

S.No. : 403

BAS 2202

No. of Printed Pages : 04

Following Paper ID and Roll No. to be filled in your Answer Book.

**PAPER ID : 29907**

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## B. Tech. Examination 2021-22

(Even Semester)

PHYSICS - II

*Time : Three Hours]*

*[Maximum Marks : 60*

**Note :-** Attempt all questions.

### SECTION - A

1. Attempt all parts of the following :  $8 \times 1 = 8$
- (a) What do you mean by wave particle duality?
  - (b) What do you mean by expectation value?
  - (c) What do you understand by eigen value and eigen function?
  - (d) What are the applications of Bragg's spectrometer?

**[P. T. O.]**

- (e) What do you mean by packing factor?
- (f) What is skin depth?
- (g) What are carbon nanotubes?
- (h) What do you mean by critical temperature?

### SECTION – B

2. Attempt any two parts of the following :  $2 \times 6 = 12$
- (a) Calculate the smallest possible uncertainty in the position of an electron moving with velocity  $3 \times 10^7 \text{ ms}^{-1}$ .
  - (b) The lattice constant for a unit cell of aluminium is  $4.049 \text{ \AA}$ . Calculate the spacing of  $(2 \ 2 \ 0)$  plane.
  - (c) If earth receives  $2 \text{ cal min}^{-1} \text{ cm}^{-2}$  solar energy, what are the amplitudes of electric and magnetic fields of radiation?
  - (d) A super conducting tin has a critical temperature of  $3.7 \text{ K}$  in zero magnetic field and a critical field of  $0.0306 \text{ T}$  at  $0 \text{ K}$ . Find the critical field at  $2 \text{ K}$ .

## SECTION – C

**Note :-** Attempt all questions. Attempt any two parts from each questions.  $5 \times 8 = 40$

3. (a) What is physical significance of wave function? Derive time independent Schrodinger wave equation.
- (b) What is Heisenberg uncertainty principle? Apply this to prove the non-existence of electron in the nucleus.
- (c) Starting from Maxwell's equations obtain electromagnetic wave equation for free space. Also prove that EM wave travels in free space with the velocity of light.
4. (a) Describe Davission-Germer experiment to demonstrate the wave nature of particle.
- (b) Describe the diamond crystal structure and calculate the packing factor of diamond.
- (c) Define atomic radius. Calculate atomic radius in case of SC, BCC and FCC structure.

**[P. T. O.]**

5. (a) What is Bragg's law? Describe Bragg's X-ray spectrometer.
- (b) What do you mean by inter planar distance? Show that in a cubic lattice the distance between successive planes having Miller indices  $(h\ k\ \ell)$  is given by :

$$d_{hkl} = \frac{a}{\sqrt{(h^2 + k^2 + \ell^2)}}$$

- (c) What are Super Conductors? Describe Meissner effect in super conductors.
6. (a) What is Poynting vector? Describe Poynting theorem and explain its physical significances.
- (b) Discuss characteristic properties and uses of superconductors.
- (c) Describe bukyballs. Describe their properties and uses.

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