

**NORTH GAUHATI COLLEGE**

**DEPARTMENT OF PHYSICS**

**ONLINE SESSIONAL EXAMINATION, 2021**

**Semester 2<sup>nd</sup> (H), Paper: Electricity & Magnetism, PHY-HC-2016**

**Max Marks-20**

**Date: 29<sup>th</sup> October, 2021**

- 
- 1) Answer the following questions :  $1 \times 5 = 5$
- Write down the inverse square law in Electrostatics.
  - Define force in terms of potential.
  - Write down the expression of magnetic flux density at the center of a long solenoid carrying current.
  - Express ‘Henry’ in terms of fundamental quantities (M, L, T, I).
  - If a sinusoidal voltage is applied across a resistor, show that voltage and current are in phase.
  - What is the difference between ‘dead-beat galvanometer’ and ‘ballistic galvanometer’?
- 2) Answer any three of the following :  $3 \times 5 = 15$
- Using Gauss’s law to determine the electric field for a uniformly charged spherical conductor.
  - A current  $i(t) = 2e^{-t} - e^{-2t}$   $\mu$ A charges up a 120 nF capacitor for a period of 2s. If the final voltage across the capacitor is 15 V, what is the initial voltage across it?
  - Derive an expression for the electric field and potential at a point due to an electric dipole.
  - Obtain an expression for the power factor of an a.c. circuit? Explain the term ‘wattless current’.
  - What is meant by resonance in an a.c. circuit? In an a.c. circuit containing L, C and R in series, find the condition under which the resonance is obtained.
  - A coil of resistance 10  $\Omega$  and inductance 0.1 H is connected in series with a capacitor with capacitance 150  $\mu$ F across a 200 V (r.m.s), 50 Hz supply. Calculate the power factor and power consumed in the circuit.

**Nota Bene:**

- Write your answers in A4 paper sheet mentioning clearly **your name, GU roll number, registration number, paper code etc.** at the front page of your answer sheet.
- You have to make a single PDF file of your answer sheets.
- You need to submit your respective PDF at the online portal of our college website ONLY.
- The submission deadline is 29<sup>th</sup> October, 2021 (23.59 hrs).