Tutorial –
Unit-3 Feedback Amplifier

1) A negative feedback amplifier in voltage-series configuration feeds 10% of the output back to the input. voltage gain of the amplifier without feedback is 100. Input & output resistance are 10KΩ & 1KΩ resp.:
Find % reduction in voltage gain, input resistance & o/p resistance with feedback

Sol:- Given openloop gain $A = 100$

feedback Ratio $\beta = 10\% = 0.1$

I/p impedance without feedback $Z_{in} = 10K\Omega$

O/p impedance without feedback $Z_{out} = 1K\Omega$

⇒ closed loop voltage gain $A_f = \frac{A}{1+A\beta} = 9.09$

% reduction in voltage gain

$= \frac{A - A_f}{A} \times 100 = 90.9\%$

⇒ Input impedance with feedback

$Z_{inf} = (1+A\beta) Z_{in} = 110K\Omega$

% increment in input impedance

$\Rightarrow \frac{Z_{inf} - Z_{in}}{Z_{in}} \times 100 = 1000\%$

⇒ output impedance with feedback

$Z_{outf} = \frac{Z_{out}}{1+A\beta} = \frac{1}{11}$

% reduction in o/p impedance ⇒

$\frac{Z_{out} - Z_{outf}}{Z_{out}} \times 100 = 90.91\%$

2) An amplifier has a mid freq gain of 1000 and a bandwidth of 500KHz

(1) What will be the new bandwidth & gain, if 10% negative feedback is given.

(2) what should be the amount of feedback if the bandwidth is to be restricted to 1MHz.

Sol:- given mid freq gain = A = 1000

B.W without feedback = 500KHz

feedback ratio β = 10% = 0.1

⇒ (i) $B.W_f = (1+A\beta) B.W$

∴ gain with feedback

$$A_f = \frac{A}{1+A\beta}$$

(ii) Feedback ratio to restrict the bandwidth to 1MHz (∵)

$$\beta = \frac{\frac{BW_f}{BW} - 1}{A} =$$

3) To amplifier of 60 dB gain a feedback $\beta = 0.006$ is applied. what could be the change in the overall gain of the feedback amplifier if the gain of the amplifiers decreases by 15%

Sol: $A = 60\,dB = 1000 \qquad \beta = 0.006$

$$A_{f_1} = \frac{1000}{1+A\beta} = 142.8$$

A_{f_2} ⇒ if A is reduce 15% = 1000 − 150 = 850

$$A_{f_2} = \frac{850}{1+A\beta} = 139.34$$

⇒ Change of overall gain ⇒ $\frac{A_{f_1} - A_{f_2}}{A_{f_1}} \times 100 = 2.42\%$