Total No. of Questions : 6]

SEAT No. :

P552

[Total No. of Pages : 2

[4456] - 9
F.E. (Common) (Semester - II)
APPLIED SCIENCE - II
Physics
(2008Course)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your are advised to attempt not more than questions.***
4) ***Use of logarithmic tables Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Constants:

$h = 6.63 \times 10^{-34}$ J.s

$e = 1.6 \times 10^{-19}$ C

$m_e = 9.1 \times 10^{-31}$ kg

$C = 3 \times 10^{8}$ m/s

Q1) a) Explain de-Broglie's hypothesis of matter waves and obtain an equation for wavelength of matter waves in terms of K.E. of particle. **[7]**

b) Deduce Schroedinger's time independent wave equation. **[6]**

c) An electron is trapped in a rigid box of length 2Å. Compute first two energy eigen values of electron in eV. **[4]**

OR

Q2) a) Derive an equation of energy and wave function when a particle is trapped in rigid box. **[7]**

b) State and explain Heisenberg's uncertainty principle. **[6]**

c) Calculate de-Broglie wavelength of an electron accelerated through potential difference of 1000V. **[4]**

P.T.O.

Q3) a) Explain construction and working of Ruby Laser. **[6]**

b) What is superconductivity? Explain BCS theory of superconductors. **[6]**

c) State and explain: **[4]**

i) Meissner effect.

ii) Critical field.

OR

Q4) a) Explain construction and working of He-Ne Laser. **[6]**

b) Distinguish between Type I and Type II super conductors. **[6]**

c) State any four applications of Laser. **[4]**

Q5) a) What is Fermi function? Show that Fermi level lies at the centre of V.B. and C.B. in case of an intrinsic semiconductor. **[7]**

b) Explain synthesis of metal nano-particles by colloidal route. **[6]**

c) If the mobility of electrons is 1000 $cm^2/V.s$ and the resistivity of N-type semiconductor to be formed is $10^{-6} \Omega cm$, calculate the number of doner atoms to be added. **[4]**

OR

Q6) a) State and explain Hall effect. What is Hall coefficient? State applications of Hall effect. **[7]**

b) Explain any two properties of nanoparticles. **[6]**

c) Draw energy band diagrams for a P-N junction diode in forward biased and reverse biased condition. **[4]**