Chapter 4
Feedback in Amplifiers

One mark questions (knowledge)

1. What is feedback?
2. Mention the types of feedback.
3. Define positive feedback.
4. Define negative feedback.
5. Define feedback factor.
6. Define open loop gain.
7. Define closed loop gain.
8. What is meant by loop gain?
9. Write the expression for the gain of an amplifier with positive feedback.
10. Write the expression for the gain of an amplifier with negative feedback.
11. Write the expression for the input impedance of an amplifier with negative feedback.
12. Write the expression for the output impedance of an amplifier with negative feedback.
13. Write the expression for the upper cut-off frequency of an amplifier with negative feedback.
14. Write the expression for the lower cut-off frequency of an amplifier with negative feedback.
15. Name the type of feedback that is preferred for an amplifier.
16. Which type of feedback is required in an oscillator?
17. What is the effect of negative feedback on bandwidth of an amplifier?
18. What happens to the input impedance of the amplifier when voltage series negative feedback is applied?
19. What happens to the output impedance of the amplifier when voltage series negative feedback is applied?
20. What is the effect of negative feedback on gain stability of an amplifier?
21. Which type of negative feedback decreases both input and output impedance of an amplifier?
22. What kind of negative feedback decreases input impedance and increases output impedance?
23. What is the effect of negative feedback on the gain bandwidth product of the amplifier?
24. Mention the only disadvantage of negative feedback.

One mark questions (understanding)

1. What happens to the voltage gain of an amplifier when negative feedback is applied?
2. What happens to the input impedance of an amplifier when negative feedback is applied?
3. Which type of feedback is required to reduce distortion in an amplifier?

One mark questions (skill)

1. Draw the block diagram of voltage series negative feedback.
2. Draw the block diagram of voltage shunt negative feedback.
3. Draw the block diagram of current series negative feedback.
4. Draw the block diagram of current shunt negative feedback.

Two mark questions (knowledge)

1. Name the type of feedback used in an amplifier and an oscillator.
2. Mention the advantages of negative feedback.
3. Mention the different types of negative feedback.
4. Mention the disadvantages of positive feedback.
5. Write the expressions for the gain and bandwidth of an amplifier using negative feedback.
6. Write the expressions for the input impedance and output impedance using negative feedback.
7. Write the expressions for the lower cutoff frequency and upper cutoff frequency of an amplifier using negative feedback.
8. Write the expressions for the noise and distortion of an amplifier using negative feedback.

Two mark questions (understanding)

1. Distinguish between open loop and closed loop gain.
2. Distinguish between positive feedback and negative feedback.
3. Explain the effect of positive and negative feedback on the gain of an amplifier.
4. Positive feedback is seldom used in amplifier, why?
5. Explain gain bandwidth product of an amplifier.

Two mark questions (skill)

1. Draw the block diagrams of voltage series negative feedback and current shunt negative feedback.
2. Draw the block diagrams of current series negative feedback and voltage shunt negative feedback.
3. Draw the frequency response curve of an amplifier with and without negative feedback.

Three mark questions (knowledge)

1. Explain the terms feedback ratio, loop gain and closed loop gain.
2. What is meant by gain stability of a negative feedback amplifier? Explain the effect of negative feedback on gain stability of an amplifier.

Three mark questions (understanding)

1. With a block diagram, derive an expression for output impedance of an amplifier with negative feedback.
2. With a block diagram, derive an expression for voltage gain of an amplifier with negative feedback.
3. With a block diagram, derive an expression for input impedance of an amplifier with negative feedback.
4. Derive an expression for gain stability of an amplifier with negative feedback.

Three mark questions (skill)

1. Draw the frequency response curve of an amplifier with and without feedback. Write the expression for the bandwidth of an amplifier with negative feedback.

PROBLEMS:

1. Calculate the gain of a negative feedback amplifier with an open loop gain A=250 and feedback factor β=0.1.   (Ans= 9.65)

2. In a negative feedback amplifier if A=1000 and β=0.04, find the gain with feedback.

     (Ans= 24.39)

3. An amplifier of gain 600 reduces to 50 after negative feedback. Calculate the feedback fraction.

     (Ans= 0.0183 or 1.83%)

4. If an amplifier has a bandwidth of 500 Hz and voltage gain of 100. What will be the new bandwidth if 6% negative feedback is introduced?

     (Ans= 3500kHz)

5. In an amplifier upper cut-off frequency is 1000 kHz and open loop gain is 100. Determine upper cut-off frequency when 2% negative feedback is introduced.

     (Ans= 3000kHz)

6. In an amplifier lower cut-off frequency is 500 Hz and open loop gain is 100. Determine lower cut-off frequency when 5% negative feedback is introduced.

     (Ans= 83.3Hz)

7. An amplifier with Z_i= 1kΩ has a voltage gain A= 1000. If a negative feedback of β=0.01 is applied. Calculate the input impedance of the negative feedback amplifier.

     (Ans= 11KΩ)

8. An amplifier with Z_O= 10kΩ has a voltage gain A=500. If a negative feedback of β=0.01 is applied. Calculate the input impedance of the negative feedback amplifier.

     (Ans= 1.6 KΩ)

9. An amplifier has a bandwidth of 220 kHz and voltage gain of 100. Calculate the gain and bandwidth if 10% negative feedback is introduced.

     (Ans= 2420kHz)

10. An amplifier has an output impedance of 3kΩ without feedback and 300Ω with feedback. If the open loop gain is 180 find the feedback factor.

     (Ans= 0.05 or 5%)

11. The input impedance of an amplifier is 2kΩ while its output impedance with and without feedback is 150Ω and 5kΩ. If the open loop gain of the amplifier is 500, calculate the input impedance with feedback.

     (Ans= 66.6kohm)

12. The output impedance of an amplifier is 5kΩ while its input impedance with and without feedback is 15kΩ and 5kΩ. If the open loop gain of the amplifier is 100 calculate the gain with feedback.

     (Ans= 33.3)