M.Sc. (Physics) (NEP Pattern) Semester-I

NEP-234 / 01MSCPH2 - DSC Paper-II : Electrodynamics

P. Pages : 2 **GUG/W/24/15135**

Time : Three Hours * 6 0 1 8 * Max. Marks : 80

Notes : 1. All questions are compulsory.

Either:

1. a) Derive an expression for Poisson's and Laplace equation. **8**

b) Explain Coulomb's law in vector form. Write down Coulomb's law equation for various type charge distribution. **8**

OR

e) Obtain an expression for molecular polarizability? **8**

f) State and explain Gauss's law further derive its differential form. **8**

Either:

2. a) Discuss magnetostatic boundary condition in detail. **8**

b) Define and prove Biot-Savart law. **8**

OR

e) Derive Ampere law in differential as well as in integral form. **8**

f) Using Ampere's law find magnetic field outside and inside of a very long solenoid. **8**

Either:

3. a) Explain Lorentz Transformation in terms of four vectors. **8**

b) Derive an expression for representing Maxwell's equation in scalar and vector potential. **8**

OR

e) Explain coulomb transformation in detail. **8**

f) Explain various properties of electromagnetic filed in detail. **8**

Either:

4. a) Obtain Electromagnetic place wave equation for conducting media. **8**

b) Explain the concept of polarization for Electromagnetic wave. **8**

OR

e) Obtain plane wave equation of electromagnetic field in vacuum. **8**

f) Explain the following for electromagnetic waves: **8**

i) Reflection ii) Refraction

iii) Interference iv) Diffraction

5. All questions are compulsory.

a) What will be the force between charges. **4**

i) 5 microcoulomb placed at (0, 0, 0)

ii) -10 microcoulomb placed at (1,1,1)

$(\varepsilon_0 = 8.80 \times 10^{-12}\ C^2 / Nm^2)$

b) Explain the concept of displacement current. **4**

c) Explain Gauge transformation. **4**

d) Explain Interference of electromagnetic waves. **4**

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