

- **MOSFET:**

- **Common-Source** (CS)

- *i/p to G, o/p from D, S common to both i/p and o/p*

- **Common-Gate** (CG)

- *i/p to S, o/p from D, G common to both i/p and o/p*

- **Common-Drain** (CD)

- *i/p to G, o/p from S, D common to both i/p and o/p*

- **Common-Source (Degeneration)** [CS(D)]

- *Same as CS, but now with a source resistance attached*

- For *MOSFETs*, an *additional topology* possible: *i/p to Body*, *o/p from S/D*
  - Known as *body-driven* or *bulk-driven* stage
- Each of the *topologies* has *specific characteristics* in terms of *voltage/current gain* and *input/output resistance*
- Each of these will be treated as a *module*, and will do a *complete analysis* for each of these stages

# Multi-Stage Topologies

- Also known as *Compound Connections*
- *Combination of 2 or more stages*
  - *A module by itself*
- *Some widely used topologies:*
  - *Darlington*
  - *Cascode*
  - *Differential Amplifier/Differential Pair*  
(DA/DP)

# Basic Structure

- Consists of a *driver* and a *load*
- *Driver*: Universally *active devices*, e.g., *BJTs* or *MOSFETs*
- *Load*: Can either be *resistors* (*passive*) or *transistors* (*active*)
- Generally, *discrete stages* have *passive loads*, while *IC stages* have *active loads*

# Resistance Transformation (Only for BJTs)

- *A very useful technique*

- For *equivalence*:

$$I_b R_2 = I_e R_1$$

$$\Rightarrow R_2 = (\beta + 1)R_1$$

$$\text{or } R_1 = R_2/(\beta + 1)$$

- *Apply it freely!*

