

2123  
B.E. (ECE), First Semester  
EC-103: Introduction to Electronics

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- Why does an intrinsic semiconductor behave like an insulator at absolute zero temperature?
- For CB input characteristics,  $I_E$  versus  $V_{EB}$  curves move inwards for higher values of  $V_{CB}$ . Justify.
- Define mean time of a carrier.
- Differentiate between direct bandgap and Indirect bandgap semiconductor.
- Analyse the importance of forbidden gap in determining the nature of conduction of a material. (5x2)

UNIT - I

- What are extrinsic and intrinsic semiconductors? Draw the crystalline structure of N-type semiconductor.
  - A small concentration of minority carriers is injected into a homogeneous semiconductor crystal at one point. An electric field of 10V/cm is applied across the crystal and this moves the minority carriers a distance of 1 cm in 20 $\mu$ sec. Find the mobility. (5x2)
- What is Luminescence? Explain the mechanism of Electroluminescence with neat diagram.
  - Describe the Hall Effect. Derive equation of Hall voltage  $V_H$  and mobility. (5x2)
- Derive mathematical expressions of thermal equilibrium electron and hole concentrations in a semiconductor. Also draw an energy band diagram representing density of states functions, Fermi-Dirac probability function and electrons and holes concentration areas in the case when  $E_F$  is above the intrinsic fermi energy. (10)

P.T.O.

(2)

UNIT - II

- V a) For a PNP transistor the base current and collector current are  $45\mu\text{A}$  and  $5.45\text{mA}$  respectively. Determine (i) values of  $\alpha$ ,  $\beta$  and (ii) Base current required to make collector current of  $10\text{mA}$ .  
b) With the help of a diagram explain the working of a solar cell. (2x5)
- VI. a) Explain the output characteristics of transistor in CE configuration and 3 regions of operation.  
b) Explain how a zener diode can be used as voltage regulator. (2x5)
- VII. a) Explain the principle of operation of an LED. List any two types of semiconductor materials used in the construction of LED.  
b) Give the symbol, structure and applications of the device with metal semiconductor contact. (2x5)

x-x-x