

QUESTION BANK

PERIOD: July - Nov 2024

BATCH: 2022-2026

BRANCH: ECE

YEAR/SEM: V

SUB CODE/NAME: BTEC 503-18 LINEAR INTEGRATED CIRCUITS

UNIT I: BASICS OF OPERATIONAL AMPLIFIERS

PART A

1. What is a Voltage Reference?
2. Why is the slew rate infinite an ideal op-amp?
3. Define slew rate. What causes slew rate?
4. What are the assumptions made from ideal Op-amp characteristics? (or) List the ideal characteristics of an op-amp (or) List the characteristics of ideal Op-amp and draw its equivalent circuits?
5. Why is collector resistance replaced by a constant current source in differential amplifier?
6. State the significance of current mirror circuit.
7. Define Differential Mode gain.
8. Compute any two blocks associated with Op-Amp block schematic?
9. What are the two methods can be used to produce voltage sources?
10. Enumerate any four advantages of ICs over discrete component circuits.
11. Find the maximum frequency for a sine wave output voltage of 12v peak with an OP-AMP whose slew rate is $0.5\text{V}/\mu\text{s}$.
12. Find the maximum frequency for sine wave output voltage 10Vpp with an op-amp whose slew rate is $1\text{V}/\mu\text{s}$.
13. Differentiate the Ideal and Practical characteristics of an op-amp.)
14. A differential amplifier has a differential voltage gain of 2000 and a common mode gain of 0.2. Determine the CMRR in dB.
15. Define input bias current and input offset current of an operational amplifier.
16. Mention two advantages of active load over passive load in an operational amplifier.
17. An operational amplifier has a slew rate of $4\text{V}/\mu\text{s}$. Determine the maximum frequency of operation to produce a distortion less output swing of 12V.
18. List the advantages of IC over discrete component circuit.
19. Define input offset current and input offset voltage.
20. Define CMRR AND PSRR. Mention their ideal values.
21. What is the maximum undistorted amplitude, that a sine wave input of 10 kHz can produce at the output of an op-amp whose slew rate is $0.5\text{ V}/\mu\text{s}$?

22. What is the purpose of a current source in integrated circuits?
23. What is an op-amp? List its functions.
24. List the essential terminals of an op-amp.
25. Explain the virtual ground concept with a suitable example.
26. Design a circuit using op-amp whose gain is -3 .
27. What are the factors that affect the stability of an op-amp?
28. What are the various methods available for frequency compensation?
29. Mention some applications of op-amp in open loop mode.
30. Why are FET op-amps better than BJT op-amps? Op-amps using FETs in the input stage offer some very significant advantages over bipolar op-amps, especially in areas as input impedance, input bias and offset currents and slewing rate as shown in table.
31. Explain thermal drift related to an op-amp.
32. Why is current mirror circuit used in differential amplifier circuit?
33. What is the need of integrator?
34. How does a zero crossing detector work?
35. Draw the circuit of clipper using op-amp.
36. What is the function of a phase shift circuit?
37. What is hysteresis and mention the purpose of hysteresis in a comparator?
38. Draw the circuit diagram of an op-amp differentiator circuit.
39. What is a comparator? List the applications of comparator. (or) Draw the circuit diagram of the comparator. Mention its applications.
40. What is an instrumentation amplifier? Explain.
41. Explain Schmitt trigger?
42. Draw the transfer characteristics of an ideal and a practical comparator.
43. With neat diagram explain logarithmic amplifier and antilogarithmic amplifier.
44. Draw the circuit of temperature independent logarithmic amplifier and explain its operation. Also deduce the expression for output voltage.
45. With neat circuit diagram explain the working principle of instrumentation amplifier and derive its differential gain.
46. Describe about the voltage follower circuit.
47. Explain the circuit of a Non-inverting comparator.
48. Describe the circuit and working of a Square-wave generator.
49. Explain the application of operational amplifier as differentiator.
50. With neat figures describe the circuit using Op Amps as First order Butterworth High pass filter. Design a second order high pass Butterworth filter having cut off frequency of 1 KHz.
51. Mention two advantages of active filter over passive filter. also design a second order filter using

- operational amplifier for upper cut off frequency of 2 KHz. assume the value of capacitor to be $0.1\mu\text{ F}$.
- 52.** Design a second order low pass Butter worth filter for a cut off frequency of 1 KHz.
 - 53.** Describe Analog multiplier and mention its two applications.
 - 54.** List the features of 566 VCO.
 - 55.** Define lock range of a PLL. Define Capture range, Lock in range, Pull in time.
 - 56.** Explain the circuit of a RC Phase Shift Oscillator.
 - 57.** What are the modes of operation of a timer? Draw the functional diagram of a square wave generator using timer and derive its duty cycle.
 - 58.** Explain the working principle of Triangular wave generator circuit using op-amp and mention its application.
 - 59.** Describe the working of IC723 voltage regulator and explain the importance of current limiting techniques. Also, state the need for isolation amplifier.
 - 60.** With a neat circuit diagram, explain the working of linear voltage regulator using operational amplifier.
 - 61.** With neat diagram explain the working of step down switching regulator and step up regulator.
 - 62.** Discuss the functionalities and working of switched mode power supply.
 - 63.** State the significant difference between fixed and adjustable voltage regulators.
 - 64.** Draw and explain the functional block diagram of the LM 317 three terminal adjustable regulators.
 - 65.** Give the classification of Power amplifiers and explain.
 - 66.** Explain the following ICs function and application: (i) Audio Power Amplifier (ii) Video Power Amplifier.
 - 67.** Explain about a) Pulse width modulator b) Pulse Stretcher
 - 68.** Explain the working and functionalities of LM 380 power audio amplifier, Switched Capacitor Filter, Opto coupler.
 - 69.** With Necessary Sketches, explain about Opto Couplers / Opto Isolators.
 - 70.** Write short notes on Isolation amplifier.