



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



COIMBATORE-35

**Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**

DEPARTMENT OF BIOMEDICAL ENGINEERING

COURSE NAME: 19EIB201/ ELECTRONIC DEVICES

II YEAR / III SEMESTER

Unit 1 – Transistors

Topic 2: MOSFET





MOSFET

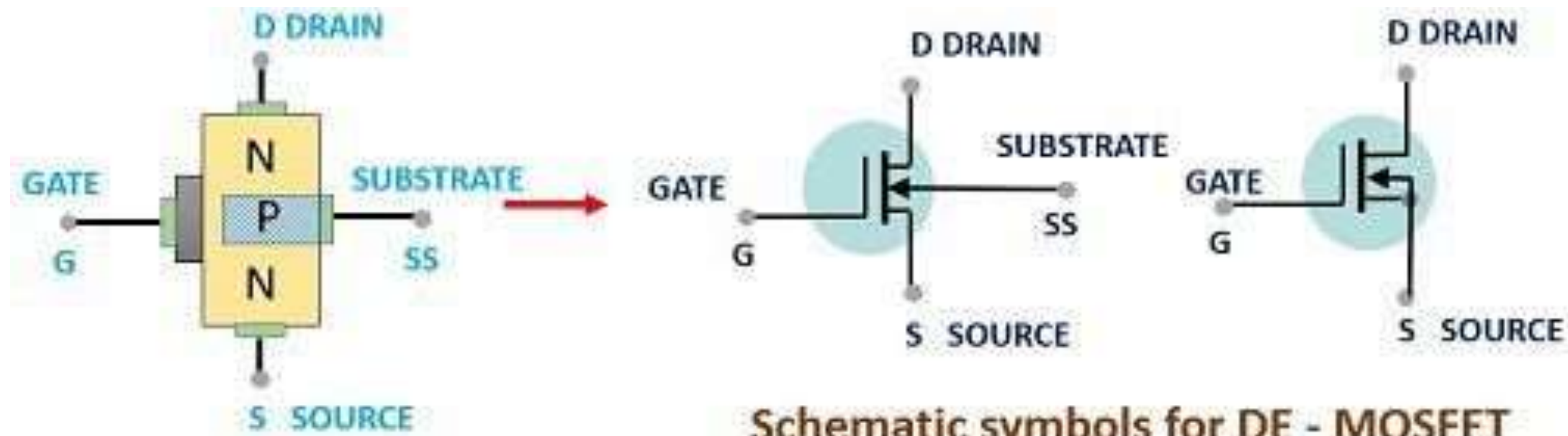


MOSFET is an acronym for Metal Oxide Semi-Conductor Field Effect Transistor. It is a device in which the variation in the voltage determines the conductivity of the device. It is a three terminal device which has a source, a drain and a gate terminal.

- These are voltage controlled devices, in which the current flowing between source and drain is proportional to the provided input voltage.
- MOSFET has a smaller value of capacitance and its input impedance is much more than that of FET due to small leakage current.
- It finds application widely in switching and amplification of electronic signals because of its ability to change conductivity with the applied voltage.

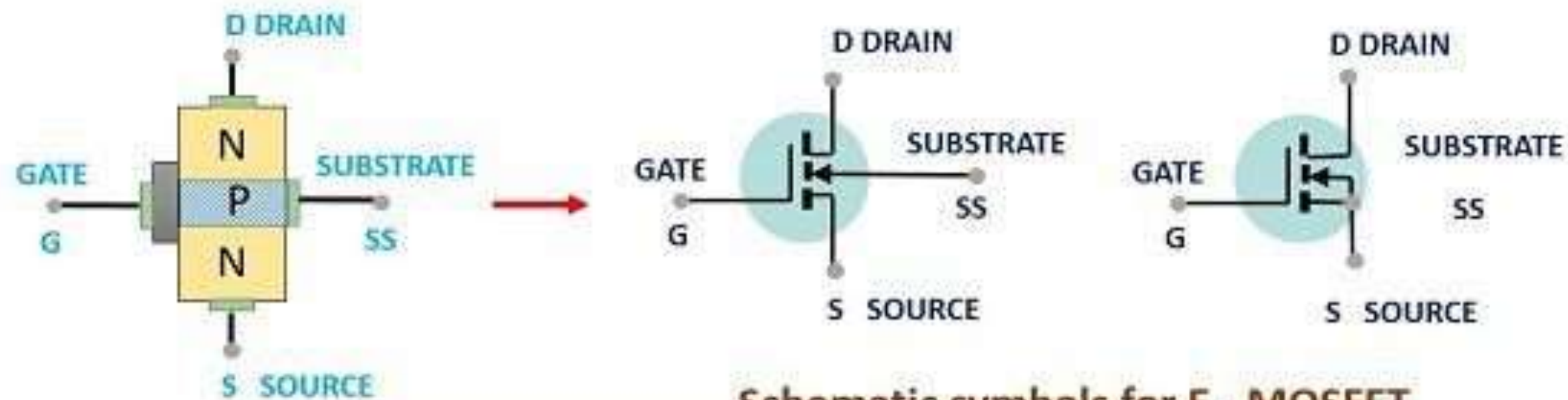


MOSFET



Schematic symbols for DE - MOSFET

N – Channel DE- MOSFET

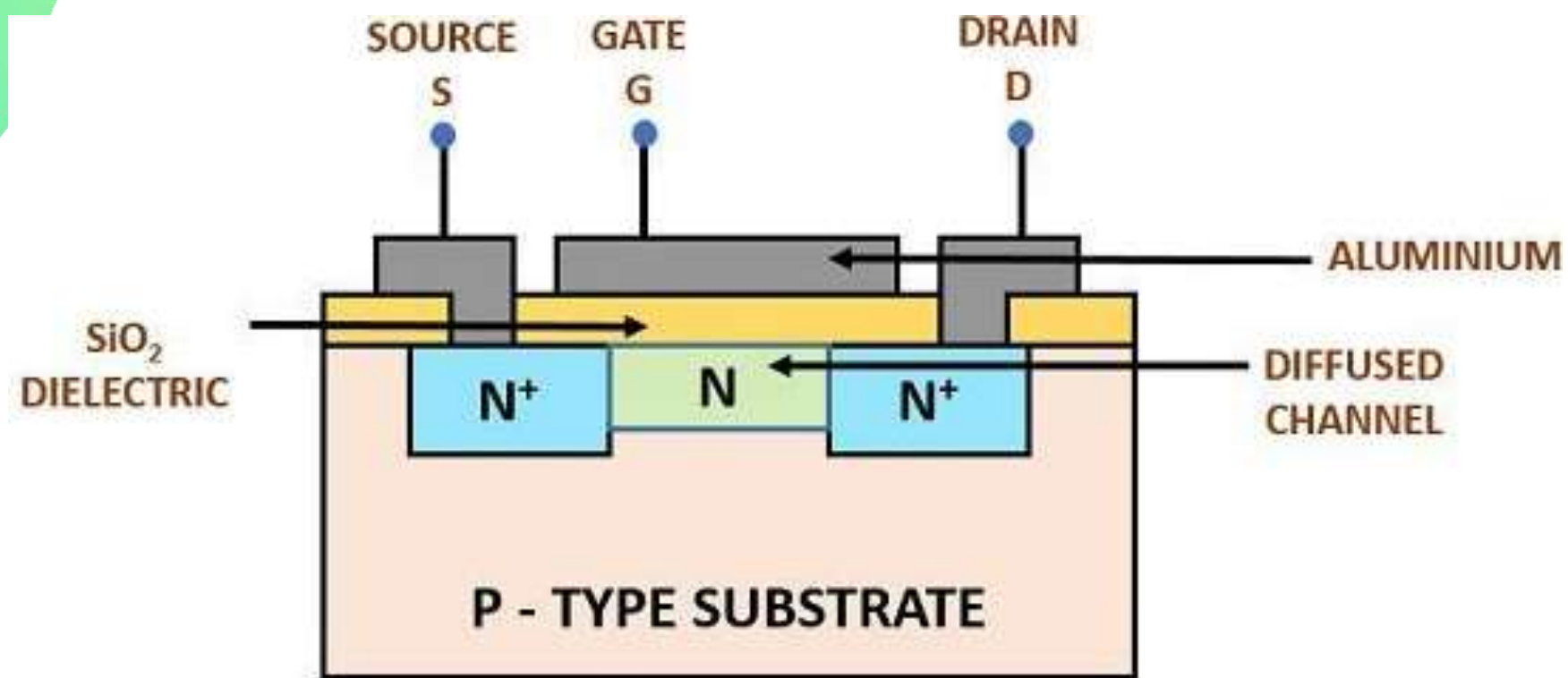


Schematic symbols for E - MOSFET

N – Channel E- MOSFET



Construction of a depletion type MOSFET

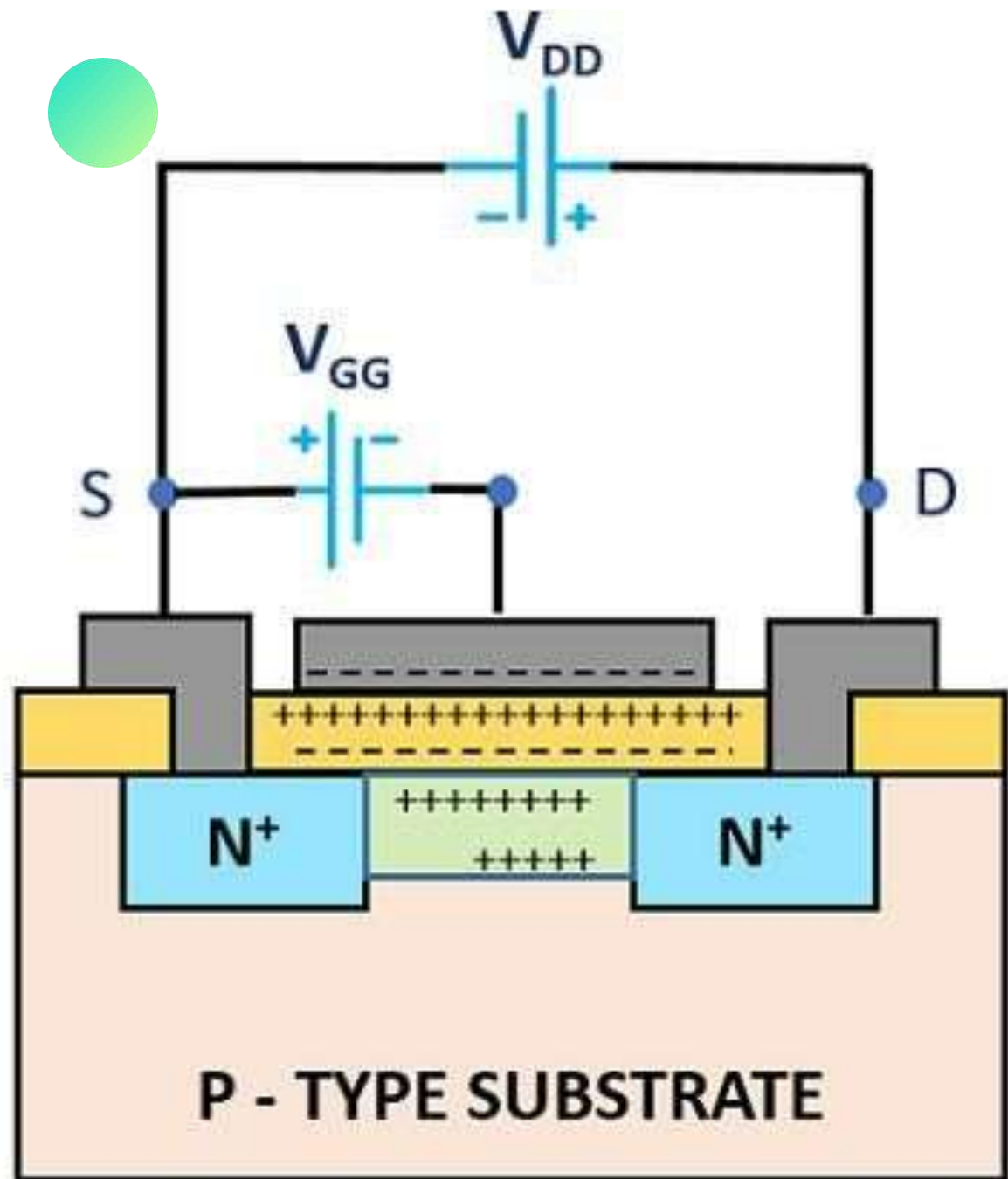


N – Channel DE – MOSFET Structure

- Lightly doped P-type substrate contains two heavily doped N-type material thus forming source and drain.
- A thin layer of SiO₂ is deposited over the surface and holes are then cut through SiO₂.
- A metal plate is also deposited in between the source and drain terminal which acts as gate terminal for the device.
- The layer of SiO₂ provides an extremely high input impedance of the order of **10¹⁰ to 10¹⁵ ohms**.



Working of a Depletion-type MOSFET

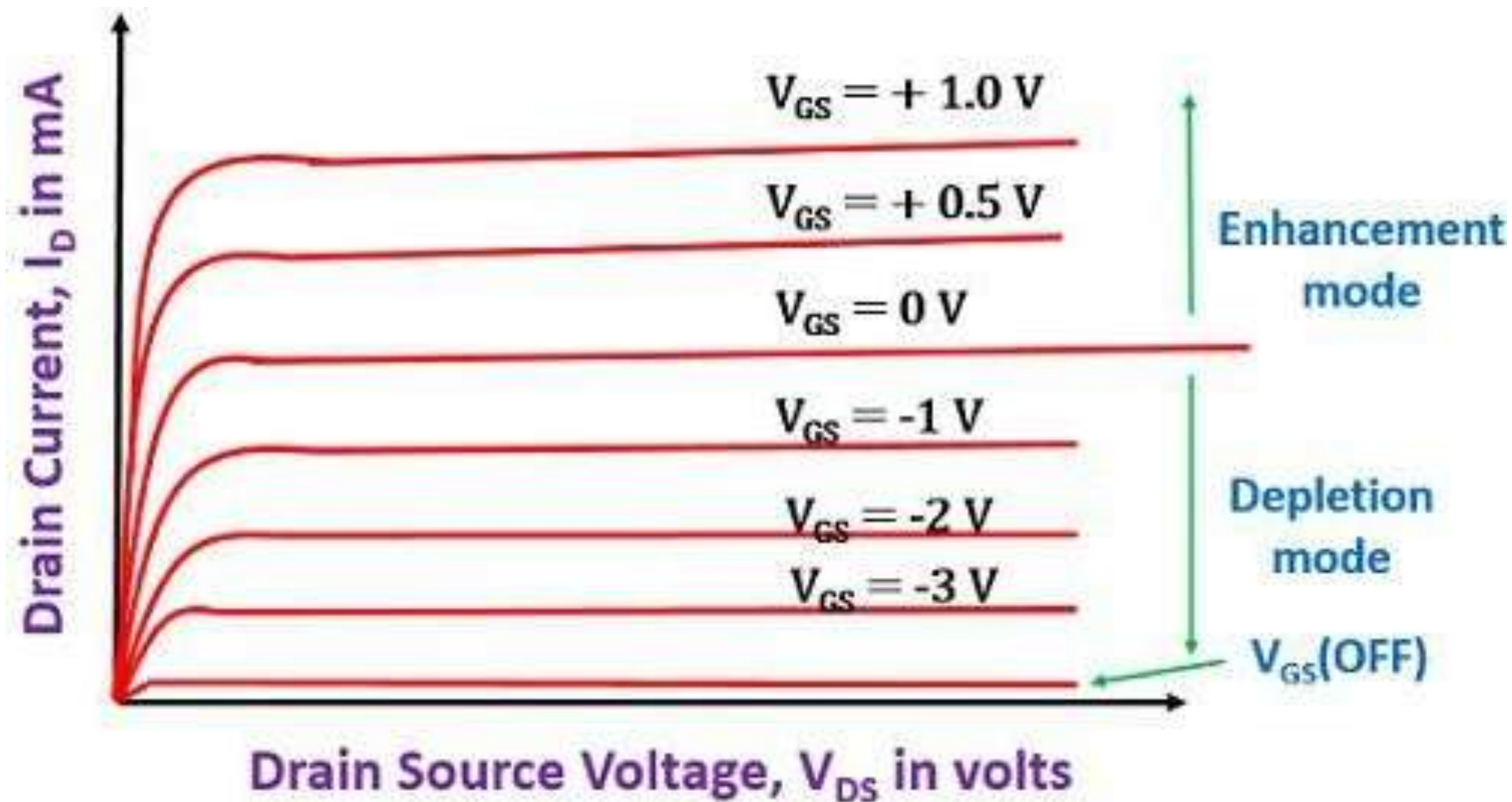


Depletion Mode Operation

- In a DE-MOSFET when the gate potential is made negative with respect to the substrate, it causes repulsion of negative charge carriers out of the initially formed channel.
- This increases the channel resistance which resultantly reduces the drain current.
- In the case when the gate terminal is made positive with respect to the substrate, more number of electrons gets attracted towards the channel. Thus, causing more current to flow through the channel.
- A pinch-off condition also arises in DE-MOS when a much negative gate voltage is applied.



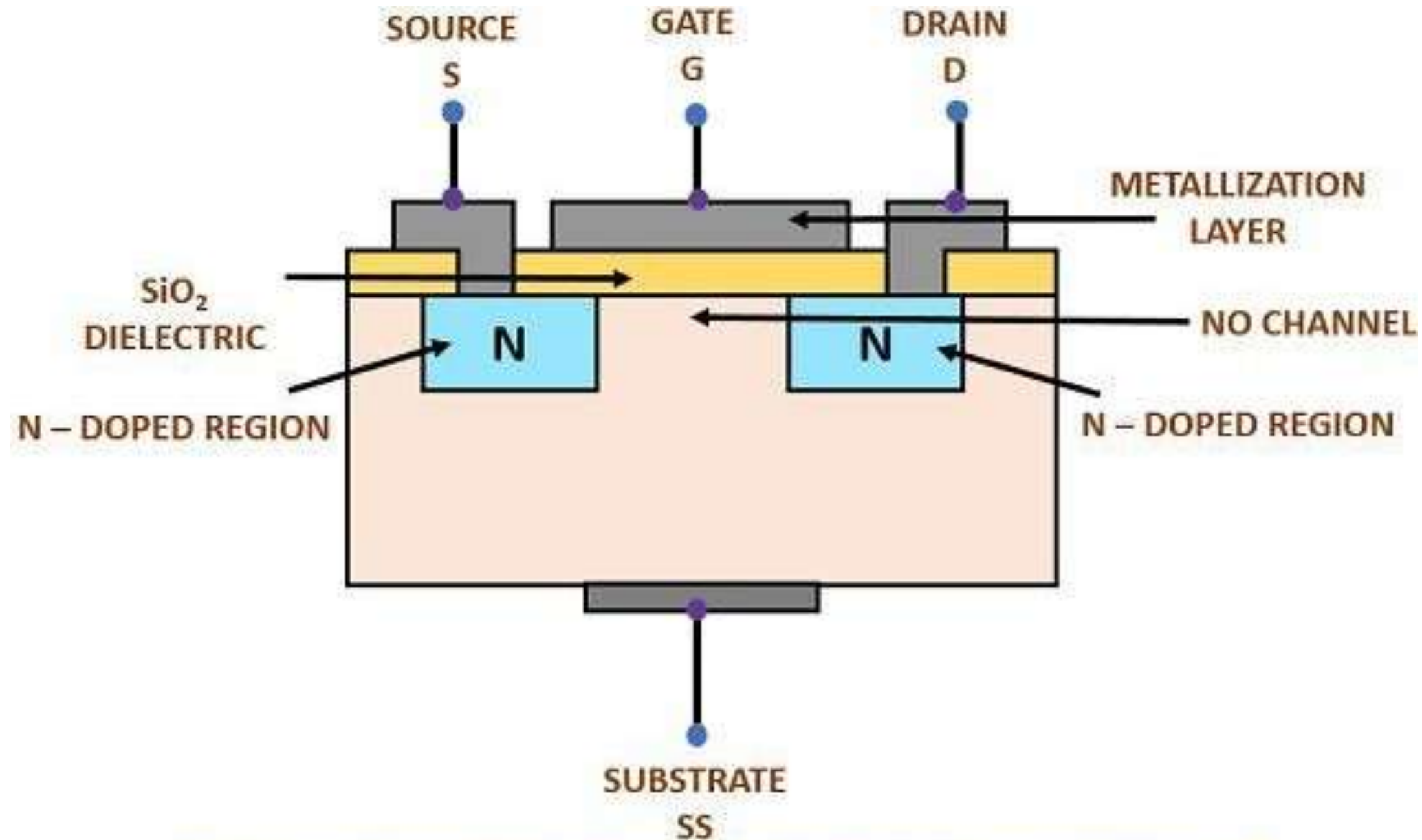
Characteristic Curve of Depletion MOSFET



DRAIN CHARACTERISTICS



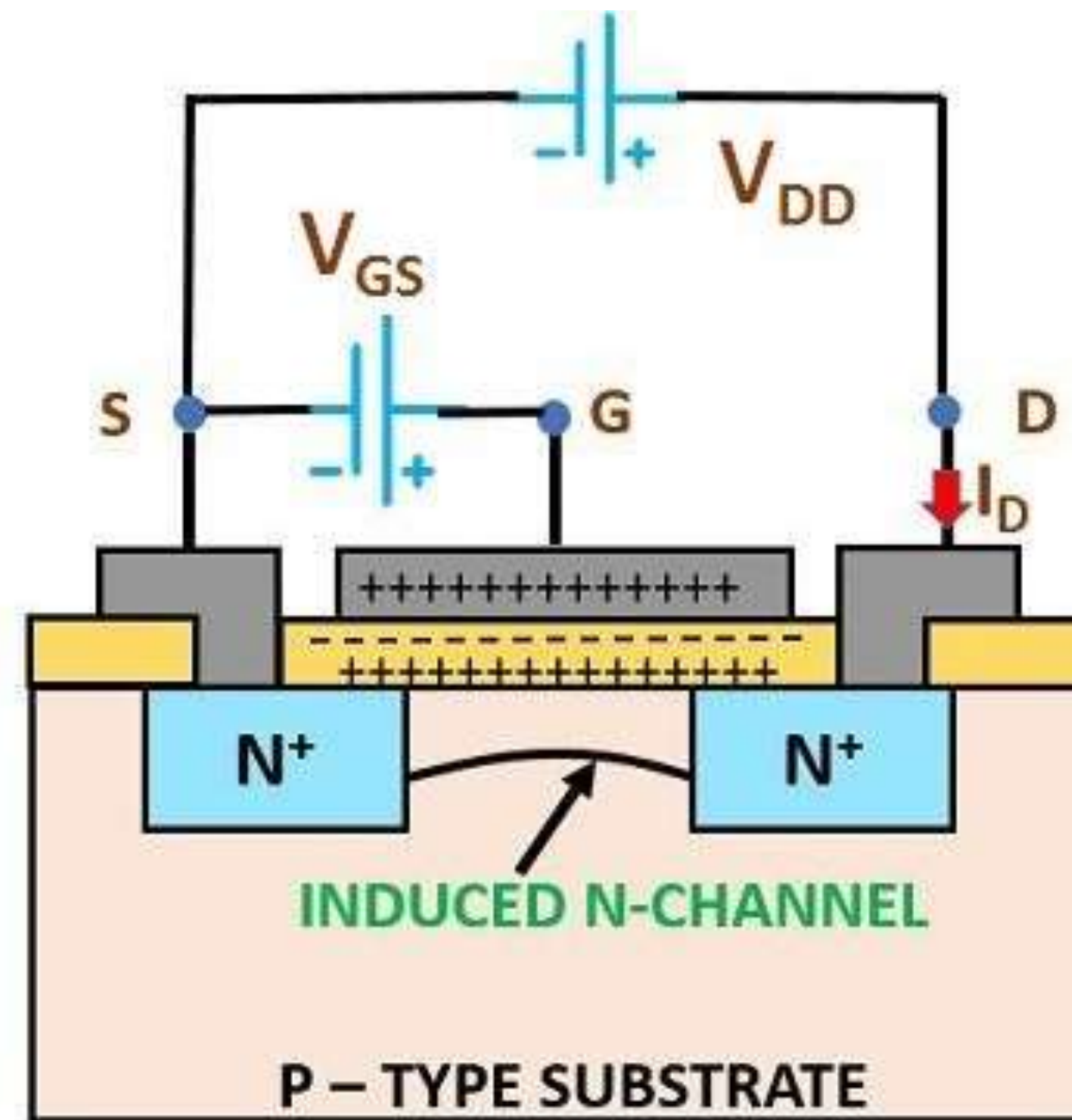
Construction of Enhancement type MOSFET



E – MOSFET Structure without channel



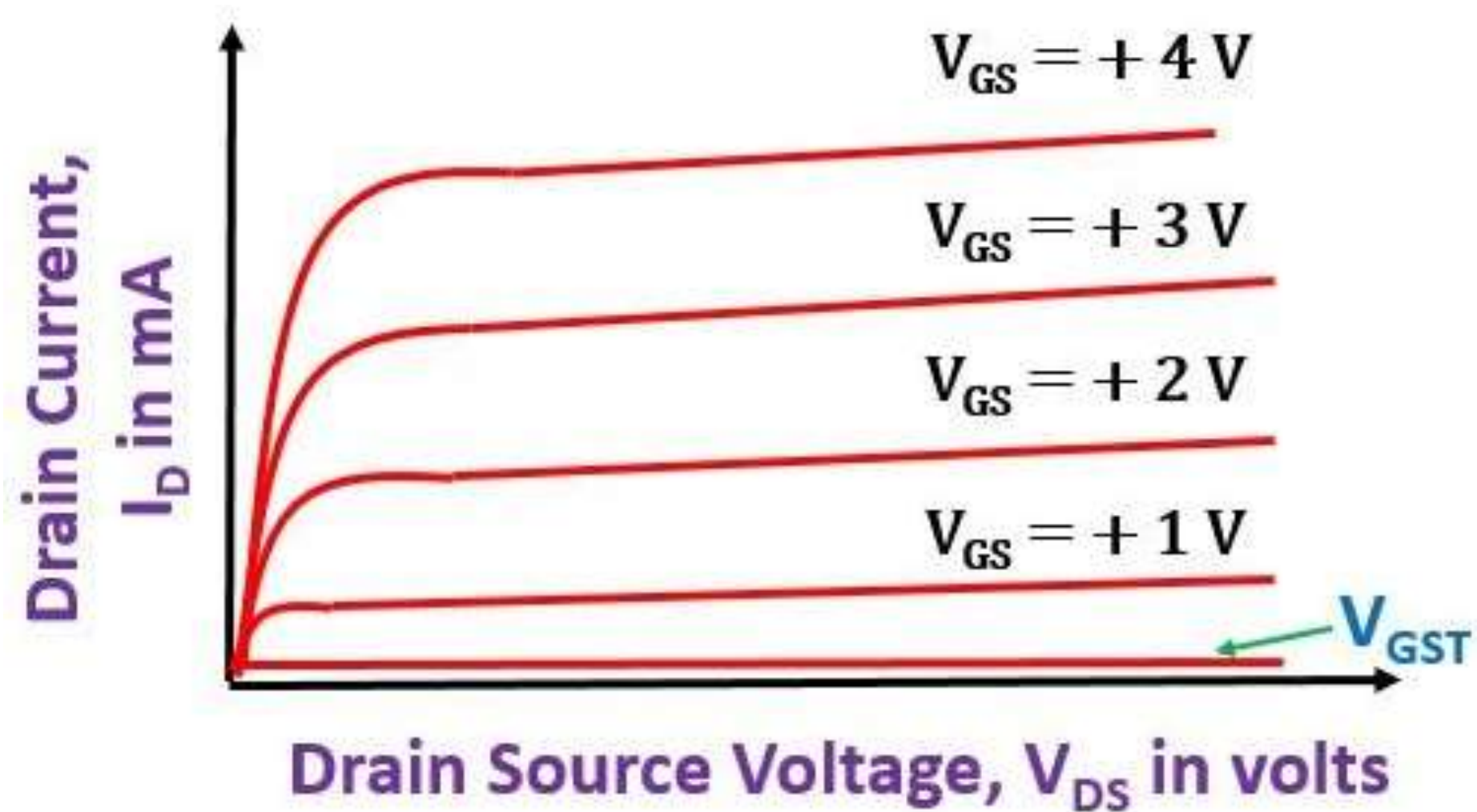
Working of a Enhancement-type MOSFET



Operation of N-Channel E – MOSFET



Characteristic Curve of Enhancement MOSFET



Drain Characteristics



Comparison between BJT, FET and MOSFET



TERMS	BJT	FET	MOSFET
Device type	Current controlled	Voltage controlled	Voltage Controlled
Current flow	Bipolar	Unipolar	Unipolar
Terminals	Not interchangeable	Interchangeable	Interchangeable
Operational modes	No modes	Depletion mode only	Both Enhancement and Depletion modes
Input impedance	Low	High	Very high
Output resistance	Moderate	Moderate	Low
Operational speed	Low	Moderate	High
Noise	High	Low	Low
Thermal stability	Low	Better	High



SUMMARY



ASSESSMENT

Dear student,

Quiz is posted in your Google class room

Allotted time for quiz is 5 min

No of Questions is 10





KEEP
LEARNING..
Thank u

SEE YOU IN NEXT CLASS