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UG/2nd Sem/Elec/H/19

2019

B.Sc.

2nd Semester Examination

ELECTRONICS (Honours)

Paper - C3T

[Applied Physics (Theory)]

Full Marks : 40

Time : 2 Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

1. Answer any *five* of the following questions : 2×5
- (i) What is Face-Centred Crystal (FCC)? What is the number of atoms per unit cell of a FCC? 1+1
 - (ii) Define entropy and write its significance. 1+1
 - (iii) Compare ferro and anti-ferro magnetism. 2
 - (iv) Define curie temperature of ferromagnetic material and write its significance. 1+1

[Turn Over]

(v) Write the process of carrier generation in an intrinsic semi conductor. 2

(vi) Write the schrodinger wave equation for a particle of mass m , total energy E and potential energy V . Reduce the equation for free particle. 1+1

(vii) Define phase space and write the meaning of quantization of phase space. 1+1

(viii) Define dielectric-constant of an insulator and write its significance. 1+1

2. Answer any *four* of the following questions : 4×5

(i) What is ionic bond? Write the characteristics of ionic bond. Give an example of ionic-bond crystal. 1+2+2

(ii) State and discuss seeback law of thermoelectricity. Define thermoelectric power. 1+2+2

(iii) Define Young's modulus (Y) and rigidity modulus (η) of a material and find their relationship. 2+3

(iv) What is Bose-Einstein Statistic? Find Bose-Einstein distribution function. 2+3

- (v) Particle is restricted to move in one dimension two pts, such that the potential function is defined as

$$V(x) = \infty \text{ to } x < 0 \text{ and } x > a$$

$$= 0 \text{ for } 0 \leq x \leq a \quad 5$$

Solve Schrodinger equation for the particle motion and eigen values.

- (vi) State and discuss 1st and 2nd laws of thermodynamics. $2\frac{1}{2}+2\frac{1}{2}$

3. Answer any *one* of the following : 1×10

- (i) (a) What is fermi-level? Find its relation with carrier concentration in a solid. $1+4$

- (b) The number of free electrons per cubic metre of sodium is 2.5×10^{28} . Calculate the Fermi-energy. 3

- (c) Define relaxation time and write its relation with mobility. $1+1$

- (ii) (a) What is photoelectric effect? What is Threshold frequency? Give Einstein's explanation for photo electric effect.

$1+1+3$

[Turn Over]

(4)

- (b) Calculate the de-Broglie Wavelength neutron of energy 28.8 eV.

Given : $h = 6.62 \times 10^{-34}$ J-S,

$$m = 1.67 \times 10^{-27} \text{ kg.} \quad 3$$

- (c) An electron has speed of 500 m/s with an accuracy of 0.005%. Calculate the uncertainty with which we can locate the position of the electron. $h = 6.6 \times 10^{-34}$ J-S.

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