Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

Autonomous

QUESTION BANK

Department of Electronics

<u>Subject – ELE4102: Integrated Circuit Analysis</u>   Class: M.Sc.-I

Q1] Answer in one or two sentences.   **2M**

1. Define D.C. or Static resistance in diode.

2. Define A.C or Dynamic resistance in diode.

3. Mention the applications of class-c tuned amplifier.

4. List the diode applications.

5. Define the transition capacitance (CT) in diode.

6. What is Diffusion capacitance in diode?

7. Write diode current equation.

8. When a reverse bias is applied to a germanium PN junction diode, the reverse saturation current at room temperature is 0.3 µA. Determine the current flowing in the diode when 0.15V forward bias is applied at room temperature.

9. Determine the forward bias voltage applied to a silicon diode to cause a forward current of 10m A and reverse saturation current, $I_o = 2.5 \times 10^{-7}$ at a room temperature.

10. Determine the forward resistance of a PN junction diode when the forward current is 5m A at T=300K. Assume silicon diode.

11. In a common base transistor circuit, the emitter current IE is 10mAand the collector current Ic is 9.8mA. Find the value of the base current IB.

12. If a transistor has α of 0.97, find the value of β. If β is 200, find the value of α.

13. When the emitter current of a transistor is changed by 1mA, there is a change in collector current by 0.99mA. Find the current gain of the transducer.

14. When a reverse gate voltage of JFET changes from 4.0 to 3.9v, the drain current changes from 1.3 to 1.6 mA. Find the value of transconductance.

15. Define differential gain of amplifier.

16. Define common mode gain of amplifier.

17. Define Q factor of resonant circuit.

19. Define the CMRR and Slew rate.

20. For a given Opamp CMRR=10^5 and differential gain Ad=10^5. Determine the common mode gain Acm of the Opamp.

21. The output voltage of a certain opamp circuit changes by 20v in 4µs. What is Slew rate?

22. What is frequency response?

23. Mention application of PLL.

Q2] Write a Short Note on below.   **4M**

1. Write a note on Transition or space charge Capacitance (CT).
2. Write a note on Diffusion Capacitance (Cd).
3. Write a note on Avalanche breakdown in diode.
4. Write a note on Zener breakdown in diode.
5. Write a note on Temperature effect on PN junction diode.
6. Write a note on Pinch off voltage in PN junction.
7. Write a note on Darlington amplifier
8. Write a note on Oscillator.
9. Write a note on Miller Oscillator
10. Write a note on Diode comparator
11. Write a note on Class AB amplifier
12. Write a note on Class c Power amplifier.
13. Write a note on Stagger tuned amplifier.

Q 3] Short answer.   **4M**

1. Explain I-V characteristics of forward bias PN junction diode.
2. Explain diode current equation.
3. The reverse saturation current of a silicon PN junction diode is 10µA. calculate the diode current for the forward bias voltage of 0.6v at 25c.
4. What is a PN junction? How is it formed?
5. Explain the formation of depletion region in a PN junction.

6. Derive the relationship between α and β.
7. What is tuned amplifier? Define the Q-factor of a resonant circuit.
8. What is stagger tuned amplifier? Explain its working.
9. What is the effect of temperature on diode characteristics?
10. Distinguish between Butter worth and Chebyshev filter approximation techniques.
11. Determine the H-parameter   for CE configuration.
12. Draw the circuit diagram of an active low pass filter. Design it for cut-off frequency 2 KHz and pass band gain of 1.56.
13. Describe the different coupling scheme used in BJT amplifiers.
14. Distinguish between Zener and avalanche breakdown in PN junction diode.
15. Explain the different type of distortion in amplifier.

Q 4] long answer questions.   6M

1. Explain I-V characteristics of PN junction diode.
2. Derive the relationship between α ,β and γ of a transistor. Show how they are related to each other.
3. Compare the performance of CB, CC, and CE configuration of BJT.
4. Compare JFET and BJT.
5. Explain the working of N-channel JFET.
6. Explain I-V characteristics of N-channel MOSFET.
7. Explain Ebers Moll model.
8. Draw the ckt diagram of common emitter/common collector/ common base amplifier and explain its working.
9. Explain Miller theorem.
10. What are DC amplifiers? Mention a few applications of dc amplifiers.
11. Explain two stages RC coupled amplifiers.
12. Explain classification Based on biasing condition of amplifier.
13. Explain large signal amplifier (class A).
14. Draw the circuit of Hartley oscillator and explain its working .Derive the expressions for frequency of oscillation and condition for starting of oscillation.
15. Draw the circuit of colpitts oscillator. How is the feedback requirement in it?
16. Describe the construction of phase shift oscillator and explain its working.

17. What are the merits and demerits of phase shift oscillator.
18. Draw the circuit diagram of a wein bridge oscillator and explain its operation.
19. Draw the equivalent circuit of a quartz crystal.
20. Explain diode as positive clipper.
21. Explain ideal characteristics of Opamp.
22. Draw the Circuit diagram of practical differentiators using OPAMP and give its designing steps.
23. In the colpitts, $C1=0.2\mu F$ and $C2=0.022\mu F$, If frequency of oscillator is 9 kHz, Find value of inductor .Also find required gain for oscillation.
24. Draw the circuit diagram of Instrumentation amplifier and obtain the expression for its output.
25. What is feedback amplifier? List two types of feedback.
26. Explain virtual ground concept in an Opamp.
27. Design active Low pass filter.
28. Design active High pass filter.
29. Design first order BPF and BRF.
30. What is the concept of Phase lock loop?
31. With the help of circuit diagram, explain depletion and enhancement mode of operation in MOSEFT.
32. What is clamper? Explain the working of a clamper with neat circuit diagram.
33. Explain Colpitts oscillator with circuit diagram. Derive the expression for frequency of oscillations.
34. Obtain the expression for input impedance and output impedance with negative feedback for Non-inverting Amplifier.

Q5] Long answer questions.   12M

1. Draw and Explain diode clipper with biasing.
2. Explain switching charteristics of PN junction diode.
3. Compare CE, CB, and CC configuration of BJT.
4. Differentiate BJT, JFET and MOSFET transistor.
5. Design and analysis of LC and RC oscillator.
6. With neat diagram showing the structure of each JFET and MOSFET, explain how the construction of MOSFET is different from JFET.

7. What are active filters? What are their advantages over passive filters? Compare between active and passive filters. Draw the circuit diagram of second order low pass Butterworth filter and write its design equations.
8. Draw the block diagram of PLL and explain the function of each block. State its applications.
9. Explain the following terms associated with OPAMP.
    A) Input offset voltage
    B) Input offset current
    C) Input bias current
    D) CMRR
    E) Slew rate.
10. Explain the below terms related to diode,
    A) Cut-off voltage.
    B) Dynamic Equilibrium.
    C) Biasing.
    D) Space charge region.
    E) Breakdown in diode.

---xx--