**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

Branch: ECE Subject : Analog Electronic

Year : II Subject code : 1151EC103

Sem : III Faculty : Dr.S.SHIYAMALA

**UNIT –III**

1. **Define positive feedback or regenerative feedback? [Nov/Dec-07] [Nov/Dec-14]**

If the feedback signal is in phase with input signal, then the net effect of the feedback will increase the input signal given to the amplifier. This type of feedback is said to be positive or regenerative feedback.

Gain of amplifier with positive feedbackAf =

1. **Define negative feedbackor degenerative feedback? [Nov/Dec-07]**

If the feedback signal is out of phase with the input signal then the input voltage applied to the basic amplifier is decreased and correspondingly the output is decreased. This type of feedback is known as negative or degenerative feedback.

Gain of amplifier with negative feedback Af =

1. **Define sensitivity?**

Sensitivity is defined as the ratio of percentage change in voltage gain with feedback to the percentage change in voltage gain without feedback.

S =

1. **What are the types of feedback? [May/Jun-06]**

i. Voltage-series feedback ii. Voltage-shunt feedback

iii. Current-series feedback iv. Current-shunt feedback

1. **Define feedback? [May/Jun-12]**

A portion of the output signal is taken from the output of the amplifier and given back to the normal input signal with inphase or out of phase.This is known as feedback.

1. **Write the expression for input and output resistance of voltage series feedback amplifier.**

Input resistance with feedback, Rinf =Rin (1+AB)

Output resistance with feedback,ROf=Ro/(1+AB)

1. **Give an example for voltage-series feedback.**

The Common collector or Emitter follower amplifier is an example for voltage series feedback.

1. **Write the expression for input and output resistance of current shunt feedback amplifier. [May/Jun-12] [Nov/Dec-12][May/Jun-12]**

Input resistance with feedback , Rinf =Rin(1+AB)

Output resistance with feedback,ROf=Ro/(1+AB)

1. **List the characteristics of an amplifier which are modified by negative feedback (or)Give the properties of negative feedback. (Nov’13)**
2. Af<A, Negative feedback reduces the gain

ii. when AB>>1, Af=1/B ie gain is depends on feedback factor.If feedback elements are

stable then gain with negative feedback is also stable.

iii. Negative feedback property is used in amplifier.

iv. Noise and Distortion is very much reduced

v. Increases the Bandwidth

1. **Give the effect of negative feedback on amplifier characteristics. [Nov/Dec-07]**
2. Increase the input resistance

ii. Decrease the output resistance

iii. Increase the gain stability

iv. Increase the Bandwidth

v. Decrease the Noise and distortion

1. **What happens to the input resistance based on types of feedback in an amplifier? [May/Jun-09]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Characteristics | Current series (SS) | Voltageseries (SP) | Voltage shunt (PP) | Current shunt(PS) |
| Voltage gain | Decreases | Decreases | Decreases | Decreases |
| Bandwidth | Increases | Increases | Increases | Increases |
| Input resistance | Increases | Increases | Decreases | Decreases |
| Output resistance | Increases | Decreases | Decreases | Increases |

1. **Define loop gain. [Nov/Dec-07]**

The product of feedback factor and open loop amplifier gain is called loop gain [Aβ=loop gain]

1. **Draw the circuit diagram of transresistanceamplifier.Specify conditions for Ri&Ro**

**[Apr/May-08]**

**14. Whatarethe basicamplifiers?**

Thebasicamplifiersare amplifiersare

i.Voltageamplifier ,ii Current amplifiermplifieriii.Transconductanceamplifier iv.Transresistance amplifier.

**15.Whatarethe componentsof feedback amplifier?**

Thecomponentsare Signal sourse, amplifier, samplingnetwork, Feedback network, andmixernetwork.

**16..Whataretwotypes ofsampling?**

Voltagesamplingornodesampling

Currentsamplingorloop sampling

**17 Statethetwotypes ofmixing?**

Seriesmixing and shunt mixing

**18 . Whatistransfergain?**

Itistheratio oftheoutputsignaltotheinputsignal. ItisdenotedbyA.

A=Xo/Xi

**19. Whatistheeffect of inputresistancedueto series mixing?**

Theinput resistance increasesduetoseries mixingirrespectiveof thetypeof sampling. Thefeedbacksignal opposesthesource signalandtheinput currentdecreases and duetothisinput resistance increases.

Rif>Ri

Where Rif=input resistance withfeedback

Ri =input resistance without feedback

**20. Whatistheeffect of inputresistancedueto shuntmixing?**

Theinput resistance decreases dueto shunt mixingirrespectiveofthetypeof sampling. Thefeedbacksignal opposesthesource signalandtheinput current (Ii) decreasesas aconsequence ViIireducesleading toareductionin input resistance.

Rif<Ri

Where Rif=input resistance withfeedback

Ri =input resistance without feedback

**21. Whathappensto output resistanceduetocurrentsampling?**

Theoutput resistance increasesduetocurrentsampling.

Rof>Ro

Rof=input resistance withfeedback

Ro=input resistance without feedback

**22. What happens tooutput resistanceduetovoltagesampling?**

Theoutput resistance decreases duetocurrentsampling.

Rof<Ro

Rof=input resistance withfeedback

Ro=input resistance without feedback

**23. Writethe expression forinputandoutput resistanceofvoltage seriesfeedback**

**amplifier.**

Input resistance withfeedback, Rif=Ri(1+βA)

Output resistance withfeedback, Rof=Ro(1+βA)

**24. Define feedback factor. [Apr/May-10] [May/Jun-12]**

β is feedback factor or feedback ratio which always lies between 0 and 1. It is the ratio between output of feedback network to input of feedback network

1. **Comment on the values of lower and upper cut off frequencies in a feedback amplifier.**

**[May/Jun-12]**

Lower cut off frequency decreases and upper cut off frequency increases in feedback amplifier.

Flf =Fl/1+AB,

Fhf= Fh(1+AB)

1. **Mention the three networks that are connected around the basic amplifier to implement feedback**

**concept. [Nov/Dec-12]**

a. Mixing network

1. Feedback network

C Sampling network

27. **Compare negative and positive feedback. [May/Jun-09] [May/Jun-07]**

* If the feedback signal is in phase with input signal, then the net effect of the feedback will increase the input signal given to the amplifier. This type of feedback is said to be positive or regenerative feedback.
* Positive feedback is employed in oscillators
* If the feedback signal is out of phase with the input signal then the input voltage applied to the basic amplifier is decreased and correspondingly the output is decreased. This type of feedback is known as negative or degenerative feedback.
* Negative feedback is employed in amplifier.

**28. What is the disadvantage of negative feed back?**

Reduces amplifier gain.

Stability of gain is depends on stability of feedback network elements.

**29. Define Desensitivity.**

It is the ratio of percentage change in voltage gain without feedback to the percentage change in voltage gain with feed back. It is the reciprocal of sensitivity.

D= 1+Aβ

30. An amplifier ahs an open loop gain of 1000 and a feedback ratio of 0.04. If the open loop gain changes by 0% due to temperature, find the percentage change in gain of the amplifier with feedback.

Solution: A = 1000 , β = 0.04 and = 10

31. In a negative feedback amplifier , A = 100 , β = 0.04 and Vs = 50mV, find (a) gain with feedback (b) output voltage (c) feedback factor (d) feedback voltage (Nov’13)

32. what is return ratio of a feedback amplifier (Nov’11)

33.Draw the block diagram of voltage shunt feedback amplifier and write the expressions for the input and output resistance. (Nov’11)

34. A feedback amplifier has an open loop gain of 600 and β = 0.01. find the closed loop gain with negative feedback. (Nov’14)

Draw a single stage amplifier with current series feedback (May’14)

“Neagtive feedback stabilizes the gain” – Justify the statement (May’14)

**16 marks questions**

**UNIT-I**

**Draw the block diagram of voltage series feedback amplifier and derive the equation for the input impedance, output impedance and the voltage gain. (Nov’13)(10)**

**Explain how negative feedback helps in reduction of distortion and noise(Nov’13)(6)**

**Discuss the effect of negative feedback on stabilization of gain (Nov’13)(6)**

**Draw the block diagram of feedback amplifier and discus the effect of negative feedback with respect to closed loop gain , bandwidth and distortion (Nov’11)(10)**

**An amplifier has a midband gain of 125 and bandwidth 250KHz , if 4% negative feedback is introduced find the bandwidth and gain.If the bandwidth is to be restricted 1 MHz find the feedback ratio (Nov’11)(6)**

**With neat circuit diagram explain which type of feedback is employed in a BJT emitter follower and obtained the expression for Av,AI, , Ri and Ro(Nov’11)(8)**

**The Voltage shunt feedback amplifier has the following values of circuit parameters Rs = 600Ω, hie = 5 KΩ, hfe = 80 , RL = 2 KΩ, RB = 40 KΩ. Calculate Av, Rif, Avf, Ro and Rof’.(Nov’11)(8)**

**Draw the block diagram of four types of feedback topologies and compare them with respect to gain , input and output resistance. Give one example for each. (Nov’14)(16)**

1. Sketch the block diagram of a feedback amplifier and derive the expression for gain
2. With positive feedback
3. With negative feedback

State the advantages of negative feedback. [Nov/Dec-12] [6]

1. Draw the circuits of voltage shunt and current series feedback amplifiers, and derive the expression for input impedance Rif  [Nov/Dec-12] [10]
2. Discuss Nyquist Criterion for stability of feedback amplifiers with the help of Nyquist plot and Bode plot. [Nov/Dec-12] [6]
3. For a feedback amplifier derive the expression for the [Nov/Dec-12] [8]
4. The gain with feedback
5. Lower cut off frequency
6. Upper cut off frequency
7. What is the effect of a current series negative feedback, on input resistance and output resistance of a BJT amplifier? Explain the same with necessary circuit, equivalent circuit and equations.  **[May/Jun-12] [8]**
8. What do you understand by voltage series feedback amplifier? Draw the circuit diagram of a two stage voltage series feedback amplifier and explain its working present its,
9. DC analysis
10. AC analysis using approximate h parameter model**. [Nov/Dec-10] [16]**
11. With neat diagram explain the current series feedback amplifier and also derive the expression for feedback ratio, input resistance, output resistance and voltage gain (May’13)**[May/Jun-07] [16]**
12. Explain in detail the effect of negative feedback on gain ,bandwidth, distortion, noise, input resistance, and output resistance**. [May/Jun-10] [16]**
13. With block diagram of current series feedback, derive the expression for Rif, Rof

**[Nov/Dec-09] [8]**

1. Write notes on Nyquist Criterion. **[Apr/May-10] [8]**
2. Write notes on a feedback amplifier using a block diagram. **[Apr/May-10] [8]**
3. Show how negative feedback reduces gain of an amplifier**. [Nov/Dec-07] [8]**

**(Or)**

**Discuss the effect of negative feedback on stabilization of gain (May’13)(8)**

1. Explain the effect of negative feedback on the input resistance, for a voltage shunt feedback amplifier.  **[Nov/Dec-07] [8]**
2. Draw the block diagrams of four possible feedback topologies and explain**. [Nov/Dec-07] [8]**
3. Prove that the bandwidth of amplifier increases with negative feedback**. [Nov/Dec-07] [8]**
4. Derive an expression for gain Avf, with positive feedback and negative feedback, and state condition for stability in negative feedback amplifiers**. [Apr/May-08] [8]**
5. Elaborate the method of identifying feedback topology**. [Apr/May-08] [6]**
6. With example prove that negative feedback increases stability **[Apr/May-08] [5]**
7. Draw the circuit of an emitter follower identify the type of negative feedback. Calculate the gain, input and output resistance with and without feedback. [Nov/Dec-08] [Nov/Dec-14] [16]
8. Draw the circuit diagram of voltage series feedback amplifier using BJT and analyze the circuit to determine the input and output resistance. [May/Jun-09] [16]
9. Draw the block diagram of feedback amplifier and discuss the effect of negative feedback with respect to closed loop gain , bandwidth and distortion (Nov’11)(10)
10. An amplifier has a mid band gain of 125 and a bandwidth of 250KHz. If 4%negative feedback is introduced, find the new bandwidth and gain. If the bandwidth is to be restricted 1MHz, find the feedback ratio. (Nov’11)(6)
11. With neat circuit diagram explain which type of feedback is employed in a BJT emitter follower and obtain the expression for Av, Ai, Ri and Ro. (Nov’11)(8)
12. The voltage shunt feedback amplifier hs the following values of circuit parameter Rs = 600Ω , hie = 5KΩ, hfe = 80, Rl = 2 KΩ, RB = 40KΩ. Calculate the Av, Rif, Avf, Rof and R’of. (Nov’11)(8)
13. Draw the block diagram of voltage series amplifier and derive for Avf, Rif and Rof. Draw a two stage amplifier with voltage series amplifier. .(Nov’13)( (May’14)(10)
14. Explain how a negative feedback in an amplifier helps in reduction of distortion and noise.(Nov’13)(6)
15. Draw the typical circuit for current series feedback confirmation and drive the expression for voltage gain , current gain, input impedance and output impedance. (Nov’13)(10)
16. Discuss the effect of negative feedback on stabilization of gain(Nov’13)(6)
17. Derive the bandwidth with feedback BW.(May’14)(6)
18. Find the type of amplifier shown in the diagram given below and draw the basic amplifier without feedback and find its gain with equivalent circuit. Also find feedback factor and its closed loop voltage gain. (16)(May’14)

(Circuit diagram draw)