Analog Electronics

- Stability factor of self biasing circuit is

$$S = 1 + \frac{R_{TH}}{R_E}$$

- Stability factor of Collector to base bias ing circuit is $S = 1 + \frac{R_B}{R_C}$
- Stability factor of Fixed Biasing circuit is

$$S = 1 + \beta$$

- Darlington Emitter Follower (CC–CC) consists of two identical emitter is cascade mode.
- Cascode Amplifier is the configuration of CE–CB in BJT
- Formulas regarding to high frequency model are

$$f_\beta = \frac{gm}{2\pi h_{fe}(C_C + C_E)}, f_T = h_{fe}.f_\beta, f_\alpha = (1 + h_{fe})f_\beta \text{ or } \frac{f_\beta}{(1-\alpha)}$$

- Voltage gain in Multistage Cascaded Amplifier

$$Av^* = 20\log_{10}(Av_1) + 20\log_{10}|Av_2| \text{ ..... in dB}$$

- Power gain in Multistage Cascaded Amplifier

$$A_P^* = A_V^* A_I^* \text{ .....}$$

- Higher cutoff frequency Reduce

$$f_H^* = f_2\sqrt{2^{1/n} - 1}$$

- Lower cutoff frequency Increases

$$f_L^* = \frac{f_1}{\sqrt{2^{1/n} - 1}}.$$

- Product of gain and bandwidth in an amplifier remain constant
- Negative Feedback $\boxed{A_F = \frac{A}{1 + \beta A}}$
- Positive feedback $\boxed{A_F = \frac{A}{1 - \beta A}}$

- Sensitivity factor , $S = \frac{1}{1+\beta A}$, Desensitivity factor 'D' $D = \frac{1}{S} = 1+\beta A$
- $CMRR = \rho = \left|\frac{Ad}{Ac}\right|$
- Barkhausen criteria $|\beta A_V| = +1$ & $\phi = 2\pi n,\ n = 1, 2 .....$
- Oscillation frequency of R–C Phase Shift Oscillator = $\frac{1}{2\pi\sqrt{6}RC}$
- Voltage gain for FET $\boxed{A_v = -g_m(r_d \parallel R_D)}$
- Time period of Square Wave Generator is $T = 2RC \ln\left(\frac{1+\beta}{1-\beta}\right)$
- Time period(Monostable Multivibrator) $T = RC \ln\left(\frac{1+(v_1/v_z)}{1-\beta}\right)$
- Frequency of triangular wave generator $f_o = \frac{R_3}{4R_1C_1R_2}$