

**B.Sc. II Semester Examination**

**CBS-IIs/7 (R&P)**

**225082**

**PHYSICS**

**Course No.: - UPHTC-201**

**Time Allowed : 2½ Hours**

**Maximum Marks : 80**

**Note :-** Attempt all questions from section A and section B and any two questions from section C.

**SECTION-A**

**(5×3=15)**

1. Evaluate  $\nabla (1/R^2)$  where  $\vec{R} = x\hat{i} + y\hat{j} + z\hat{k}$
2. Show that the scalar field  $\phi = (A/r) + B$ , where A and B are constants, satisfies the Laplace equation.
3. Explain how a current loop acts as a magnetic dipole?
4. Explain self inductance of a solenoid.
5. Conductivity  $\sigma$  for silver is  $3 \times 10^7$  mho/m. Calculate the skin depth for a frequency of  $10^{10}$  cycles/s. Given  $\mu = 4\pi \times 10^{-7}$  H/m.

**SECTION - B**

**(5×7=35)**

1. Explain line integral, surface integral and volume integral by giving examples.

**[Turn Over**

(2) **CBS-IIs/7(R&P)-225082**

2. Prove that electric potential at a point due to a quadrupole varies as  $1/r^3$ .
3. Obtain Ohm's law in microscopic form. What are limitations of this law?
4. Explain reciprocity theorem of mutual inductance.
5. Derive wave equations satisfied by electric field vector and magnetic field vector in vacuum.

**SECTION - C**

**(2×15=30)**

1. What do you understand by scalar and vector fields? Give physical interpretation of gradient of a scalar field and divergence of a vector field.
2. Explain integral and differential forms of Gauss's law.
3. Explain magnetic scalar and vector potentials. Find the divergence of vector potential.
4. State and prove pointing theorem.
5. Derive the laws of reflection and refraction when an electromagnetic wave travelling in a homogeneous isotropic dielectric is incident obliquely at the plane surface of another dielectric.

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