UNIT-I

Short Answer Questions:

1. How depletion region is formed in PN junction diode.
2. Define the concept of diffusion, Forbidden energy gap.
3. Define diffusion and transition capacitance. And derive diffusion capacitance.
4. Write the current equation for Ge and Si PN-junction diode.
5. Explain space charge capacitance of PN junction diode.
6. Define Static and Dynamic resistances.
7. Write the differences between Ideal and practical diode.
8. Define Drift and Diffusion Current.
9. Explain DC load line of a Diode.

Long Answer Questions:.

1. Problems based on finding forward current, saturation current and voltage based on diode current equation.
2. Explain V-I characteristics of a diode.
3. Explain the effect of temperature on applied voltage and reverse saturation current.
4. Derive the expression for diffusion capacitance.
5. Derive Diode Equation.
6. Explain the Current components in a PN Diode.
7. Explain the operation of a diode for i)No bias ii) farward voltage iii) reverse voltage.
8. The voltage across a Si diode at room temperature of 300K is 0.71V when 2.5 mA current flows through it. If the voltage increases to 0.8V, calculate the new diode current?
9. Explain the operation of PN Junction diode and explain the current components of a diode.
10. A Silicon diode has reverse saturation current of 2.5 micro amps at 300k. Find forward voltage for a forward current of 10 milli amps.
11. Explain the effect of temperature on applied voltage and reverse saturation current of PN diode.

12. Explain piece wise linear model of a diode

13. Explain about Intrinsic and Extrinsic Semiconductors

14. Problems discussed

UNIT-II

Short Answer Questions:

1. Explain varactor diode.
2. Define the following terms in tunnel diode.
   (i) peak-point voltage (ii) valley-point voltage (iii) negative-resistance region
3. List of applications on varactor diode.
4. What are the applications of SCR.
5. Explain the breakdown mechanisms in diode.
6. Draw the symbols for Zener Diode,Varactor diode, SCR
7. List of applications on Tunnel diode.

Long Answer Questions:

1. Explain the operation of a tunnel diode with energy band diagrams.
2. Explain how Zener Diode works as a regulator?
3. For the voltage regulator circuit supply voltage is 12 v. R = 5Kohms R_l = 1K ohms. Then find the output voltage of the zener voltage regulator, voltage drop across R V_R, and current through zenar diode I_z.
4. Explain the operation of a zener diode with the help of its V-I characteristics and explain the breakdown mechanisms.
5. Explain the operation of a Varactor diode.
6. Describe the operation, characteristics and applications of silicon controlled rectifier (SCR).

UNIT-III

Short Answer Questions:

1. What is a Rectifier?
2. What is a Filter? And Regulator.
3. Define PIV, Ripple factor, TUF and efficiency of a rectifier.
4. What are the advantages of center tapped full-wave rectifier?
5. Explain the operation of "C" filter.
6. What are the advantages of Bridge rectifier?
7. What are the disadvantages of Half-wave rectifiers?
8. Draw circuit diagram and waveforms of Half-wave rectifier.
9. Draw circuit diagrams and waveforms of Full-wave rectifier.
10. Draw circuit diagrams and waveforms of Bridge rectifiers.
11. Explain the operation of "L" filter.
12. Explain the operation of "Pi" filter.
13. Write differences among Rectifeirs.

Long Answer Questions:

1. Explain the operation of a full wave rectifier and derive I_{dc} , V_{dc}, I_{rms}, V_{rms}, ripple factor (δ), Efficiency (η), TUF, PIV.

2. Explain the purpose of bleeder resistor.
3. Explain the operation of half-wave rectifier and derive its various parameters.

4. In a half-wave rectifier circuit, a voltage of 12 sin wt is applied. The diode has a forward

   Resistance of 10Ω .The load is 1K. Determine V_m, $I_{m, IDC, IRMS}$ and P_i.

5. Explain the operation of FWR bridge rectifier & derive I_{dc}, I_{rms}, V_{rms}, Ripple factor, efficiency η, TUF, PIV.
6. Explain the operation of an inductor filter and calculate its ripple factor.
7. In a Full-wave rectifier circuit, a voltage of 12 sin wt is applied. The diode has a forward resistance of 10Ω .The load is 1K. Determine V_m, $I_{m, IDC}$, I_{RMS} and PIV.

8. Explain the operation of a capacitor filter with FWR and derive its ripple factor?
9. In a bridge rectifier the transformer is connected to 200V, 60 Hz mains and the turn's ratio of the step down transformer is 11:1. Assuming the diode is ideal, find i) I_{dc} ii) voltage across the load iii) PIV.
10. Explain the operation of L-section filter.
11. Calculate the value of inductance to use in the inductor filter connected to a full wave rectifier operating at 60 Hz to provide a dc output with 4%ripple for a 100Ω load.
12. Explain the operation of inductor filter for a FWR and calculate its ripple factor.
13. Explain the operation of π filter and calculate its ripple factor.

Problems discussed in class

UNIT-IV

Short Answer Questions:

1. Explain current components in a transistor.
2. What is the need of biasing in a transistor?
3. Write the relationship between current gains α and β of transistor configurations.
4. What are advantages of CE configuration?
5. Define stability factor & derive expression 'S'.
6. If α = 0.91, find β and If β = 98, find α.
7. Explain how transistor acts as an amplifier.
8. What is early effect?
9. Explain about stabilization against variations in Ico, VBE and β.
10. Derive the relationship between α, β, γ?
11. Define the stability factor and derive the expression for it?
12. What is meant by configuration and draw different configurations of an NPN and PNP transistor.
13. Explain DC load line of a transistor.
14. Why transistor is called as Current Controlled device
15. Explain the concept of Thermal runaway.

Long Answer Questions:

1. Explain input and output characteristics of a common base configured transistor

circuit

2. Explain the Input and output characteristics of common emitter (CE) transistor Configuration.
3. Explain input and output characteristics of a common collector configured transistor circuit Calculate the values of Ic and Ie for a transistor with $\alpha = 0.99$, Icbo = 5μA, I_B is measured as 20μA
4. Calculate the values of Ic and Ie for a transistor with $\alpha = 0.99$, Icbo = 5μA, I_B is measured as 20μA
5. In CB configuration, Ic = 0.96m amps and Ib= 0.05m amps. What is the value of β.
6. Explain the factors that affect the operating point of a transistor.
7. Explain the principle of operation of a fixed bias method and derive its Stability factor.
8. Explain the principle of operation of a Collector feedback and collector to Emitter feedback methods and derive its Stability factor.
9. Explain the operation of a self-bias circuit and derive its stability factor.
10. Design a fixed bias circuit for CE Configuration having β = 89, s = 10 the other value are V_{CE}=6v, V_{RE}=5.5v, VCC=15v, rl=2.5k, VBE= 0.3v.
11. Find emitter current (I_e) for transistor with self-bias circuit having β = 100, Vcc = 20V, R1 = 12KΩ , R2 = 8KΩ , Rc = 2KΩ and RE = 1KΩ .
12. Design a self-bias circuit voltage devider for CE amplifier having β = 99, S = 5. The other values are Vce = 6V, Vcc = 15V, R_E = 2.5KΩ and V_{be} = 0.3V. Ic=2mA Rc=2KΩ .
13. Design a self-bias circuit voltage devider for CE amplifier having β = 99, S = 5. The other values are Vce = 6V, V_{re} = 5.5V, Vcc = 15V, R_l = 2.5KΩ and V_{be} = 0.3V.
14. Explain various bias compensation techniques.
15. Design a Collector to Base bias circuit for given values Vcc=15V, Vce=5V,Ic=5mA, β = 100.
16. For a Collector to Emitter feedback circuit Vcc=24V, Rc=10 KΩ ,Re=270 Ω . β = 45,Vce=5V,Vbe=0.6V calculate,Rb and Stability factor S.

17. Problems discussed in class

UNIT-V

Short Answer Questions:

1. Write the differences between FET & BJT.
2. What is the relationship between μ, r_d and g_m of FET.
3. Write the differences between MOSFET and FET.
4. What are the advantages of FET.
5. Plot the Drain and transfer characteristics of a JFET.
6. Draw the symbols of JFET, D-MOSFET and E-MOSFET.
7. Define Pinch off Voltage.
8. Derive the Expression for Transconductance of a JFET.
9. Why FET is called as a Voltage controlled Device.

Long Answer Questions:

1. For N-channel JFET, Determine drain current when Vgs = 0V, -1V, -4V, Idss = 10mA and Vp = -4V.
2. Explain the principle of operation of a JFET with neat diagrams.
3. Explain the following terms

   a. (i) Pinch-off voltage (ii) Drain resistance (iii) Transconductance

b. (iv) Amplification factor (v) Regulation

4. Explain the following terms in FET parameters.

a) Pinch off voltage.

b) Drain resistance.

c) Transconductance.

d) Amplification factor.

5. For N-channel JFET, Determine drain current when Vgs = 0V, -1V, -4V, Idss = 10mA and Vp = -4V.
6. Explain the operation Of Depletion MOSFET with its characteristics.
7. Explain the operation Of Enhancement MOSFET with its characteristics.
8. Write the differences between Depletion MOSFET and Enhancement MOSFET

9. Problems discussed in class