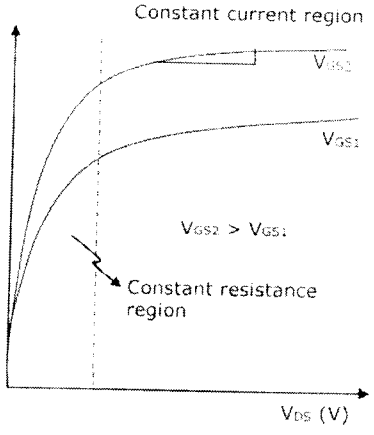



**Ideal Graph:**

**Transfer Characteristics:**




**Drain Characteristics**



**PROCEDURE:**

## OUTPUT CHARACTERISTICS:

1. Connect the circuit as per given diagram properly.
2. Keep VGS constant at some value say 3.1 V by varying VGG.
3. Initially Vary VDS in step of 0.1V, once current gets constant then vary VDS in step of 1 V up to 15 volts and measure the drain current ID. Tabulate all the readings.
4. Repeat the above procedure for VGS as 3.1 V, 3.2 V and 3.3 V.
5. Plot the output characteristics VDS vs ID.

## TRANSFER CHARACTERISTICS:

1. Connect the circuit as per given diagram properly.
2. Set the voltage VDS constant at 3 V by varying VDD.
3. Vary VGS by varying VGG in the step of 0V to 3.5 V and note down value of drain current ID. Tabulate all the readings.
4. Plot the transfer characteristics VGS vs ID.

## OBSERVATION TABLE:

## OUTPUT CHARACTERISTICS

| **VGS = 3.1 V** | | **VGS = 3.2 V** | | **VGS = 3.3 V** | |
|---|---|---|---|---|---|
| **$V_{DS}$ (V)** | **ID (mA)** | **$V_{DS}$ (V)** | **ID (mA)** | **$V_{DS}$ (V)** | **ID (mA)** |
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## TRANSFER CHARACTERISTICS

| VDS = 3 V | |
|---|---|
| **VGS (V)** | **ID (mA)** |
| 0 | |
| 0.1 | |
| 0.2 | |
| . | |
| . | |
| . | |
| . | |
| . | |
| . | |
| . | |
| 3.5 | |

## CALCULATION:

**1. Threshold voltage $V_T$ :** Gate to source voltage at which, drain current starts flowing.

**2. Transconductance gm :** Ratio of small change in drain current ($\Delta I_D$) to the corresponding change in gate to source voltage ($\Delta V_{GS}$) for a constant $V_{DS}$.

**gm = $\Delta I_D / \Delta V_{GS}$ at constant $V_{DS}$**

**3. Output drain resistance :** It is given by the relation of small change in drain to source voltage ($\Delta V_{DS}$) to the corresponding change in Drain Current ($\Delta I_D$) for a constant $V_{GS}$.

**rd or ro = $\Delta V_{DS} / \Delta I_D$ at a constant $V_{GS}$**

## RESULTS:

**1. $V_T$ : _____**
**2. gm : _____**
**3. ro : _____**

## CONCLUSION: