BAP-202

SEMESTER EXAMINATION- MAY 2024

B.TECH. SEMESTER:II

PHYSICS

ENGINEERING PHYSICS

Time: 3 hours

Max. Marks: 70

Note: Question Paper is divided into two sections: **A** and **B**. Attempt both the sections as per given instructions.

	CO	BL
SECTION-A (SHORT ANSWER TYPE QUESTIONS)		

$T = 2.\overline{T}2$

Instructions: Answer any *five* questions in about 150 words each. Each question carries six marks.

$(5 \times 6 = 30 \text{ Marks})$

1. Find out an expression for the radius of circular path obtained by a charged particle on entering perpendicularly in a magnetic field. Also obtain its time period. **CO1 L3**

2. Obtain an expression for magnetic field at a point lying on the axis of a current carrying coil. **CO3 L3**

3. Prove that electric field strength is equal to the negative gradient of electric potential. **CO1 L3**

4. What do you mean by diamagnetic, paramagnetic and ferromagnetic materials? Give two examples of each. **CO1 L4**

5. Calculate the de-Broglie wavelength of an electron in the first Bohr orbit of hydrogen atom. Given: Speed of light (c)=3×10^8 m/s, Rydberg's Constant(R)=1.097×10^7 m^{-1} and Planck's Constant (h)= 6.62×10^{-34} Js. **CO2 L3**

6. What do you mean by effective mass? Obtain mathematical expression for effective mass of electron. **CO2 L5**

7. Prove that curl of electric field is zero. **CO2 L5**

8. What do you mean by phase velocity and group velocity? Establish a relationship $\quad$ CO1 $\quad$ L4

between them.

9. What do you mean by Heisenberg's uncertainty principle? Why does electron $\quad$ CO1 $\quad$ L4

not exist inside the nucleus, illustrate it by uncertainty principle.

$\qquad$ CO4 $\quad$ L3

10. Derive the differential form of Gauss's law.

$\qquad$ CO $\quad$ BL

SECTION-B (LONG ANSWER TYPE QUESTIONS)

Instructions: Answer any *four* questions in detail. Each question carries 10 marks.

$(4 \times 10 = 40$ Marks$)$

1. What do you mean by damped harmonic oscillator? Discuss heavy, critical and $\quad$ CO3 $\quad$ L3

light damping.

2. Discuss principle, construction and working of *Ruby laser* laser with its $\quad$ CO4 $\quad$ L5

appropriate energy level diagram.

$\qquad$ CO5 $\quad$ L5

3. Derive Schroedinger's time Independent wave equation.

4. What do you mean by conductor, insulator and semiconductor? Classify $\quad$ CO5 $\quad$ L4

semiconductors in detail on the basis of band theory of solids.

5. Calculate electric field strength due to a solid sphere formed by non-conducting $\quad$ CO1 $\quad$ L4

material at external and internal points. Also show the variation in electric field

strength with respect to distance.

6. Derive an expression for average energy of Planck's oscillator. Also derive $\quad$ CO6 $\quad$ L3

Planck's radiation formula in terms of wavelength. Show that Wien's law and

Rayleigh Jean's law are the special cases of Planck's radiation formula.

7. Discuss principle, construction and working of $He - Ne$ laser with its $\quad$ CO6 $\quad$ L3

appropriate energy level diagram.

8. Define Compton's effect? Also derive mathematical expression for Compton's $\quad$ CO5 $\quad$ L2

shift with proper diagram.

*****

$$v = \frac{c}{\lambda}$$

$$\lambda = \frac{c}{v}$$

Z457/BAP-C202