

N 1150

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Second Semester

Electronics and Communication Engineering

EC 141 — ELECTRONIC DEVICES

(Common to Biomedical Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Calculate the time taken by an electron which has been accelerated through a potential difference of 1000 volts to traverse a distance of 2 cm. Given $q = 1.6 \times 10^{-19}$ and $m = 9.1 \times 10^{-31}$ kg.
2. State two applications of magnetic deflection.
3. Write down the expression for drift current density due to electrons.
4. Draw the resistance – temperature characteristics of thermistor and comment on it.
5. Define tunnelling phenomenon.
6. Calculate the values of I_C and I_E for a transistor $\alpha_{dc} = 0.97$ and $I_{CBO} = 10 \mu A$ and I_B is measured as $50 \mu A$.
7. Depletion MOSFET is commonly known as “Normally-ON-MOSFET” why?
8. What are all internal capacitance in MOSFET?
9. What is “interbase resistance” of UJT?
10. What is ion implantation process?

11. (i) The electron beam in a CRT is displaced vertically by a magnetic field of flux density 2×10^{-4} wb/m². The length of the magnetic field along the tube axis is the same as that of the electrostatic deflection plates. The final anode voltage is 800 V. Derive and calculate the voltage which should be applied to the Y-deflection plates 1 cm apart, to return the spot back to the centre of the screen. (10)
- (ii) Describe with neat diagram the principle of operation of Dynamic scattering type LCD. (6)
12. (a) Derive the continuity equation from the first principle and also derive 3 special cases of continuity equation. (16)

Or

- (b) (i) Derive the Ebers-Moll model for a PNP transistor and give equation for I_E and I_C . (8)
- (ii) The diode current is 0.6 mA when the applied voltage is 400 mV and 20 mA when the applied voltage is 500 mV. Determine η . Assume $kT/q = 25$ mV. (8)
13. (a) Explain Hall effect. How can Hall effect be used to determine some of the properties of a semiconductor and also discuss its applications. (16)

Or

- (b) Describe with the help of a relevant diagram, the construction of an LED and explain its working. (16)
14. (a) With the help of suitable diagram explain the working of different types of MOSFET. (16)

Or

- (b) (i) Draw and explain the energy band diagram for conductors, insulators and semiconductors. (4)
- (ii) Sketch the energy band diagram for P-N junction under open circuit condition and obtain the expression for contact difference of potential E_0 . (12)

5. (a) (i) With volt-ampere characteristics describe the working principle of an SCR. Also explain its construction details. (14)
- (ii) Draw the two transistor model of an SCR. (2)

Or

- (b) With necessary diagrams explain the fabrication process of NMOS devices. (16)