

Electrical Engineering
Analog Electronics Circuits

1. Draw the circuit of a simple zener voltage regulator and design the value of series resistor R_S for a load voltage of 12V. Given $R_L = 500 \Omega$, $I_{zmax} = 80 \text{ mA}$, $I_{zmin} = 10 \text{ mA}$, $V_{inmin} = 15 \text{ V}$, $V_{inmax} = 18 \text{ V}$.
2. Draw the frequency response characteristics of RC coupled amplifier and explain the reasons behind its shape.
3. List out the merits and demerits of negative feedback on amplifier performance
4. Compare the characteristics of ideal Op-Amps and practical Op-Amps.
5. Draw the circuit of an inverting amplifier and obtain the expression for its closed loop gain.
6. Draw the Schmitt trigger circuit and determine the threshold voltages V_{UT} and V_{LT} in a circuit with two resistors $18 \text{ k}\Omega$ and $1 \text{ k}\Omega$, $V_{ref} = 4 \text{ V}$, and saturation voltage $= \pm 15 \text{ V}$
7. With necessary diagrams explain the operation of OP-Amp square wave generator.
8. Explain the operation of Op-Amp crystal oscillator.
9. Draw and explain the h parameter small signal low frequency model for BJT.
10. Derive the expressions for current gain, input impedance, voltage gain and output impedance using h parameters of BJT.
11. Draw and explain small signal model of FET.
12. Obtain the operating point set by the voltage divider bias circuit for an NPN CE transistor with $\beta = 50$ and $V_{BE} = 0.7 \text{ V}$. Given $V_{cc} = 18 \text{ V}$, $R_1 = 82 \text{ k}\Omega$, $R_2 = 22 \text{ k}\Omega$, $R_c = 5.6 \text{ k}\Omega$ and $R_e = 1.2 \text{ k}\Omega$.
13. Explain the construction, biasing, operation and characteristics of JFET.
14. With necessary diagrams explain the working of class A transformer coupled
15. amplifier and obtain the maximum overall efficiency.
16. What are its advantages and disadvantages
17. Compare different types of multistage amplifiers.
18. With a neat circuit diagram explain the operation of Colpitt's oscillator using BJT.
19. Define the following terms
 - i) CMRR
 - ii) Slew rate
 - iii) Input bias current

(iv) Input offset voltage

20. Give the typical values of above parameters for 741 IC
21. Explain the operation of Op-Amp integrator and differentiator circuits.
22. Explain the working and design of a triangular wave generator circuit with necessary diagrams.
23. What are the features of instrumentation amplifier? Derive the expression for output voltage of an instrumentation amplifier.
24. Design the feedback circuit of a Wein Bridge oscillator with 2MHz output frequency.
25. With the help of internal circuit diagram of IC555 explain the operation of a stable multivibrator. Derive the expression for frequency of oscillation.