B 2154

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Electronics and Communication Engineering

EC 141 — ELECTRONIC DEVICES

(Common to Bio medical Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is photo electric emission. Write the expression for the energy released by the photons.

2. What is a double beam oscilloscope?

3. Calculate the intrinsic resistivity for germanium of the mobilities of free electrons and holes in pure germanium are 0.38 and 0.18 m^2/us. The intrinsic concentration for germanium at room temperature is $2.5 \times 10^{19}/m^3$.

4. An ac voltage of peak value 20 V is connected in series with a silicon diode and load resistance of 1 K Ω. If the forward resistance of the diode is 15 Ω find the peak current through the diode.

5. What happens to a transistor when both the junctions are reverse biased?

6. Determine the transconductance of a JFET of its amplification factor is 96 and drain resistance is 32 K Ω.

7. How does the MOSFET has high input impedance?

8. A MOSFET can be operated with positive or negative gate voltage, why?

9. A triac is considered as two SCRs connected in reverse parallel, why?

10. Why germanium instead of silicon is used for construction of SCR?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain electrostatic deflection sensitivity and magnetic field intensity. (8)

(ii) What transverse magnetic field acting over the entire length of CRT must be applied to cause a deflection of 3 cm on a screen that is 15 cm away from the anode of the accelerating voltage is 2000 V? (8)

Or

(b) Explain with neat sketch the difference in operation, material, power consumption for a television picture tube, LCD and flat panel display. (16)

12. (a) (i) Discuss the behaviour of a PN junction, when forward biased and reverse biased. Give suitable diagrams wherever necessary? (8)

(ii) The mobilities of free electrons and holes in pure germanium are 0.38 and 0.18 m^2/us. The corresponding values for pure silicon are 0.13 and 0.5 respectively. Determine the value of intrinsic resistivity for both germanium and silicon (n_i for ge = $2.5 \times 10^{19}/m^3$ and n_i for s_i = $1.5 \times 10^6/m^3$). Calculate the result. (8)

Or

(b) (i) Explain the significance of the continuity equation. (8)

(ii) What is hall effect and what are its application? (8)

13. (a) In what respect is an LED different from an ordinary PN junction diode? State applications of LED. Why LED is preferred over conventional incandescent lamps? (16)

Or

(b) What are the different current components in a PNP transistor? Prove the current relation $I_c = \alpha I_E + I_{CBO}$ and $I_c = \beta I_B + (\beta + 1)I_{CEO}$. In what way I_{CBO} and I_{CEO} depend on temperature. (16)

14. (a) Draw and explain the constructional features of E MOSFET and D MOSFET. Explain the drain characteristics. (16)

Or

(b) Why NMOS devices are preferred over PMOS devices. What are the handling precautions for MOSFET. Draw the circuit symbols for N channel D MOSFETS. (16)

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15. (a) Ex
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(b) Ex
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15. (a) Explain the steps required to fabricate various components on monolithic IC. (16)

Or

(b) Explain the construction, working and VI characteristics of an SCR for different gate currents and indicate on the wave form holding current, latching current and break over voltage. (16)
