Total No. of Questions : 6]

P552

**SEAT No. :** 

[Total No. of Pages : 2

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

## (2008Course)

*Time : 2 Hours]* 

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 x  $10^{-34}$  J.s e = 1.6 x  $10^{-19}$  C m<sub>e</sub> = 9.1 x  $10^{-31}$  kg C = 3 x  $10^8$  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

<i>Q2)</i> a)	Derive an equation of energy and wave function when a particle is trappe		
	in rigid box.	[7]	
b)	State and explain Heisenberg's uncertainty principle.	[6]	
c)	Calculate de-Broglie wavelength of an electron accelerated potential difference of 1000V.	through [4]	
		<i>P.T.O.</i>	

[Max. Marks : 50

<b>Q3)</b> a	)	Exp	lain construction and working of Ruby Laser.	[6]
b	)	Wh	at is superconductivity? Explain BCS theory of superconductor	s.
				[6]
c)	)	Stat	e and explain:	[4]
		i)	Meissner effect.	
		ii)	Critical field.	
			OR	
<b>Q4)</b> a	)	Exp	lain 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 Lease
  - 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 cm²/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

<b>Q6)</b> a)	State and explain Hall effect. What is Hall coefficient? State application		
	of mail effect.	[/]	
b)	Explain any two properties of nanoparticles.	[6]	
c)	Draw energy band diagrams for a P-N junction diode in forward bias		
	and reverse biased condition.	[4]	