Dhanalakshmi Srinivasan Engineering College - Perambalur
Department of EEE

QUESTION BANK

Linear Integrated Circuits and Applications

UNIT-I
ICs FABRICATION

PART A

1. Mention the advantages of integrated circuits.
2. Write down the various processes used to fabricate IC's using silicon planar technology.
3. What is the purpose of oxidation?
4. Why aluminum is preferred for metallization?
5. What are the popular IC packages available?
6. Name the parameters which govern the thickness of the film in the oxidation process.
7. What do you mean by monolithic process?
8. List the advantages of integrated circuits over discrete component circuit
9. What are various steps involved in basic planar process of IC fabrication.
10. What are the limitations of integrated circuits?
11. What is the advantage of using dry etching process?
12. What is meant by epitaxial growth?
13. What are the advantages of ion implantation technique?
14. Why aluminium is preferred for metallization?
15. What is ion implantation?
16. Name the different types of IC packages.
17. Classify IC's based on the fabrication.
18. Give reason for selecting SiO_2 for oxidation process in IC fabrication

PART B

1. Explain in detail the fabrication of ICs using silicon planar technology.
2. Design an active load for an emitter-coupled pair(differential amplifier)
3. Explain the process of epitaxial growth IC fabrication with neat diagram?
4. Explain the fundamental of monolithic IC technology using suitable circuit?
5. Explain the process of photolithography.
6. Compare Ion implantation with diffusion.
7. What are the different ways by which the diode structure can be realized in IC?
8. Explain the importance of isolation and discuss the method of isolation.
9. Explain the various steps involved in the process of fabricating monolithic IC.

UNIT-II
CHARACTERISTICS OF OPAMP

PART A

1. Define an operational amplifier.
2. Mention the characteristics of an ideal op-amp.
3. What happens when the common terminal of V+ and V- sources is not grounded?
4. Define input offset voltage.
5. Define input offset current. State the reasons for the offset currents at the input of the op-amp.
6. Define CMRR of an op-amp.
7. What are the applications of current sources?
8. Justify the reasons for using current sources in integrated circuits.
9. What is the advantage of widlar current source over constant current source?
10. Mention the advantages of Wilson current source.

11. Define sensitivity.
12. What are the limitations in a temperature compensated zener-reference source?
13. What do you mean by a band-gap referenced biasing circuit?
14. In practical op-amps, what is the effect of high frequency on its performance?
15. What is the need for frequency compensation in practical op-amps?
16. Mention the frequency compensation methods.
17. What are the merits and demerits of Dominant-pole compensation?
18. Define slew rate.
19. Why IC 741 is not used for high frequency applications?
20. What causes slew rate?
21. Calculate the output voltage $V_{0\ of}$ the circuit shown in fig. 1

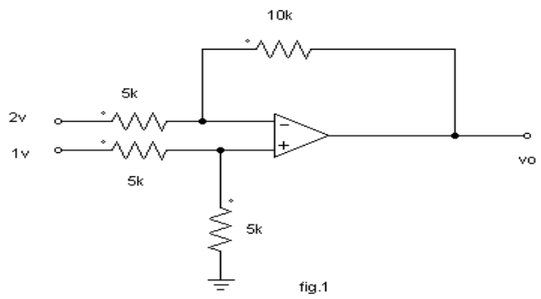


fig.1

22. Draw the circuit diagram of voltage follower using IC 741.
23. For the op-amp shown, determine the voltage gain.

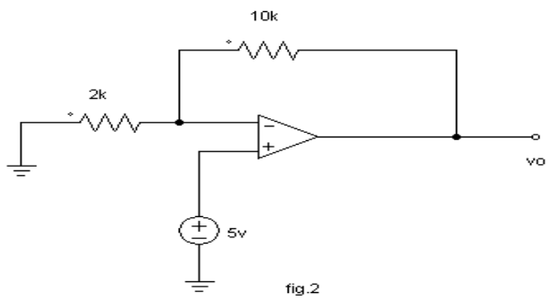
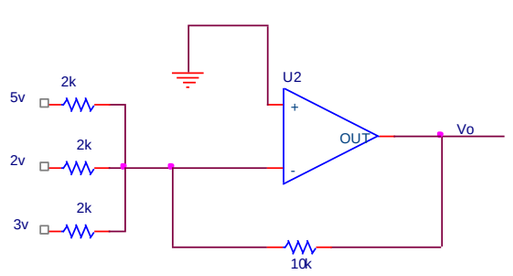


fig.2

PART B

1. Write a brief note on frequency compensation in op-amp.
2. Explain various stability criteria of op-amp circuit.
3. What are the methods used to improve the slew rate? Briefly explain.
4. Discuss the various DC characteristic of op-amp.
5. Explain the operation of differential amplifier
6. With circuit and waveforms explain the working operation of voltage shunt Feedback amplifier.
7. Discuss the frequency response of op-amp
8. With circuit and waveforms explain the working operation of voltage series feedback amplifier.
9. Obtain the frequency response of an open-loop op-amp and discuss about the methods of frequency compensation .
10. A)What is meant by voltage follower?
    B)Determine the output voltage v_o for the following circuit.



11. What are the methods used to improve the slew rate? Briefly explain.
12. (a) For a non inverting amplifier R1=1K?, Rf=10K?
    (i) Calculate the maximum output offset voltage due to Vos .

    Given Ib =300nA, Ios=50nA,
    Vos =10mv , Ios =9nA
    (ii) Calculate the value of Rcomp needed to reduce the effect of Ib
    (iii) Calculate the maximum output offset if Rcomp is connected in the circuit.
    (b) Design an adder circuit using op-amp to get the out put expression as
    Vo= - (0.1V1+V2+10V3)

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    (ii) Calculate the value of Rcomp needed to reduce the effect of Ib
    (iii) Calculate the maximum output offset if Rcomp is connected in the circuit.
    (b) Design an adder circuit using op-amp to get the output expression as
    Vo= - (V1+5V2+10V3)

UNIT III
APPLICATION OF OP – AMPS

PART A

1. Mention some of the linear applications of op – amps :
2. Mention some of the non – linear applications of op-amps:-
3. What is the need for an instrumentation amplifier?
4. List the features of instrumentation amplifier:
5. What do you mean by a precision diode?
6. Write down the applications of precision diode.
7. List the applications of Log amplifiers:
8. What are the limitations of the basic differentiator circuit?
9. Write down the condition for good differentiation :-
10. What is a comparator?
11. What are the applications of comparator?
12. What is a Schmitt trigger?
13. What is a multivibrator?
14. What do you mean by monostable multivibrator?.
15. What is an astable multivibrator?
16. What is a bistable multivibrator?
17. What are the requirements for producing sustained oscillations in feedback circuits?
18. Mention any two audio frequency oscillators :
19. What are the characteristics of a comparator?
20. What is a filter?
21. What are the demerits of passive filters?
22. What are the advantages of active filters?
23. Mention some commonly used active filters :
24. List the broad classification of ADCs.
25. List out some integrating type converters.
26. What is integrating type converter?
27. Explain in brief the principle of operation of successive Approximation ADC.
28. What are the main advantages of integrating type ADCs?
29. Where is the successive approximation type ADC’s used?
30. What is the main drawback of a dual-slop ADC?
31. State the advantages of dual slope ADC:
32. Define conversion time.
33. Define resolution of a data converter.

34. Define accuracy of converter.
35. What is settling time?
36. Explain in brief stability of a converter:
37. What is meant by linearity?
38. What is monotonic DAC?
39. What is multiplying DAC?
40. What is a sample and hold circuit? Where it is used?
41. Define sample period and hold period.
42. What is meant by delta modulation?

PART B

1. Discuss the need for an instrumentation amplifier? Give a detailed analysis for the same.
2. Explain the operation of the Schmitt trigger.
3. Discuss in detail the operation of Astable multivibrator.
4. Discuss in detail the operation of Monostable multivibrator.
5. What are the requirements for producing sustained oscillations in feedback circuits? Discuss any two audio frequency oscillators.
6. Explain the operation OF Wein bridge oscillator
7. What is integrating type converter? Explain the operation of dual slope ADC:
8. Explain the principle of operation of successive Approximation ADC.
9. Explain the operation of sample and hold circuit .
10. Explain the various types of digital to analog converters:
11. Explain the operation of FLASH type ADC.
12. Discuss the need for an filter? Give a detailed analysis for active filter.

UNIT –IV
555 TIMER ANALOG MULTIPLIER AND PLL

PART A

1. Mention some areas where PLL is widely used:
2. Mention some applications of 555 timer:
3. List the applications of 555 timer in monostable mode of operation:
4. List the applications of 555 timer in Astable mode of operation:
5. List the basic building blocks of PLL:
6. What are the three stages through which PLL operates?
7. Define lock-in range of a PLL:
8. Define capture range of PLL:
9. Define Pull-in time.
10. Give the classification of phase detector:
11. What are the problems associated with switch type phase detector?
12. What is a voltage controlled oscillator?
13. On what parameters does the free running frequency of VCO depend on?
14. Give the expression for the VCO free running frequency.
15. Define Voltage to Frequency conversion factor.
16. What is the purpose of having a low pass filter in PLL?
17. Discuss the effect of having large capture range.
18. Mention some typical applications of PLL:
19. What is a compander IC? Give some examples.
20. What are the merits of companding?.
21. List the applications of OTA:

PART B

1. Briefly explain the block diagram of PLL and derive the expression for Lock range and capture range.
2. With a neat functional diagram, explain the operation of VCO. Also derive an expression for fo.
3. Analyze the analog multiplier IC with a neat circuit diagram. Discuss its applications.

4. discuss the applications of PLL:
5. What is 555 timer? What are the features of 555 timer? Explain the monostable mode in detail?
6. Explain the Astable mode of operation using 555 timer.
7. discuss the applications of 555 monostable timer.

UNIT V
SPECIAL FUNCTION ICs

PART A

1. What is a voltage regulator?
2. Give the classification of voltage regulators:
3. What is a linear voltage regulator?
4. What is a switching regulator?
5. What are the advantages of IC voltage regulators?
6. Give some examples of monolithic IC voltage regulators:
7. What is the purpose of having input and output capacitors in three terminal IC regulators?
8. Define line regulation.
9. Define load regulation.
10. What is meant by current limiting?
11. Give the drawbacks of linear regulators:
12. What is the advantage of switching regulators?
13. What is an opto-coupler IC? Give examples.
14. Mention the advantages of opto-couplers:
15. What is an isolation amplifier?

PART B

1. In detail dicuss the 723 IC general purpose voltage regulator.
2. Explain the operation of switching regulators.Give its advantages.
3. Explain the functional diagram of LM 380 power amplifier.
4. Explain any one isolation amplifier IC with the help of block diagram and state application of isolation amplifier IC.
5. Explain the operation of ICL 8038 function generator. Give its advantages.
6. Explain the operation of opto electronic ICs