SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

AN AUTONOMOUS INSTITUTION

Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai

II Semester

B.E – Department of Computer Science and Engineering

(Internet of Things & Cyber Security including Block Chain Technology)

23ECT102 – ELECTRONIC DEVICES AND CIRCUITS

Regulations -2023

QUESTION BANK

UNIT I – Transistor Biasing and Stabilisation

PART A – 2 Marks

1. Define the operating point of a transistor.
2. What is the need for transistor biasing?
3. Mention any two biasing techniques used in BJTs.
4. Define DC load line and AC load line.
5. State the criteria for choosing the operating point.
6. Write the expression for collector current in fixed bias configuration.
7. What is thermal runaway?
8. Define stabilization factor.
9. Compare fixed bias and self-bias.
10. What is the significance of collector-to-base bias?

PART B – 13 Marks

1. Explain the fixed bias method with circuit, working, and limitations.
2. Analyze the self-bias (voltage divider bias) configuration and derive all current and voltage equations.
3. Derive the stabilization factor expressions and explain their significance in biasing circuits.
4. Compare different biasing methods and discuss which offers best thermal stability.
5. Explain the construction of the DC and AC load lines and determine the Q-point graphically.

PART C – 14 Marks

1. Discuss in detail the various transistor biasing methods and evaluate their stability using mathematical expressions.
2. Design a biasing circuit for a given Q-point using voltage divider bias and analyze it.
3. Derive expressions for IC, IB, and VCE in collector-to-base bias with load line analysis.
4. Evaluate the effect of β variation on different biasing techniques.

UNIT II – P-N Junction Diode

PART A – 2 Marks

1. Write the diode current equation.
2. Define knee voltage.
3. What is reverse saturation current?
4. List two special-purpose diodes.
5. State the working principle of a Zener diode.
6. Draw the V-I characteristics of a PN junction diode.
7. What is meant by breakdown in a diode?
8. Define the depletion region in a diode.
9. What is a varactor diode used for?
10. Write two applications of photodiode.

PART B – 13 Marks

1. Explain the V-I characteristics of a PN junction diode with energy band diagram.
2. Describe Zener and avalanche breakdown mechanisms in detail.
3. Discuss the characteristics, construction, and applications of varactor and photodiodes.
4. Explain load line analysis of a diode circuit with graphical illustration.
5. Compare the characteristics of special-purpose diodes used in electronics.

PART C – 14 Marks

1. Analyze the working of photodiodes and their response under varying light conditions.
2. Derive the diode equation and explain each term's significance.
3. Illustrate the behavior of a Zener diode in voltage regulation applications with design examples.
4. Describe the construction and characteristics of SCR and its applications.

UNIT III – Bipolar Junction Transistor

PART A – 2 Marks

1. Define α and β parameters of a BJT.
2. What are the three regions of transistor operation?
3. Write the relation between α and β.
4. What is input resistance in CB configuration?
5. Define current gain in CE configuration.
6. Mention two features of common collector configuration.
7. What is the significance of h-parameter model?
8. Draw the symbol of NPN transistor and label terminals.
9. Write the expression for voltage gain using h-parameters.
10. What are hybrid parameters?

PART B – 13 Marks

1. Explain the input and output characteristics of a BJT in CB configuration.
2. Discuss the CE configuration with V-I characteristics and regions of operation.
3. Derive expressions for voltage gain, current gain, input and output impedance using h-parameters.
4. Compare CB, CE, and CC configurations based on input/output resistance and gain.
5. Explain hybrid model representation of a BJT and its use in amplifier analysis.

PART C – 14 Marks

1. Design a single-stage CE amplifier and calculate gain and impedance using h-parameters.
2. Compare all three transistor configurations in terms of gain, impedance, and applications.
3. Explain in detail the role of h-parameter model in analyzing transistor amplifiers.
4. Analyze a transistor amplifier circuit using hybrid-pi model.

UNIT IV – FET and FET Amplifier

PART A – 2 Marks

1. Define pinch-off voltage in JFET.
2. Differentiate between JFET and MOSFET.
3. What is meant by enhancement mode MOSFET?
4. State the function of gate terminal in JFET.
5. Draw the transfer characteristics of a JFET.
6. What is the role of FET in amplifier circuits?

7. Define transconductance in JFET.
8. List any two FET biasing methods.
9. Mention applications of MOSFET.
10. What is small-signal model of FET?

PART B – 13 Marks

1. Explain the construction and characteristics of JFET.
2. Describe the difference between depletion and enhancement mode MOSFETs.
3. Explain the operation of a common source FET amplifier and derive voltage gain.
4. Discuss different FET biasing methods and their stability.
5. Analyze the generalized FET amplifier and derive performance parameters.

PART C – 14 Marks

1. Design and analyze a JFET amplifier circuit including small signal parameters.
2. Derive the small signal model of a MOSFET and explain its application.
3. Compare JFET, MOSFET, and BJT in terms of input impedance, noise, and gain.
4. Analyze the AC equivalent circuit of a common source amplifier.

UNIT V – Rectifiers and Filters

PART A – 2 Marks

1. Define ripple factor.
2. What is the function of a filter in power supply?
3. Compare half-wave and full-wave rectifiers.
4. What is the use of a capacitor filter?
5. Draw the circuit of a bridge rectifier.
6. Define PIV in a rectifier.
7. Mention the use of Zener diode in voltage regulation.
8. Write the expression for efficiency of a full wave rectifier.
9. What is an L-section filter?
10. Name two types of filters used after rectifiers.

PART B – 13 Marks

1. Explain the working of half-wave and full-wave rectifiers with waveforms and equations.
2. Describe the function and analysis of bridge rectifier with performance metrics.

3. Discuss the construction and working of capacitor and inductor filters.
4. Analyze the voltage regulation using Zener diode with derivations and circuit design.
5. Compare different rectifiers based on ripple factor, efficiency, and PIV.

PART C – 14 Marks

1. Design a regulated power supply using a full-wave rectifier, capacitor filter, and Zener regulator.
2. Analyze and compare L-section and π-section filters for ripple and regulation.
3. Derive the efficiency, ripple factor, and output voltage expressions for each type of rectifier.
4. Discuss the harmonic components in rectifier output and their impact on filter design.