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

UNIT I
PN Junction Diode
SHORT ANSWER QUESTIONS (PART-A):

1. What are solid state materials?

2. What is Doping?

3. What is P-type and N-type semiconductor?

4. What is Diffusion?

5. What is meant by depletion region?

6. Define Knee voltage/cut-in voltage of a conventional diode.

7. What is reverse breakdown voltage?

8. State Reverse saturation current.

9. Draw forward bias and reverse bias of PN junction diode circuits

10. Define the Static and Dynamic Resistances of a PN Junction diode.

11. Write down the equation of PN Junction diode current.

12. Draw the ideal and practical equivalent circuit of PN Junction diode.

13. Define Transition and Diffusion Capacitances of a PN Junction diode?

14. What are the applications of PN Junction diode?

15. Diode is a bidirectional device (True or False)

16. A reverse-biased diode has _____ resistance

17. A forward biased diode has _____resistance

18. Why diode is called a switch?

19. Define Storage time and Transit Time?

20. Define Reverse Recovery time?

LONG ANSWER QUESTIONS (PART-B)

1. With neat diagram, explain the operation of PN Junction diode under Forward Bias and Reverse Bias

   Conditions.

2. a) Sketch and explain the V-I Characteristics of P-N Junction Diode for Forward Bias and ReverseBias Conditions?

   b) Calculate the static and dynamic resistance from V-I Characteristics of P-NJunction Diode.

3. State the following

i) Depletion region ii) Cut-in voltage iii) Reverse Breakdown Voltage iv) Transition Capacitance

v) Diffusion Capacitance

4. Explain in detail abouttransition capacitance C_T for a PN Junction diode.

5. Explain in detail about Diffusion capacitance C_D for a PN Junction diode.

6. The voltage across a silicon diode at room temperature of 3000K is 0.71V when 2.5mA current flows

   through it. If the voltage increases to 0.8V, calculate the new diode current.

7. With neat diagram, explain Diode Equivalent Circuits in detail.

8. With neat sketch, justify how PN Junction diode acts as a switch.

9. Explain the switching times of a PN Junction diode with neat sketch.

10. State the following

   i) Forward Bias ii) Reverse Bias iii) Storage time iv) Transition time v) Reverse recovery time

UNIT II
DIODE APPLICATIONS
SHORT ANSWER QUESTIONS (PART-A):

1. What are the applications of PN Junction diode?
2. What is meant by rectifier?
3. List different types of rectifiers?
4. Define Peak Inverse voltage of a diode.
5. Define rms voltage of a rectifier.
6. Define average voltage of a rectifier.
7. What is a ripple factor?
8. Define regulation of a rectifier?
9. State transformer utilization factor?
10. Define efficiency of a rectifier?
11. Compare 3 types of Rectifiers?
12. What is the need for a filter in rectifier?
13. Write ripple factor of capacitor filter.
14. Write ripple factor of inductive filter.
15. What is a clipper?
16. What is the other name of clipper?
17. What is a transfer characteristic?
18. Why clamper is called dc restorer?
19. What is non linear wave shaping?
20. What is the difference between the clipper and clamper?

LONG ANSWER QUESTIONS (PART-B):

1. a) Explain in detail Half Wave Rectifier circuit with neat sketches?

   b) Derive the following in reference to half wave rectifier- Average value of current, rms value of current, ripple factor, rectifier efficiency and PIV?

2. a) Explain in detail center-tapped Full Wave Rectifier circuit with neat sketches?
   b) Derive the following in reference to Full wave rectifier - Average value of current, rms value of current, ripple factor, rectifier efficiency and PIV?
3. Explain in detail Bridge Rectifier circuit with neat sketches?
4. Compare half wave, full wave and bridge rectifier circuits?
5. Explain Full Wave Rectifier with inductive filter circuit and mention the ripple factor?
6. Explain Full Wave Rectifier with Capacitive filter circuit and mention the ripple factor?
7. What is clipper circuit and explain the following

   (a)Series positive clipper   (b) Clipping below the refernce voltage

   (c) Parallel negative clipper   (d) Two level clipper

8. State and prove the clamper circuit theorem?
9. What is a clamper and explain positive clamper and negative clamper circuits?
10. Find I_{dc} , I_{rms} , ripple factor, rectifier efficiency and PIV for a full wave center-tapped rectifier for a transformer voltage of 220v with a diode resistance of 20 Ohm and a load resistance of 1kOhm?

UNIT III
Bipolar Junction Transistor (BJT)
SHORT ANSWER QUESTIONS (PART-A):

1. What is a transistor?
2. Describe the main function of the transistor.
3. Why the transistor is called as bipolar junction transistor?
4. What are the doping levels in the transistors?
5. What are the three types of configuration in transistors?
6. Why is emitter region wider than collector region in BJT?
7. Define Transistor current.
8. Draw the symbol of npn and pnp transistor.
9. Define the different operating regions of transistor.
10. Draw the input and output characteristics of a transistor in CE configuration and mark the cutoff, saturation and active regions.
11. What is early effect or basewidth modulation?
12. Expalin how transistor acts as an open switch and closed switch.
13. Explain current amplification factor.
14. What are α,β and γ in a transistor ?
15. What is the relation between α,β and γ in a transistor?
16. What is I_{CBO} and I_{CEO} in a transistor what is relation between I_{CEO}, I_{CBO} and I_{CO}?
17. Why I_{CBO} is greater than I_{CO}?
18. What is meant by collector leakage current in a transistor?
19. Describe the main factors affecting the value of collector leakage current.
20. In a BJT, the emitter current is 12 mA and the emitter current is 1.02 times the collector current. Find the base current.

LONG ANSWER QUESTIONS (PART-B):

1. Explain contruction and working operation of NPN & PNP transistor with neat sketches?

2. 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.

3. a) With neat circuit diagram, explain input and output characteristics of CE configuration of a transistor.

   b) Find input and output resistance from its characteristics.

4. a) With neat circuit diagram, explain input and output characteristics of CC configuration of a transistor.

   b) Find input and output resistance from its characteristics.

5. Describe the significance of the terms, 'α', 'β', 'γ' and establish a relation between them.

6. Write the differences between CB, CE, and CC transistor Configurations.

7. A Si NPN Transistor With α=0.995 And ICO=15 μA, IB=20μA in the CE Configuration. What is value of I_C?

8. 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?

9. Explain switching times of trasnsistor with neat sketches.

10. Explain following terms.

    a) Doping   b) Basewidth Modulation   c) Amplication factor   d) Transistor as a switch