FEEDBACK, STABILITY, & COMPENSATION

Feedback

- ***Connection between input and output* - *either directly through a wire*, *or through some circuit elements***

  $\Rightarrow$ ***Input and output gets coupled***

  $\Rightarrow$ ***Any change in either of them*, *affects the overall behavior***

- ***2 Types*:**
  - ***Negative***
  - ***Positive***

- ***Negative Feedback***:
  - ***Output fed back to input in such a way that it reduces net input***

    $\Rightarrow$ ***Causes a reduction in the output***
  - Known as ***Degenerative Feedback***
- ***Positive Feedback***:
  - ***Output fed back to input in such a way that it increases net input***

    $\Rightarrow$ ***Causes an increase in the output***
  - Known as ***Regenerative Feedback***

- ***Properties of Negative Feedback*:**
  - ***Reduction in gain***

    $\Rightarrow$ ***Improvement in bandwidth***

    (***Due to constant GBP***)
  - ***Tailoring of input and output resistances***
  - ***Desensitization of gain***
    - ***Gain becomes almost independent of the properties of the active device***
  - ***Minimization of frequency and phase distortion***

- ***Reduction in nonlinear distortion***
  - ***By suppression of harmonics present in the output***
- ***Reduction of noise***
- ***If not properly designed, can have problem of stability***

- ***Properties of Positive Feedback:***
  - ***Inherently unstable***
    - ***Due to its regenerative nature***
    - ***This property can be effectively utilized in the design of oscillators, which do not need any input***