ASSIGNMENT

Name of the Paper: Solid State Physics
Name of Course: B.Sc (APS) Physics
Semester: VI
(Due Date 2 April 2024)

Maximum Marks: 10

Explain:

Q1(a) what is reciprocal lattice? discuss some of its important properties and show that fcc lattice is the reciprocal of bcc lattice and vice versa.

Q2(b) the Bragg's angle for reflection from the (111) planes in aluminum (FCC) is 19.2^0 for an x ray wavelength of 1.54 A^0, compute (i) the cube edge of the unit cell (ii) the interplanar distance of these planes

Q3 How are Brillouin zones constructed? describe and sketch the first brillouin zone of the bcc and fcc lattice mention their importance in crystal analysis

Q4 (i) what are phonons? derive dispersion relation for a linear monoatomic lattice.

(ii) energy of a solid at temperature t is given by

$$E = 9RT\left(\frac{T}{\theta_D}\right)^3 \int_0^{\theta_D/T} \frac{x^3 dx}{e^x - 1}$$

Where $x = \frac{h\nu}{kT}$, θ_D = Debye's temp. Estimate its specific heat when T <<, θ_D and explain why is differs so much from einstein's theory of specific heat of solid.

Q5 distinguish between dia, Para and ferromagnetism. give an account of weiss theory of ferromagnetism.

Q6 by drawing E vs K curve, distinguish between metal and insulator and semiconductor.

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