

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- 1 SEMESTER – OLD PAPER – S22 TO S24 – QUESTION BANK

Subject Name & Code:

Basic Electronics (3110016)

Chapter 1: Diode Theory and Applications

Repeated Questions:

1. **Explain V-I characteristics of a PN junction diode.**
 - (SUM 22 - Q1(b) - 04 Marks)
 - (WIN 22 - Q1(c) / Q2(c) - 07 Marks)
 - (SUM 24 - Q1(b) - 04 Marks)
2. **Draw and explain a Full Wave Bridge Rectifier.**
 - (SUM 23 - Q1(b) - Compare - 04 Marks)
 - (WIN 22 - Q1(c) - 07 Marks)
 - (SUM 24 - Q1(c) - 07 Marks)
3. **Compare Half Wave, Full Wave, and Bridge Rectifiers.**
 - (SUM 23 - Q1(b) - Compare HWR & FWR - 04 Marks)
 - (SUM 24 - Q3(c) (OR) - Compare all three - 07 Marks)
4. **Explain Zener diode as a voltage regulator.**
 - (SUM 23 - Q1(a) - 03 Marks)
 - (WIN 23 - Q3(b) - 07 Marks)
 - (WIN 24 - Q3(b) (OR) - 04 Marks)
5. **Explain clipping circuits (types, waveforms).**
 - (SUM 22 - Q1(c) - 07 Marks)
 - (SUM 24 - Q1(a) - Series Positive Clipper - 03 Marks)
 - (WIN 24 - Q1(c) - Clamper Circuits - 07 Marks)
6. **Compare Avalanche and Zener breakdown.**
 - (WIN 22 - Q1(b) - 04 Marks)
 - (WIN 23 - Q3(a) - 03 Marks)

Other Important Questions:

- **What is a diode? Write its types and applications.** (SUM 22 - Q1(a) - 03 Marks)
- **Explain the ideal diode and practical diode approximations.** (WIN 24 - Q1(a) - 03 Marks)
- **Explain clamper circuits (positive/negative).** (WIN 23 - Q2(a) - Negative Clamper | WIN 24 - Q1(c) - 07 Marks)
- **Discuss different types of diodes (e.g., Schottky, Varactor, PIN, Photo).** (WIN 22 - Q2(b) - 04 Marks | SUM 24 - Q3(b) - Schottky - 04 Marks | SUM 24 - Q3(b) (OR) - Compare PIN & Photo - 04 Marks)
- **Explain RC filter and its limitations.** (WIN 23 - Q2(b) - 04 Marks)
- **Draw and explain a voltage multiplier circuit.** (WIN 22 - Q4(a) - 03 Marks | WIN 23 - Q3(a) - Voltage Doubler - 03 Marks)

Chapter 2: Bipolar Junction Transistors and its Biasing

Repeated Questions:

1. **Why is a transistor called a bipolar device? / Explain its operation.**
 - (SUM 22 - Q2(a) - 03 Marks)
 - (SUM 23 - Q2(b) - 04 Marks)
 - (WIN 24 - Q2(a) - Modes of operation - 03 Marks)
2. **Draw input and output characteristics of CE configuration.**
 - (SUM 24 - Q2(c) - 07 Marks)
 - (WIN 22 - Q3(c) - 07 Marks)
 - (WIN 23 - Q4(c) - 07 Marks)
3. **Derive the relation between α and β .**
 - (SUM 23 - Q3(a) - 03 Marks)
 - (WIN 22 - Q5(a) - 03 Marks)
 - (WIN 23 - Q4(a) - 03 Marks)
 - (SUM 24 - Q2(a) - For CE - 03 Marks)
4. **Explain the need for transistor biasing.**
 - (SUM 23 - Q2(a) - 03 Marks)
 - (WIN 24 - Q2(b) - 04 Marks)
5. **Explain voltage divider bias circuit.**
 - (WIN 22 - Q2(c) (OR) - 07 Marks)
 - (WIN 24 - Q2(c) (OR) - 07 Marks)
6. **Explain transistor as a switch.**
 - (SUM 23 - Q4(b) - 04 Marks)
 - (WIN 22 - Q4(c) - 07 Marks)
 - (SUM 24 - Q4(c) - 07 Marks)

Other Important Questions:

- **Explain DC load line and Q-point.** (WIN 22 - Q3(a) - 03 Marks | WIN 23 - Q3(c) - 07 Marks)
- **Explain thermal runaway.** (SUM 22 - Q5(a) - 03 Marks | SUM 23 - Q3(b) (OR) - 03 Marks)
- **Explain stability factors.** (SUM 22 - Q2(c) (OR) - Derive expressions - 07 Marks)
- **Explain common collector (CC) / emitter follower configuration.** (SUM 22 - Q2(c) - Sketch circuit - 07 Marks | SUM 23 - Q2(c) - 07 Marks | SUM 24 - Q4(a) - Salient features - 03 Marks)
- **Explain Early effect.** (SUM 22 - Q5(b) - 04 Marks)
- **What is the structure of an npn transistor?** (SUM 22 - Q2(b) - Conceptual - 04 Marks)

Chapter 3: Special Purpose Diodes and Transistors

Repeated Questions:

1. **Explain Varactor Diode.**
 - (SUM 22 - Q3(a) (OR) - 03 Marks)
 - (WIN 22 - Q3(a) - 03 Marks)
 - (WIN 24 - Q3(b) (OR) - 04 Marks)
2. **Explain Photodiode / PIN Photodiode.**
 - (WIN 22 - Q3(b) - 04 Marks)
 - (WIN 23 - Q4(c) - Application - 07 Marks)
 - (WIN 24 - Q3(a) (OR) - 03 Marks)
3. **Explain Tunnel Diode and its V-I characteristics.**
 - (SUM 23 - Q3(c) (OR) - 07 Marks)
 - (SUM 24 - Q3(a) - 03 Marks)
 - (WIN 24 - Q3(a) (OR) - 03 Marks)

Other Important Questions:

- **Explain LED (advantages, applications).** (SUM 24 - Q3(a) (OR) - 03 Marks)
- **Explain Solar cell.** (SUM 22 - Q3(b) (OR) - Construction & principle - 04 Marks | WIN 23 - Q4(c) - 07 Marks)
- **Explain Schottky diode.** (SUM 24 - Q3(b) - 04 Marks)
- **Compare PN junction and Zener diode.** (SUM 24 - Q3(c) - 07 Marks)
- **Explain optocoupler / phototransistor.** (SUM 22 - Q3(a) - 03 Marks | SUM 23 - Q3(c) - 07 Marks)
- **Explain seven/sixteen segment display.** (SUM 22 - Q3(b) - 16-segment - 04 Marks | WIN 23 - Q4(b) - 07-segment - 07 Marks)

Chapter 4: AC Analysis of BJT Circuits and Small Signal Amplifier

Repeated Questions:

1. **Draw h-parameter model and derive expressions for Z_i , Z_o , A_v for CE amplifier.**
 - (SUM 23 - Q4(c) - 07 Marks)
 - (WIN 24 - Q3(c) - Numerical on h-params - 07 Marks)
2. **Explain the effect of coupling and bypass capacitors.**
 - (WIN 23 - Q3(b) - 04 Marks)
 - (SUM 24 - Q5(a) - Use of coupling capacitor - 03 Marks)

Other Important Questions:

- **Explain AC load line.** (SUM 22 - Q5(a) - 03 Marks | WIN 23 - Q3(c) - Part of discussion - 07 Marks)
- **Compare CE, CB, CC configurations.** (SUM 24 - Q2(c) (OR) - 07 Marks | WIN 22 - Q3(c) (OR) - Compare CB & CC - 07 Marks | WIN 23 - Q4(b) - 07 Marks)
- **Analyze CB amplifier (find Z_i , Z_o , A_v).** (WIN 24 - Q4(c) (OR) - 07 Marks)
- **Explain common base amplifier properties.** (SUM 24 - Q5(a) (OR) - 03 Marks)
- **Explain emitter follower (working, advantages).** (SUM 23 - Q4(b) - 04 Marks)

Chapter 5: Field Effect Transistors (FET) and its Biasing

Repeated Questions:

1. **Compare BJT and FET.**
 - (SUM 22 - Q4(c) - Compare characteristics - 07 Marks)
 - (SUM 24 - Q5(b) - 04 Marks)
 - (WIN 23 - Q5(a) - 03 Marks)
 - (WIN 24 - Q4(b) - 04 Marks)
2. **Explain drain characteristics of JFET.**
 - (SUM 22 - Q4(a) - How to determine - 03 Marks)
 - (WIN 22 - Q4(c) - n-channel JFET - 07 Marks)
 - (WIN 23 - Q5(c) - Detailed explanation - 07 Marks)
 - (SUM 23 - Q5(c) - n-channel JFET - 07 Marks)
3. **Explain FET as a switch.**
 - (WIN 23 - Q5(b) - 04 Marks)
 - (WIN 24 - Q5(c) - 07 Marks)
4. **Explain FET as an amplifier.**
 - (WIN 22 - Q4(a) - 03 Marks)
 - (WIN 23 - Q5(b) - 04 Marks)
 - (WIN 24 - Q5(c) - 07 Marks)

Other Important Questions:

- **Explain JFET parameters (g_m , r_d , μ) and their relationship.** (SUM 22 - Q4(c) - 07 Marks | WIN 23 - Q5(c) - 07 Marks | WIN 24 - Q4(a) (OR) - Define - 03 Marks)
- **Explain common drain (CD) configuration.** (SUM 22 - Q4(b) - 04 Marks)
- **Explain self-bias circuit for FET.** (WIN 22 - Q5(b) - 04 Marks)
- **Explain MOSFET (construction, types, characteristics).** (SUM 22 - Q4(a) - MOSFET device - 03 Marks | SUM 23 - Q5(c) - Enhancement MOSFET - 07 Marks | WIN 22 - Q5(c) - E-MOSFET - 07 Marks | SUM 24 - Q4(c) (OR) - Discuss MOSFET - 07 Marks)
- **Advantages/disadvantages of JFET/MOSFET.** (SUM 22 - Q4(b) - Advantages of JFET - Part of | SUM 24 - Q5(b) (OR) - Adv/Dis of FET - 04 Marks)
- **Numerical on JFET/MOSFET biasing and amplification.** (WIN 24 - Q4(b) (OR) - Numerical on ID | WIN 24 - Q5(c) - Numerical on CS amplifier - 07 Marks)