M 063

MODEL PAPER

B.E. DEGREE EXAMINATION.

Second Semester

ECE

EC 141 — ELECTRONIC DEVICES

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a flat panel display?

2. An electron is injected perpendicularly into a uniform magnetic field of flux density 0.01 Wb/m^2 with an initial speed of 10^7 m/s. What will be the radius of the circular path that the electron describes?

3. Define drift current.

4. Compute the value of diffusion length in a single crystal germanium having 100 μs if the diffusion constant is 47 cm^2/sec.

5. Name the hybrid parameters of a bipolar junction transistor.

6. Write about the mechanisms of breakdown in a *pn* diode.

7. What is a power MOSFET?

8. What do you mean by direct band gap and indirect band gap materials? Give examples.

9. Draw the V–I characteristics of UJT and mark the regions of importance.

10. Name the processes involved in the fabrication of ICs.

PART B — (5 × 16 = 80 marks)

11. (i) Derive continuity equation. What are its uses? (10)

(ii) Show that the resistivity of intrinsic germanium is 45 Ω–cm at 300°K. If a donor type impurity is added to the extent of 1 atom per 10^8 germanium atoms, prove that the resistivity drops to 3.7 Ω–cm. (6)

12. (a) (i) Explain about magnetic deflection in a CRT. Derive the necessary expressions. (10)

(ii) An electron enters the space between two parallel plates *A* and *B* through a small hole in *A* with an energy of 200 eV at an angle of 60° to *A*. Calculate the uniform magnetic flux density required to cause the electrons to return through another hole set in *A* at a distance of 0.08 mt from the point of entrance and lying in the same plane as the initial velocity. (6)

Or

(b) (i) Describe about focusing system employed in CRT. (10)

(ii) A CRT has to the *Y* deflection plates a sinusoidal 5 Hz voltage of 35 V rms value. The observed deflection is a vertical line 0.045 m long.

(1) Calculate deflection sensitivity

(2) If the acceleration voltage on this tube were increased to double value, what would be the observed deflection for the above voltage? (6)

13. (a) (i) Explain basewidth modulation with the aid of potential and minority concentration throughout the base region. (10)

(ii) In a silicon transistor circuit, collector is given to a 10 V supply through a 3 KΩ resistance and the base is given to +5 V DC supply through a 190 KΩ resistance. The emitter and negative terminals of the supplies are connected together. The transistor with $\beta = 90$ is having I_{CO} equal to 25 nA. Determine the region in which the above transistor is working. (6)

Or

(b) (i) Draw the volt ampere characteristics of a JFET and explain about each of the regions of operations of the same with relevant equations. (10)

(ii) An ideal germanium diode at room temperature has a static resistance of 4.57 Ω at a point where I = 45.6 mA. Find the dynamic resistance at a feedback of 0.2 V. (6)

14. (a) Describe the operation of depletion type MOSFET.

Or

(b) With relevant diagrams, explain about Schottky barrier diodes.

15. (a) What is a MOS capacitor? Explain. How is it useful in charge transfer devices?

Or

(b) What is a bilateral diode switch? Explain.