DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ELECTRONIC DEVICES AND CIRCUITS (25EC303)

TUTORIAL QUESTIONS

Unit-1

PART A: Multiple choice questions

1.For a silicon diode, the forward voltage drop decreases by approximately 2 mV/°C with increasing temperature. This is due to

A) Increase in barrier potential
B) Decrease in barrier potential
C) Increase in depletion width
D) Increase in breakdown voltage

Answer: B

2.The dynamic resistance of a diode is inversely proportional to

A) Junction area
B) Forward current
C) Reverse current
D) Barrier voltage

Answer: B

3.The depletion region width of a PN junction is maximum under

A) Zero bias
B) Forward bias
C) Reverse bias
D) Breakdown

Answer: C

4.Which diode model provides the best trade-off between accuracy and simplicity?

A) Ideal model
B) Simplified model
C) Piecewise linear model
D) Exponential model

Answer: C

5.The ripple factor of a bridge rectifier is lower than that of a half-wave rectifier because

A) Higher PIV
B) Utilizes both half cycles
C) Uses four diodes
D) Lower transformer rating

Answer: B

6.For identical transformer ratings, the highest Transformer Utilization Factor (TUF) is obtained in

A) Half-wave rectifier
B) Center-tap rectifier
C) Bridge rectifier
D) Clamper

Answer: C

7.A bridge rectifier continues to operate even if the transformer has

A) No secondary winding
B) No center tap
C) No primary winding
D) No load

Answer: B

8.The principal disadvantage of a center-tapped rectifier compared to a bridge rectifier is

A) Higher efficiency
B) Requirement of center-tapped transformer
C) Lower PIV
D) Less ripple

Answer: B

9.In a capacitor-filtered rectifier, the capacitor charges when

A) Input voltage falls below capacitor voltage

B) Diode is reverse biased

C) Input voltage exceeds capacitor voltage

D) Load current becomes zero

Answer: C

10. Increasing filter capacitance primarily affects

A) Transformer frequency

B) Ripple voltage

C) PIV

D) Cut-in voltage

Answer: B

11.A clipper circuit is fundamentally a

A) Frequency-selective circuit

B) Amplitude-selective circuit

C) Phase-shifting circuit

D) Oscillator

Answer: B

12.A biased clipper differs from an unbiased clipper because it

A) Changes frequency

B) Clips at a predetermined voltage level

C) Amplifies signal

D) Increases current gain

Answer: B

13. The primary function of a clamper is to

A) Limit signal amplitude

B) Shift average signal level

C) Rectify AC

D) Reduce ripple

Answer: B

14.A Zener diode is normally operated in

A) Forward conduction region

B) Reverse breakdown region

C) Cutoff region

D) Saturation region

Answer: B

15. The voltage across an ideal Zener diode remains almost constant because of

A) Infinite resistance

B) Constant current

C) Sharp breakdown characteristic

D) Zero power dissipation

Answer: C

16. The dominant breakdown mechanism in lightly doped junctions is

A) Zener breakdown

B) Avalanche breakdown

C) Punch-through

D) Thermal runaway

Answer: B

17. Avalanche breakdown occurs due to

A) Tunneling

B) Impact ionization

C) Recombination

D) Diffusion

Answer: B

18.A voltage regulator using a Zener diode is generally connected

A) In series with load

B) Parallel with load

C) Parallel with source only

D) In series with source only

Answer: B

19. The reverse saturation current of a diode mainly depends on

A) Junction area and temperature

B) Forward current only

C) Load resistance

D) Supply frequency

Answer: A

20. The major limitation of the ideal diode model is the neglect of

A) Switching action

B) Cut-in voltage and resistance

C) Reverse bias

D) Load current

Answer: B

PART:B Fill in the Blanks

1. The capacitance associated with charge storage in a forward-biased diode is called _____ capacitance.

Answer: Diffusion

2. The capacitance associated with the depletion region is called _____ capacitance.

Answer: Transition

3. The mathematical relation between diode current and voltage is given by the _____ equation.

Answer: Shockley

4. The ideality factor of a practical diode generally lies between _____ and _____.

Answer: 1, 2

5. In a half-wave rectifier, current flows through the load during only one _____ of the input cycle.

Answer: Half

6. The maximum rectification efficiency of a half-wave rectifier is _____%.

Answer: 40.6

7. The ripple frequency of a full-wave rectifier is _____ times the supply frequency.

Answer: Two

8. The Peak Inverse Voltage of each diode in a center-tapped full-wave rectifier is _____.

Answer: 2 Vm

9. The output of an unfiltered rectifier is called _____ DC.

Answer: Pulsating

10. A capacitor filter behaves as an open circuit for _____.

Answer: DC

11. In a negative clamper, the waveform is shifted towards the _____ direction.

Answer: Negative

12. The combination of diode and capacitor is essential for a _____ circuit.

Answer: Clamper

13. The Zener effect is dominant in _____ doped PN junctions.

Answer: Heavily

14. The breakdown voltage of a Zener diode is represented by the symbol _____.

Answer: VZ

15. The series resistor in a Zener regulator is used to limit _____.

Answer: Current

16. The current flowing through a reverse-biased diode before breakdown is called _____ current.

Answer: Leakage

17. The region between P and N materials depleted of mobile carriers is called the _____ region.

Answer: Depletion

18. The barrier potential of a silicon diode at room temperature is approximately _____ volts.

Answer: 0.7

19. In reverse bias, the width of the depletion region _____.

Answer: Increases

20. The diode is a _____ terminal semiconductor device.

Answer: Two