B.SC. HONOURS 2ND SEMESTER INTERNAL EXAMINATION 2022
KANDI RAJ COLLEGE
DEPARTMENT OF PHYSICS

SEMESTER: 2ND **STREAM: Honours (CORE)**

Papers: (ELECTRICITY & MAGNETISM + WAVES AND OPTICS)

PAPER CODE: PHY-HCC-T-03 **Full marks: 10**

Answer any TEN questions of the following: **10×1=10**

1. The electric field inside a uniformly charged hollow cylinder is--

[A] infinite [B] depends on the location of the point [C] zero [D] finite

2. The work done in displacing a charge 2C through 0.5m on an equipotential surface is

[A] 0 [B] 1J [C] 4J [D] none of these

3. The magnetic field at the centre of a current loop is proportional to

[i] R [ii] R^{-1} [iii] R^2 [iv] R^{-2}

4. Mark the statement which is correct in all circumstances

[i] $\vec{\nabla}\times\vec{E}$ =0 [ii] $\vec{\nabla}.\vec{B}$ =0 [iii]] $\vec{\nabla}.\vec{E}$ =0 [D] $\vec{\nabla}\times\vec{B}$ =0

5. Two parallel wires carrying currents flowing in opposite directions will

[A] attract each other [B] repel each other [C] neither attract nor repel

6. The solid angle subtended at a point at the centre of a closed sphere is

[A] zero [B] π [C] 2π [D] 4π

7. Current in a circuit is wattless when the phase difference between current and voltage is

[A] zero [B] π [C] -π [D] π/2

8. The magnetic field outside the infinite solenoid is

[A] zero [B] infinite [C] $\mu_0 nI$ [D] 1/2 $\mu_0 nI$

9. The SI unit of magnetic susceptibility is

[A] A/m [B] C/m^2 [C] $A.m^2$ [D] no unit

10. The magnetic moment of an atom is due to

[A] orbital motion of electron [B] spin of electron [C] both orbital and spin motion [D] none of these

11. The direction of induced e.m.f in a circuit is given by

[A] Faraday's law [B] Fleming's left hand rule [C] Lenz's law [D] none of these

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PAPER CODE: PHY-HCC-T-04 **Full marks: 10**

Answer Any Five questions of the following: **2×5=10**

1. Explain Fraunhofer diffraction with examples ?
2. State the difference between elastic wave and electromagnetic wave.?
3. Obtain the relation between phase velocity and group velocity.
4. What is a wavefront? State Huygens principle.
5. Does Energy conserve in Young's double slit interference experiment?
6. What are the conditions for single slit diffraction pattern?
7. What are zone plates? How it behaves?

PHY-H-GE-T-02 **Full Marks-10**

Answer any two questions (5×2=10)

1. Show that two harmonic oscillations, at right angles to each other with different amplitudes and equal frequencies but with phases differing by $\pi/2$, are equivalent to an elliptic motion.
2. Derive an expression for the distribution of intensity in a single slit Fraunhofer diffraction.
3. How are fringes formed in Michelson's interferometer? How is Michelson interferometer used to measure the refractive index of a thin transparent sheet?
4. What is a forced harmonic oscillator? Find an expression for the displacement in the case of a forced harmonic oscillator.
