Register Number……

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Second Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U07EC206: Electron Devices

Time: Three Hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. The concentration of minority carriers in an extrinsic semiconductor under equilibrium is
   a. Directly proportional to the doping concentration
   b. Inversely proportional to the doping concentration
   c. Directly proportional to the intrinsic concentration
   d. Inversely proportional to the intrinsic concentration
2. The band gap of silicon at room temperature is
   a. 1.3 eV b. 0.7 eV c. 1.1 eV d. 1.4 ev
3. The drift velocity of electrons, in silicon
   a. Is proportional to the electric field for all values of electric field
   b. Is independent of the electric field
   c. Increases at low values of electric field and decreases with high values of electric field exhibiting negative differential resistance
   d. Increases linearly at low values of electric field and gradually saturates at high values of electric field
4. In the energy band diagram of an open circuited PN junction, the energy band of N region has shifted relative to that of P region ……..where E_0 equals qV_0
   a. Downward by E_0 b. Upward by E_0 c. Downward by $E_0 / 2$ d. Upward by $E_0 /2$
5. A Tunnel diode is used
   a. In high power circuits b. In circuits requiring negative resistance
   c. In very fast switching circuits d. In power supply rectifiers
6. Which diode operates only with majority carriers
   a. Laser b. Tunnel c. Schottky d. Step recovery
7. The Eber – Molls model is applicable to
   a. Bipolar Junction Transistors b. NMOS Transistors
   c. Unipolar junction Transistors d. Junction field effect Transistors

8. Two identical FETs each characterized by the parameters g_m and r_d are connected in parallel. The composite FET is the characterized by the parameters

   a. g_m /2 and 2 r_d b. g_m /2 and r_d / 2 c. 2g_m and r_d / 2 d. 2 g_m and 2 r_d

9. To trigger an SCR a good one to use might be

   a. An SCS b. a UJT c. a 4 layer diodes d. PUT

10. For JFET the change in drain current for a given change in gate to source voltage with the drain to source voltage constant is

    a. Break down b. Reverse transconductance

    c. Forward transconductance d. self biasing

PART B (10 x 2 = 20 Marks)

11. Why does an electron take a cycloidal path when it is exposed to perpendicular electric and magnetic fields?
12. What are the three commonly used semiconductors?
13. What is meant by N-type impurity in a semiconductor?
14. Indicate the differences between the characteristics of silicon and germanium diodes and state approximately their cut-in voltages.
15. Define the term diffusion capacitance of a PN junction diode
16. List out the applications of tunnel diode and mention its advantages.
17. Why BJTs are called bipolar devices and FETs unipolar devices?
18. Why are N-channel MOSFETs preferred over P-channel MOSFETs?
19. Why SCR is operated only in the forward biased condition?
20. What is the advantage of TRIAC over SCR?

PART C (5 x 14 = 70 Marks)

21. a) i) Define electrostatic deflection sensitivity and magneto static deflection sensitivity. (4)

    ii) Compare electrostatic deflection with magneto static deflection. (10)

(OR)

b) Discuss the carrier concentration of an intrinsic semiconductor and show that the Fermi level is located in the middle of the unallowed energy gap.

22. a) Explain Hall Effect. How can Hall Effect are used to determine some of the properties of semiconductor.

(OR)

b) Draw the energy band diagram of an open circuited PN junction and obtain an expression for the contact difference of potential.

23. a) From the energy band diagram, explain the V-I characteristics of a tunnel diode.

(OR)

b) Describe the construction and working of
i) Photodiode and ii) LED

24. a) With the help of suitable diagrams, explain the working of different types of MOSFET.

(OR)

b) Draw the circuit diagram of a NPN junction transistor CE configuration and describe the static input and output characteristics.

25. a) Draw the equivalent circuit of UJT and explain its operation with the help of emitter characteristics.

(OR)

b) What is TRIAC? Sketch its characteristics and describe its operation.

****