

- N.B. : (1) Question No. 1 is compulsory.  
 (2) Attempt any four questions from Q. No. 2 to 7.  
 (3) Assume suitable data and symbols if required.  
 (4) Figures to the right indicate full marks.

1. Attempt any five :—
  - (a) Describe phase measurement by using CRO. 3
  - (b) Draw following planes in Cubic Unit Cell  $(\bar{1} 1 \bar{1}) (1 0 \bar{1}) (\bar{1} 0 1)$  3
  - (c) Describe working of liquid Crystal display. 3
  - (d) State applications of Hall effect. 3
  - (e) State applications of Super Conductivity. 3
  - (f) Explain Industrial applications of x-rays. 3
  
2. (a) A loudspeaker emits energy in all directions at the rate of 1.5 J/sec. What is the intensity level in dB at a distance of 20 m ? 5  
 (Standard intensity level of sound =  $10^{-12} \text{ w/m}^2$ ).
- (b) What are Crystal imperfections ? How they are formed ? What is their Significance ? 10
  
3. (a) State Sabines formula. Explain the terms involved in it. How Sabines formula can be made applicable to acoustics of auditorium ? 5
- (b) Show that the ratio of Hall electric field  $E_H$  to the electric field  $E$  which is responsible for the Current in n-type Semiconductor kept in a Uniform magnetic field  $B$  is given by— 10  

$$\frac{E_H}{E} = \frac{B}{nep}$$
  
4. (a) Sodium is a BCC Crystal. It's density is  $9.6 \times 10^2 \text{ kg/m}^3$  and atomic weight is 23. Calculate the lattice Constant for Sodium Crystal. 5
- (b) What is Super Conductivity ? Describe Type-I and Type -II Super conductors and prove that Super Conductors are perfect diamagnetic. 10
  
5. (a) What is fermi energy and fermi-dirac distribution function ? Show that in intrinsic Semiconductors fermi level lies midway between Conduction band and valance band. 10
- (b) Estimate the number of Frankel defects per  $\text{mm}^3$  in Silver chloride if energy of formation of Frankel defects is 1.5 ev at 700°k. The molecular weight of AgCl is 0.143 kg/mol and Specific density is 5.56. 5
  
6. (a) How ultrasonic waves are produced ? 10  
 Illustrate any two applications of Ultrasonics.
- (b) Explain the concept of Electrostatic focussing in electron optics. 5
  
7. Write short notes on any three :— 15
  - (a) Miller indices
  - (b) C.R.O.
  - (c) X-rays in Crystallography
  - (d) Conduction in Semiconductor diode.