International Islamic University Chittagong
Department of Computer Science and Engineering
B.Sc. in CSE
Mid-Term Examination, Spring-2024
Course Code: **PHY-1201** Course Title: **Physics-II**
Time: 1 hour 30 minutes Full Marks:30

(i) Answer **all** the questions. The figures in the right-hand margin indicate full marks.
(ii) Course Learning Outcomes and Bloom's Levels are mentioned in additional Columns.

1. a)	State and explain Coulomb's law in electrostatics.	CLO1	R	3
b)	Derive an expression for an electric field due to a long uniformly charged wire.	CLO1	U	4
	Or			
	Define electric potential. Derive an expression for the electric potential at a distance r from a point charge q.			
c)	Calculate the repulsive Coulomb force that exists between two protons in a nucleus of iron. Assume a separation of 4×10^{-15} m.	CLO2	An	3
2. a)	State and explain Biot-Savart law.	CLO1	R	2
b)	Define self-inductance. Deduce a mathematical expression for the self-inductance of a solenoid.	CLO1	U	5
	Or			
	Derive an expression for the magnetic field at a point due to a long straight wire carrying current.			
c)	Calculate the self-inductance of a solenoid having 2000 turns and a length of 1 m. The area of the cross-section is 7 cm^2 and the relative permeability of the core is 1000.	CLO2	An	3
3. a)	Define Resistance and Capacitance.	CLO1	R	2
b)	Obtain an expression for the growth of charge and current when a capacitor is charged through a resistance for a constant emf.	CLO1	U	5
c)	A 150 μF capacitor is connected through a 500 Ω resistor to a 40 V battery. (a) What is the time constant of the circuit? (b) What is the final charge on q_o on a capacitor plate? (c) How long does it take for the charge on a capacitor plate to reach $0.8q_o$?	CLO2	An	3