EC1203: ELECTRONICS CIRCUITS-I

UNIT-I

TRANSISTOR BIASING

PART-A

1. Define stability factor.
2. Give the relations between α and β
3. What are three operating regions of BJT?
4. Why biasing is necessary in BJT amplifiers?
5. What is DC Loadline?
6. What is Q point?
7. What are the factors that affect the Q-point of a circuit using BJT?
8. How AC loadline are drawn?
9. Define 3 stability factor
10. Derive expression for stability factors.
11. Explain the different biasing circuits.
12. Explain the various methods for stabilizing the Q point.
13. Explain about fixed biasing.
14. Design a Fixed bias which has β=100 .The DC biasing point is at VCE =5vand Ic5mA, Vcc=5V.
15. Derive the stability factor of a fixed bias circuit.
16. Discuss the Advantages and disadvantages of fixed bias.
17. What is meant by transistor biasing and state the bias which is most commonly used?
18. Draw the fixed bias circuit with Vcc=10v, Rb=930kΩ, Rc=4KΩ. Determine the operating point with β=100.
19. Consider CE Amplifier with Fixed bias if β=150,Rb=1kΩ,Rc=10kΩ and Vcc=30v. Find the Q point.
20. Draw the collector to base bias circuit.
21. Design a collector to base bias circuit for the V_{ceq}=5v, I_{cq}=5mA,V_{cc}=12v and β=120
22. Derive the expression for Stability factor of a collector to base bias.
23. Discuss the Advantages and disadvantages of Collector to base bias circuit.
24. Determine the bias resistor R_b for Fixed bias and collector to base bias with the values V_{cc}=12v,R_c=330 Ω , I_b=0.3mA,β=100,Vceq=6v and compare the stability factor S
25. Difference between ohmic and saturation region.
26. Draw and explain about potential divider.
27. Draw the Thevenins equivalent circuit for voltage divider bias circuit.
28. Derive the expression for stability factor S of voltage divider bias.

29. What are the Advantages and disadvantages of self biasing circuits
30. Compare the 3 different biasing of transistor.
31. What are the biasing methods of JFET?
32. Does thermal runaway takes place in FET
33. How JFET can be used as a Voltage Variable resistor.
34. Explain the biasing of MOSFET.
35. What is the use of temperature compensation in an electronics circuits
36. Name some temperature compensation method
37. Draw the circuit diagram of Sensistor compensation.
38. What is Thermal runaway?
39. Explain the biasing of EMOSFET.
40. Why Self bias method not used on EMOSFET.

PART-B

1. Find the stability factor S of a collector to base bias circuit having Vcc=10v, Rc=1kΩ,Rb=100kΩ,Vce=5v. Prove the circuit has better stability than Fixed bias.
2. Prove the self bias is better compared to collector to base bias circuit.
3. Draw the Voltage divider bias with Vcc=12v, R1=10K, R2=5K, Rc=1k and Re=3k. Determine the operating points using Thevenins theorem
4. Draw the voltage divider bias with Vcc=10v, R1=10k, R2=2.2k, Rc=3.6k, Re=1k and β=100.Calculate V_b, I_b, V_e, Emitter current (I_e) and V_{ce}.
5. Calculate the value of Feedback resistor (Rs) required to self bias an N channel JFET with Idss=40mA, Vp=-10v and V gsq=-5v.
6. Obtain the Q point for the self bias circuit using FET with the values such as V_{DD}=20v,Rd=3.3k, RG=1M Ω and Rs=1K Ω
7. Explain the circuit which uses a diode to compensate for changes in Vbe.
8. Explain the circuit which uses a diode to compensate for changes in Ico.
9. Explain the operation of Thermistor compensation.
10. Explain the biasing of Mosfet.
11. Explain the biasing of FET.

UNIT-II

SMALL SIGNAL AMPLIFIERS

PART-A

1. Expression for H- parameter.
2. Draw the hybrid equivalent circuit for Transistor configuration.
3. Merits of hybrid model.
4. State Thevenins Theorem and Norton's Theorem.
5. Obtain the expression of h_{re} and h_{ie} interms of the CB h parameters.
6. Compare the performance of CE, CB and CC Amplifier.
7. Need of Cascading.
8. What is the reason for expressing gain in decibel?
9. Draw a cascade amplifier.
10. Draw the circuit of bootstrap emitter follower.
11. Why is the name bootstrapping.
12. Draw the Darlington emitter follower circuit.
13. What kind of technique used for increasing input impedance.
14. Define CMRR.
15. How to improve CMRR.
16. State Bisection Theorem.

PART-B

1. Derive he input impedance for the current gain, input impedance, voltage gain and output admittance of a small signal transistor amplifier interms of the h parameters.
2. 2. Derive the expression for current gain, voltage gain, input Impedance and output admittance for an emitter follower circuit
3. For an CE amplifier (R1=100k, R2=10k, Rc=10k & Re=100k).Calculate the current gain, voltage gain, input resistance and output resistance. The h parameters are h_{ie}=1.1k, h_{fe}=50, $h_{re}=2.5*10^{-4}$ and $h_{oe}=25*10^{-6}$ µA /V.
4. Derive the expression for A_i, A_v, R_i, R_o for CE Amplifier using h- parameter.
5. Draw the 2 stage RC coupled amplifier
6. Derive the expression for A_i, A_v, R_i , R_o of the cascade amplifier
7. A differential amplifier for which the total emitter bias current is 400 µA uses transistors for which β is specified to lie between 80 and 200. What is the largest possible input bias current.

UNIT-III

FREQUENCY RESPONSE

PART-A

1. What are the effects of coupling capacitors on the bandwidth of the amplifier?
2. Discuss the effect of bypass capacitor on frequency response of a amplifier
3. An audio frequency amplifier is designed for operating over a range of 20 Hz to 20 kHz. Calculate the value of input coupling capacitor C1 if the total series resistance is 10k.
4. Define the term bandwidth.
5. Define cutoff frequencies and bandwidth for an amplifier.
6. What is the relationship between bandwidth and rise time.
7. Define Rise time derive the expression for it.
8. State Millers theorem.
9. Discuss about the low frequency response of the amplifier.
10. Why does gain of CE amplifier drop at high frequency?
11. Draw the small signal model of FET for high frequency.
12. What is cut off frequencies?
13. Discuss the frequency response of the multi stage amplifier.
14. Calculate the overall upper cut off frequencies.
15. Define Sag time
16. Give the main reason for the drop in gain at the low frequency region and high frequency region.

PART B

1. Derive the upper and lower cutoff frequencies of a RC coupled BJT amplifier.
2. For the CE amplifier with following specification (R1=40k, R2=10k, Rc=4k, Re2k, Coupling capacitor C1= 10μf and C2= 1 μf and bypass capacitor across R_E (c=20 μ f). and Rl=1.8k. Determine the low frequency response.
3. Determine the low frequency response of the CS JFET RC coupled amplifier with the following specification (Rd=1.8k Ω, R_g=10 M Ω, R_L=18K and coupling capacitor C1=0.001 μf, C2= 1 μf. Assume I_{GSS}=10nA.
4. Discuss the high frequency response of an amplifier.
5. With a diagram explain hybrid- π for CE transistor model.
6. Draw the high frequency equivalent circuit for a FET amplifier and derive the values of all the parameters.

UNIT-IV

LARGE SIGNAL AMPLIFIERS

PART-A

1. Compare the performance of RC coupled amplifier and transformer coupled amplifier
2. How is cross over distortion caused
3. Define class-C operation
4. Mention the use of heat sink.
5. Mention Any 2 parameters considered for designing the heat sink.
6. Which power amplifier has maximum efficiency? and Mention the efficiency
7. How power amplifiers are classified based on frequency ranges.
8. Classification of power amplifier.
9. Advantages and disadvantages of Class B amplifier.
10. Define Class AB Amplifier.
11. Write short note on frequency distortion.
12. Advantages and disadvantages of directly coupled class A amplifier.
13. Write the disadvantages of transformer coupled class A amplifier.
14. Write short notes on harmonic distortion.
15. What is frequency distortion?
16. Write short notes on phase distortion.
17. For a transformer coupled class A amplifier, the load resistance is 8 Ω and the turns ratio of the transformer [N1/N2] =64, calculate the required turns ratio of the transformer. What is the type of the transformer?
18. What is cross over distortion?
19. Drawback of class B amplifier.
20. Define thermal resistance and heat sink.
21. Compare the efficiency of class A, B, C, AB.

PART-B

1. Explain Class A amplifier.
2. Explain Class B amplifier.
3. Explain Class AB amplifier in detail.
4. Compare the different types of power amplifier.
5. Explain the operation of Class C amplifier and derive its efficiency and figure of merit.
6. Derive efficiency of class A amplifier.
7. For the transformer coupled class A amplifier circuit. Derive the expression for its efficiency.
8. With the diagram explain the operation of class B push pull amplifier.
9. Prove that maximum efficiency of class B push pull amplifier.
10. Describe the operation of class AB amplifier to avoid cross over distortion.
11. Explain the operation of Class S amplifier with diagram.

12. Explain the Power MOSFET amplifier.
13. Differentiate class S from class D amplifier and derive its efficiency.
14. Derive the expression for the maximum efficiency of Class A amplifier.

UNIT-V

FEEDBACK AMPLIFIERS

PART-A

1. What is negative feedback amplifier?
2. Define Loop gain.
3. Define gain stability.
4. What is Feedback amplifier?
5. Difference between positive feedback amplifier and negative feedback amplifier.
6. Define sensitivity and desensitivity.
7. Advantages and disadvantages of negative feedback amplifier.
8. Define feedback factor β.

PART-B

1. Write about distortion in amplifiers.(8)
2. Explain the Nyquist criterion for stability.(8)
3. Explain in detail about the voltage shunt feedback and current series feedback.(16m)
4. Explain in detail about the voltage series feedback.
5. Determine the A_i, A_v, R_i , R_o feedback for voltage series Feedback with A =-100, R_i= 10k, R_o= 20k.
6. Explain in detain about the current shunt feedback amplifier with necessary diagram.