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Subject Name : Basic Electronics
Subject Code : PH508T

UNIT – I : SEMICONDUCTOR DEVICES

Bonding, Band gap of semiconductors –Types of semiconductors-Elemental and Compound semiconductors-intrinsic and extrinsic semiconductors – effect of temperature on Fermi level – PN junction diode – Zener diode-LED - photo diode – Solar cell-different modes of operation – transistor biasing –characteristics in CB & CE modes –H-Parameters- α and β of a transistor.

1. What is electronics ? Mention some important applications of electronics
2. Explain how valence electrons determine the electrical properties of a material.
3. Write short notes on the following :
   (i) Atomic structure (ii) Valence electrons (iii) Free electrons
4. Define semiconductor.
5. Explain the concept of energy bands in solids.
6. Describe the valence band, conduction band and forbidden energy gap with the help of energy level diagram.
7. What do you understand by a semiconductor ? Discuss some important properties of semiconductors.
8. Which are the most commonly used semiconductors and why?
9. Give the energy band description of semiconductors.
10. Discuss the effect of temperature on semiconductors.
11. Give the mechanism of hole current flow in a semiconductor.
12. What do you understand by intrinsic and extrinsic semiconductors ?
13. What is a pn junction ? Explain the formation of potential barrier in a pn junction.
14. Discuss the behaviour of a pn junction under forward and reverse biasing.
15. Draw and explain the V-I characteristics of a pn junction.
16. Write short notes on the following :
   (i) Breakdown voltage (ii) Knee voltage
   (iii) Limitations in the operating conditions of pn junction
17. Give the energy band description of conductors, semiconductors and insulators
18. Define PN junction.
19. Define Bonding in semiconductor.
20. Define Current Amplification Factor.
21. Define Tunneling effect
22. Explain the types of semiconductors.
23. Discuss about the effect of temperature on Fermi level.
24. Describe the formation of PN junction.
25. Explain about the biasing of PN junction.
26. Define α and β & Derive the relation between α and β.
27. Draw the circuit for voltage Regulator and explain

28. Explain the principle, working and characteristic of Photo Diode
29. Explain the formation & working of Transistor.
30. Explain the Transistor characteristics in CB mode.
31. Explain the principle, working and characteristic of Zener Diode
32. Explain the principle, working and characteristic of Tunnel Diode

UNIT –II : RECTIFIERS AND AMPLIFIERS

Half-wave , full-wave and bridge rectifier – expression for efficiency and ripple factor – choke input filter – capacitor input filter – π section filter – zener regulated power supply .

RC coupled amplifier – frequency response curve – analysis of mid-frequency region – classification of amplifiers – class A power amplifier – Push-pull, class B power amplifier – Emitter follower.

1. Define ripple factor and Derive the ripple factor for full wave rectifier
2. Define thermal runaway
3. Define Rectification
4. Write in brief the types of feedback circuit
5. Draw the equivalent circuit for the crystal in crystal oscillator.
6. Explain the Half wave rectifier
7. Derive the expression for the power efficiency of Half wave Rectifier.
8. Discuss about the Full wave bridge rectifier
9. Discuss about the centre tapped rectifier
10. Derive the expression for the power efficiency of Full wave Rectifier.
11. What do you understand by hybrid parameters? What are their dimensions?
12. What are the notations for h parameters of a transistor when used in (i) CB (ii) CE and (iii) CC arrangement?
13. Explain the Construction and Frequency response of RC Coupled amplifier.
14. How are h parameters of a transistor measured?
15. Explain the construction and working of RC coupled amplifier.
16. Draw the circuit of Push Pull amplifier and explain in detail
17. Explain the working of Emitter follower
18. Explain the classifications of power amplifiers
19. Describe a half-wave rectifier using a crystal diode.
20. Derive an expression for the efficiency of a half-wave rectifier.
21. With a neat sketch, explain the working of (i) Centre-tap full-wave rectifier (ii) Full-wave bridge rectifier.
22. Derive an expression for the efficiency for a full-wave rectifier.
23. Write a short note about the nature of rectifier output.
24. What is a ripple factor ? What is its value for a half-wave and full-wave rectifier ?
25. Describe the action of the following filter circuits : (i) capacitor filter (ii) choke input filter (iii) capacitor input filter.
26. What is a zener diode ? Draw the equivalent circuit of an ideal zener in the breakdown region.
27. Explain how zener diode maintains constant voltage across the load.
28. What is a LED ?
29. Explain the working of a LED.
30. Give two applications of LEDs.

31. Why do LEDs need series current-limiting resistors ?
32. How does LED differ from an ordinary diode ?
33. What is a photo-diode ?
34. How does photo-diode work ?
35. Give two applications of photo-diodes.
36. Describe the action of emitter follower with a neat diagram.
37. Derive the expressions for (i) voltage gain (ii) input impedance and (iii) output impedance of an emitter follower.

UNIT –III : OSCILLATORS

Voltage gain of a feedback amplifier – Barkhausen criterion – Hartley, Colpitt's, phase shift and Weinbridge oscillators – expression for frequency of oscillations and condition for sustained oscillations in each case – crystal oscillator – frequency stability.

1. What do you understand by feedback ? Why is negative feedback applied in high gain amplifiers ?
2. Discuss the principles of negative voltage feedback in amplifiers with a neat diagram.
3. Derive an expression for the gain of negative voltage feedback amplifier.
4. What is a feedback circuit ? Explain how it provides feedback in amplifiers.
5. What is an oscillator ? What is its need ? Discuss the advantages of oscillators.
6. What do you understand by damped and undamped electrical oscillations ? Illustrate your answer with examples.
7. Explain the operation of a tank circuit with neat diagrams.
8. What is the nature of oscillations produced by tank circuit ?
9. How will you get undamped oscillations from a tank circuit ?
10. Discuss the essentials of an oscillator.
11. Discuss the circuit operation of tuned collector oscillator.
12. With a neat diagram, explain the action of Hartley and Colpitt's oscillators.
13. Discuss in detail the types of filters.
14. Discuss about the Colpitt's oscillator
15. Discuss about the Hartley's oscillator
16. Explain the Phase Shift oscillator in detail.
17. Derive the expression for frequency of oscillations in Crystal and Wein bridge oscillator
18. What are the drawbacks of LC oscillators ?
19. Write short notes on the following :
    (i) RC oscillators (ii) Wien bridge oscillators (iii) Crystal oscillator

UNIT –IV : WAVE SHAPING CIRCUITS AND MULTI VIBRATORS

Clipping and clamping circuit – biased clipper – integrating and differentiating circuits – RC time constants. Multivibrators – Astable – Mono stable and bi-stable multivibrators – Schmitt trigger

1. What is a multivibrator ? Explain the principle on which it works.
2. With a neat sketch, explain the working of (i) astable multivibrator (ii) monostable multivibrator (iii) bistable multivibrator.
3. What is the basic difference among the three types of multivibrators ?

4. With a neat sketch, explain the working of Schmitt trigger.
5. Show that the output from a differentiating circuit is derivative of the input. What assumptions are made in the derivation ?
6. Sketch the output waveforms from a differentiating circuit when input is (i) a square wave (ii) saw-tooth wave.
7. Show that the output from an integrating circuit is the integral of the input.
8. What is a clipper ? Describe (i) positive clipper (ii) biased clipper and (iii) combination clipper.
9. What do you understand by a clamping circuit ? With neat diagrams explain the action of a (i) positive clamper (ii) negative clamper.

UNIT –V: APPLICATION OF ELECTRONICS (15 hours)

Passive devices – resistors – Capacitors – Colour coding – TV antennas – dipole – folded – Yagi – Dish – DTH – Mobile communication system.

1. Describe the colour coding in detail.
2. Explain the Passive devices.
3. Discuss resistors
4. Discuss Capacitors
5. Describe the classification of TV antennas.
6. Briefly Explain the Mobile communication system.
7. How does the DTH work?
8. What is the DTH technology?
9. What is a satellite television?
10. How does antenna work?
11. Discuss Digital Modulation Techniques?