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DEPARTMENT OF SCIENCE AND HUMANITIES

I-Year/II-Semester- (Branch: ECE)

Subject: EC6201 - ELECTRONIC DEVICES

UNIT – I SEMICONDUCTOR DIODE

PART A

1. Why silicon is always preferred than germanium?
2. What are the differences between N type & P type semiconductor? Give example.
3. What are the differences between drift and diffusion current?
4. Write down the diode current equation.
5. What is the difference between diffusion and transition capacitance?
6. Draw the energy band structure of PN junction diode.
7. What is breakdown voltage or Peak Inverse Voltage (PIV)?
8. Distinguish between Avalanche and Zener breakdown?
9. What are the applications of PN diode?
10. What is reverse saturation current?
11. Give the expression for drift current density and diffusion current density due to electron and hole.
12. State Mass-Action law.
13. Define diffusion length.
14. What is continuity equation?
15. What are static resistance and dynamic resistance?
16. Define barrier potential at the junction.

PART – B

1. Explain and derive the current components of diode.
2. Derive the continuity equation and explain how it varies with carrier concentration.
3. Explain the operation of PN junction diode during forward and reverse biased conditions. Also, explain the V-I characteristics of PN junction diode.
4. Derive the PN diode current equation.
5. Explain the operation of PN junction under zero voltage applied bias condition and derive the expression for built in potential barrier.
6. Explain the operation of PN junction diode under biased condition and derive the PN diode current equation.
7. Explain the switching characteristics of a diode.
8. Discuss V-I characteristics of PN junction diode and also mention the various applications of PN junction diode.

UNIT II BIPOLAR JUNCTION

PART – A

1. Define transistor action.
2. Define hybrid parameters.
3. Which is the most commonly used transistor configuration? Why?
4. State early effect. What are the consequences of it?
5. Why do we choose q-point at the center of the load line?

6. What is thermal runaway?
7. Define the terms h_{ie} and h_{fe} for a CE configuration.
8. Define α and β of a transistor.
9. In a bipolar transistor which region is wider and which region is thinner? Why?
10. For an NPN transistor I_E = 12mA and β = 140. Determine the value of I_B and Ic.
11. Determine β and I_E for a transistor if I_B = 50μA and Ic = 3.6mA.
12. If a transistor has α of 0.97, find the value of β. If β=200, find the value of α.
13. Among CE, CB, CC which one is most popular. Why?
14. Why BJT is called current controlled device?
15. Draw the characteristics of CE configuration.
16. Give some applications of BJT.

PART – B

1. Explain the operation of PNP & NPN transistors.
2. Compare CC, CE, and CB configurations.
3. Explain *h*-model and π-model in detail.
4. Explain the current components of a transistor.
5. Explain Ebers Moll and Gummel Poon model.
6. How multi emitter transistor is working? Explain it with neat diagram.
7. Explain the input & output characteristics of CE configuration of a transistor.
8. Explain the input & output Characteristic of CB configuration of a transistor.

UNIT III FIELD EFFECT TRANSISTORS

PART - A

1. Why it is called Field Effect Transistor?
2. Why FET is called voltage controlled device?
3. What are the advantages of MOSFET compared to JFET?
4. What are the two modes of operation of MOSFET?
5. Define pinch-off voltage.
6. What are the differences between JFET & BJT?
7. Define the term threshold voltage.
8. Mention the three regions that are present in the drain source characteristics of JFET.
9. What is channel length modulation?
10. Draw the V-I characteristics curve of MOSFET.
11. Draw the transfer characteristics curve for JFET.
12. List the characteristics of JFET.
13. Give the drain current equation of JFET.
14. Define amplification factor in JFET.
15. Give the operation of JFET at various gate bias potentials.
16. Write some applications for JFET.
17. What is the characteristic for FINFET?

PART – B

1. What is FET? Explain the N-channel and P-channel JFET with its operation.
2. Explain the operation of dual gate MOSFET in detail.
3. Explain the construction and working principle of a JFET and obtain its characteristic parameters.
4. Explain the operation of a depletion mode MOSFET and its comparison over enhancement mode MOSFET with neat diagrams.
5. What is MOSFET? Explain the construction and working principle of enhancement mode and depletion mode MOSFET with neat diagrams.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES

PART – A

1. What is metal semiconductor junction?
2. What is MESFET?
3. Difference between MOSFET and MESFET.
4. Define Zener diode.
5. Give differences between Schottky barrier diode and P-N Junction diode.
6. Define Zener breakdown voltage.
7. List the application of Zener diode.
8. Give the applications of Schottky diode.
9. Define negative resistance of tunnel diode.
10. Define tunneling phenomenon. (or) How does tunnel diode works?
11. Explain the advantages & disadvantages of tunnel diode.
12. Explain the applications of tunnel diode.
13. Give the symbol and structure of Schottky diode.
14. What is a varactor diode?
15. What is Gallium Arsenide (GaAs) device?
16. What is Laser diode? List the applications of Laser diode.
17. What is LDR? List the applications.
18. Draw the V-I characteristics curve for Zener diode.
19. Draw equivalent circuit of tunnel diode.
20. Why Zener diode is often preferred than PN diode?

PART – B

1. Describe the operation of Zener diode and explain its characteristics.
2. Explain the tunneling phenomenon.
3. Explain about the ohmic contact of metal semiconductor junction.
4. Write short notes on varactor diode and Schottky barrier diode.
5. Explain the laser action for Laser diode.
6. How does the Zener diode act as a voltage regulator? Explain.
7. Explain Gallium Arsenide device in detail.
8. Write short notes on LDR.
9. With neat diagram give the working principle of Laser diode.
10. With neat diagram explain about varactor diode.

UNIT V POWER DEVICES AND DISPLAY DEVICES

PART – A

1. What are the applications of UJT?
2. Draw the V-I characteristics of UJT.
3. Differentiate BJT and UJT.
4. What is SCR?
5. Mention the applications of SCR.
6. What is a DIAC? Give the basic construction and symbol of DIAC.
7. List out the applications of DIAC.
8. Compare SCR with TRIAC.
9. What is a TRIAC? Give the symbol and structure of TRIAC.
10. Draw the V-I characteristics for TRIAC.
11. Give the application of TRIAC.
12. State the principle of operation of an LED and list its application.
13. What is a phototransistor?

14. Compare LEDs and LCDs.
15. What is mean by solar cell?
16. What is photo voltaic effect?
17. On what factor does the color of the light emitted by a LED depend?
18. Give some notes on CCD.

PART – B

1. Explain the construction, operation, V-I characteristics and application of SCR. Also, explain its two transistor model.
2. Explain the construction, operation, equivalent circuit, V-I characteristics and application of UJT.
3. Explain the construction, operation, equivalent circuit, V-I characteristics and application of TRIAC.
4. Explain the construction, operation, equivalent circuit, V-I characteristics and application of DIAC.
5. Explain the operation of (a) Photo transistor (b) Solar cell.
6. Explain: (a) Power BJT (b) Power MOSFET.
7. Describe the operation of LED and LCD.
8. Explain the operation of (a) CCD (b) Opto coupler.
9. Compare the characteristics and applications of UJT, SCR, DIAC and TRIAC.