Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech. (AI&DS/AI&ML/Block Chain/CE/CSE/Cyber Security/ DS/IOT/CSD/EEE/EE/ECE/ETE/ECS/FT/IT/ME/Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology) (Sem-1,2)

ENGINEERING PHYSICS

Subject Code : BTPH101-23

M.Code : 93794

Date of Examination : 14-06-2025

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select at least TWO questions from SECTION - B & C.**

SECTION - A

l. Write briefly :

a. Calculate the minimum wavelength of Continuous X-rays emitted from an X-ray tube whose operating voltage is 40 kV.

b. Show that at 0 K, the probability to find electron in an energy level above the fermi level is Zero.

c. Why superconductors cannot carry current beyond a certain limit?

d. Distinguish between diamagnetic and paramagnetic materials.

e. Show that Divergence of Curl of vector is zero.

f. Distinguish between Stimulated emission and spontaneous emission.

g. Write a note on four level lasers.

h. What are Carbon Nanotubes (CNTs)?

i. An electron has a speed of 400 m/s, correct upto 0.01%, with what minimum accuracy, can you locate the electron?

j. Distinguish between splicers and couplers.

SECTION - B

2. What is Bragg's law? Explain the measurement of crystal spacing (d) using Bragg's spectrometer.

3. Distinguish between intrinsic and extrinsic semiconductors. Derive the expression for carrier concentration in n-type semiconductors.

4. What is Meissner effect? Explain it using London's equation.

5. a. Write the Maxwell's equations and discuss the physical significance of each equation.

   b. Define Poynting vector ($\vec{P}$). Show that $\vec{P} = < \vec{E} \times \vec{H} >$, where symbols have their usual meanings.

SECTION - C

6. Explain the construction and working of Ruby laser with the help of energy level diagram. Explain why it is pulsed laser?

7. What are the various kinds of losses a light suffers while propagating through a fibre? Calculate the refractive index of core and clad of fibre where Numerical aperture is 0.40 and $\Delta = 0.020$.

8. Solve time independent Schrodinger wave equation for particle in a box and show that energy of particle is quantized.

9. Explain the synthesis of nanomaterials using sol-gel techniques. Why it is called bottom to top approach?

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.