QUESTION BANK
ELECTRONIC DEVICES AND CIRCUITS
YEAR/SEMESTER: II / I
Common to ECE, CSE & IT Branches

UNIT I
PN Junction diode and its Applications

SHORT ANSWER QUESTIONS (PART-A):

1. Distinguish the Features of Si and Ge Diodes.
2. Define Knee voltage/cut-in voltage of a diode.
3. What is meant by depletion region?
4. State Reverse saturation current.
5. Define the Static and Dynamic Resistances of a PN Junction diode.
6. Write down the equation of PN Junction diode current
7. State the Effect of Temperature on V-I Characteristics of PN Junction diode.
8. Draw the equivalent circuit of PN Junction diode.
9. Define Transition and Diffusion Capacitances of a PN Junction diode?
10. What are the applications of PN Junction diode?
11. What is meant by rectifier?
12. Define Peak Inverse voltage of a diode.
13. What is ripple factor?
14. Define regulation of a rectifier?
15. State transformer utilization factor?
16. Define efficiency of a rectifier?
17. Compare 3 types of Rectifiers?
18. What is the need for a filter in rectifier?
19. What is a clipper?
20. What is the difference between the clipper and clamper?

LONG ANSWER QUESTIONS (PART-B):

1. a) Sketch the V-I Characteristics of P-N Junction Diode for Forward Bias and Reverse Bias Conditions?
   b) Calculate the static and dynamic resistance from V-I Characteristics of P-N Junction Diode.
2. a) Derive the expression for transition capacitance C_T for a PN Junction diode.
   b) The voltage across a silicon diode at room temperature of 300^0K is 0.71V when 2.5mA current flows through it. If the voltage increases to 0.8V, calculate the new diode current.
3. a) With neat diagram, Explain the Operation of a Half Wave Rectifier?
   b) Derive the expression for Efficiency, Ripple Factor and PIV of HWR.
4. a) Explain the Working of Full Wave Rectifier with neat sketch.
   b) Derive the expressions for $V_{DC,}$ $I_{DC,}$ V_{rms} and I_{rms} for FWR.
5. a) Explain the operation of series negative clipper.
   b) With neat diagram, explain positive clamper in detail.

UNIT II
Bipolar Junction Transistor (BJT)

SHORT ANSWER QUESTIONS (PART-A):

1. What is a Bipolar Junction Transistor?
2. Draw the symbol of npn and pnp transistor.
3. Calculate β of a transistor when α = 0.98
4. Among CE, CB and CC configurations, which one is the popular? Why?
5. Compare the Characteristics of a BJT in CB, CE and CC Configurations.
6. What is the relation between I_B, I_E and I_C in CB configuration?
7. What are hybrid parameters?
8. Draw the h-parameter equivalent circuit of a CE BJT configuration?
9. Draw the h-parameter equivalent circuit of a CB BJT configuration?
10. When does a transistor acts as a switch?
11. Define α, β and Ɣ of a Transistor
12. State the relationship between α, β and Ɣ.
13. List out Applications of BJT.
14. Define the Operating Regions of a Transistor?
15. Why BJT is called as "Current controlled device"?
16. Give the h_{ie} and h_{oe} equations of BJT
17. State Early Effect?
18. List out The Typical Values of h – Parameters in BJT Configurations (CE,CB & CC).
19. Draw the construction of NPN and PNP transistors?
20. Write short notes on transistor as an amplifier

LONG ANSWER QUESTIONS (PART-B):

1. a) With neat circuit diagram, explain input and output characteristics of CB configuration of a transistor.
   b) Calculate input and output resistance from its characteristics.
2. a) Explain the input & output characteristics of a BJT in common emitter configuration.
   b) Find input and output resistance from its characteristics.
3. a) Explain the Construction Details Of Bipolar Junction Transistor ?
   b) A Si NPN Transistor With α=0.995 And I_{CO}=15 μA, I_B=20μA in the CE Configuration. What is value I_C?
4. a) Describe the significance of the terms, 'α' And 'β' and establish a relation between them.
   b) Determine The collector current of a BJT with both of its junctions Reverse Biased. Assume I_{CO} = 5μA, I_{EO} = 3.58 μA, α = 0.98 And Any Other Parameter Values as Required?
5. a) Write the differences between CB, CE, and CC Amplifier Configurations.
   b) Discuss, how the h-parameters are determined from transistor Characteristics.

UNIT III
Transistor Biasing and Stabilization
&
Analysis and Design of Small Signal Low Frequency BJT Amplifiers

SHORT ANSWER QUESTIONS (PART-A):

1. What is meant by Thermal runaway?
2. What is meant by Q-Point?
3. List out The Different Types of Biasing Methods?
4. State the Condition for Thermal Stability.
5. What is Meant by Stabilization?
6. Define The Different Stability Factors S,S'and S$^{''}$
7. What three factors contribute to Thermal instability?
8. What is the need for biasing a Transistor?
9. What is a Heat Sink?
10. List out Different Techniques Used for Biasing Transistor Amplifiers?
11. Draw the circuit of self-biased CE amplifier with diode compensation for V_{BE} ?
12. What are the advantages and disadvantages of fixed bias method?
13. Draw the d.c load line on the output characteristics of a CE amplifier?
14. What is the significance of d.c load line?
15. Draw the a.c load line?
16. In a CE amplifier Vcc=12V Vce=5V Rc=1K draw the d.c load line and locate Q point?
17. Justify Statement "Potential Divider Bias is the most commonly used biasing method".
18. Discuss the advantage and disadvantages of self biasing?
19. List out compensation methods?
20. Write condition to avoid thermal runaway?

LONG ANSWER QUESTIONS (PART-B):

1. a) Explain potential divider method in detail and derive the expression for a stability factor
   b) A germanium transistor with β= 100 uses potential divider method of biasing. R$_1$=50K, R$_2$=10K, R$_C$=2K and R$_E$=1K. if V_{CC}=12V find the value of I$_C$,V_{CE} and stability factor S.
2. a) Explain fixed bias in detail and derive the expression for a stability factor
   b) Write short notes on compensation techniques?
3. a). Explain collector to base bias method and derive the stability factor.
   b). Find I$_C$ and V_{CE} for the collector to base biased circuit for given data R$_B$=510 KΩ,R$_C$= 4 KΩ, V_{CC}=10 V and β=100. Assume that it is a silicon transistor.
4. Draw and explain the h-parameter equivalent circuit of a transistor in CE configuration. Derive the expressions for input impedance, output impedance, voltage gain and current gain.
5. Draw and explain the h-parameter equivalent circuit of a transistor in CB configuration. Derive the expressions for input impedance, output impedance, voltage gain and current gain.

UNIT IV
Junction Field Effect Transistor & MOSFET

SHORT ANSWER QUESTIONS (PART-A):

1. Draw the symbols of N-CHANNEL FET, P-CHANNEL FET, N-CH E-MOSFET, P-CH E-MOSFET, N-CH D-MOSFET, P-CH D-MOSFET?
2. Compare JFET with BJT.
3. Why the name field effect used for the JFET device?
4. Give the classification of JFET?
5. Describe How A FET Can Be Used As A Voltage Variable Resistance (VVR) ?
6. Explain Why FET Is Called Uni polar Device?
7. Why FET is called voltage controlled device?
8. Why thermal runaway is not there in FETs?
9. Why noise is less in FET?
10. Define μ, R_d and $G_{m \, of}$ JFET?
11. Obtain the expression for μ (amplification factor)?
12. What are the merits and demerits of an N-Channel and P-Channel FET ?
13. State the applications of JFET?
14. Give the classification of MOSFET?
15. Compare JFET and MOSFET?
16. List out the Advantages and Disadvantages of FET over MOSFET?
17. Define Pinch Off Voltage?
18. Define Cut-off voltage Vgs(off)?
19. Compare E-MOSFET AND D-MOSFET?
20. Write different biasing circuits of FET?

LONG ANSWER QUESTIONS (PART-B):

1. a) Explain construction and the Operation Of N-ch FET With The help of Drain Characteristics and Transfer characteristics?

   b) A FET Follows The Relation $I_D = I_{DSS}\left[1 - (\frac{VGS}{VP})\right]^2$. What are the values of ID and gm For VGS = -1.5 V If IDSS And VP Are given as 8.4 mA and -3V respectively

2. a) Explain the construction of an N-channel MOSFET of enhancement type and draw its characteristics?

   b) With the help of a neat diagram explain the voltage divider biasing method for JFET

3. a) What are the different biasing methods of JFET?

   b) Explain any biasing method with the help of neat diagram?

4. a) Explain the Construction Of An N-Channel MOSFET Of Enhancement Type And Draw Its Characteristics ?

   b) A Self Biased P – Channel JFET Has A Pinch – Off Voltage Of V_P = 5 V And I_{DSS} = 12ma. The Supply Voltage Is 12 V. Determine The Values Of R_D And R_S So That I_D = 5 M and V_{DS} = 6V.

5. a) Establish A Relation Between The Three JFET Parameters, μ, Rd And Gm ?

   b) Describe How A FET Can Be Used As A Voltage Variable Resistance (VVR).

UNIT V
FET Amplifiers
&
Special Purpose Devices
SHORT ANSWER QUESTIONS (PART-A):

1. Draw the small signal model of a FET.
2. What are the types of FET amplifiers?
3. A JFET has a g_m of 4 mS with an external drain resistance of 1.5KΩ.Find the value of Voltage gain.
4. Differentiate CS, CD and CG Amplifiers.
5. Draw the small signal model of a MOSFET.
6. Write any two Applications of Varactor Diode.
7. Give any two Applications of Tunnel Diode.
8. Compare P-N Junction Diode and Zener Diode.
9. State any two applications of Zener diode.
10. How is the zener diode act as a voltage regulator?
11. Define Holding current.
12. Sketch how a Variable Capacitance Can be built using a Varactor Diode.
13. Draw the equivalent circuit of tunnel diode.
14. Draw the Symbol of SCR.
15. State Forward break over voltage in SCR.
16. What are the applications of SCR?
17. Draw the symbol and equivalent circuit of UJT.
18. Define intrinsic stand off ratio.
19. Write the applications of UJT.
20. What are the operating regions of UJT?

LONG ANSWER QUESTIONS (PART-B):

1. a) Explain the operation of common source FET amplifier and derive the expression for input
      impedance, output impedance and voltage gain.
   b) Explain the V-I Characteristics of Zener Diode.
2. a) With neat diagram, explain the operation of Common Drain FET amplifier and derive the expressions
      for input impedance, output impedance, voltage gain and current gain.
   b) How is Zener diode act as a Voltage Regulator?
3. a) Draw the symbol and equivalent circuit of a UJT.
   b) Explain the operation of UJT with the help of its V-I characteristics?
4. a) Describe the Construction and Principle of Operation of SCR.
   b) Explain the V-I Characteristics of a SCR.
5. a) Explain the V – I Characteristics Of a Tunnel Diode With the Help Of Energy Band Structure ?
   b) Write short notes on Varactor Diode.