

**Dhaka International University**  
**Department of Computer Science & Engineering**  
**Semester Final Examination (Fall-2019)**  
**Batch: 76<sup>th</sup> (Evening), Semester: 2<sup>nd</sup>,**  
**Course No.: Phy-103, Course Title: Physics II**  
**Marks allotted are indicated in the right margin**

**Time: 2.5 Hours**

**Full Marks: 50**

**Group A**

*(Answer any two questions)*

1. (a) Define electric dipole. Calculate the electric dipole moment of an electron and a proton 4.30 nm apart. 2  
 (b) Find out an expression of the electric field due to a dipole at a point  $P$ , a distance  $r$  from the midpoint of the dipole and on the axis. 6  
 (c) Find the magnitude of the repulsive electrostatic force between two of the protons that are separated by  $4 \times 10^{-15}$  m? 4.5
2. (a) Find the equivalent capacitance of the following circuit. Assume that  $C_1$  is 10 F,  $C_2$  is 5 F, and  $C_3$  is 4 F and the battery's potential difference is  $V = 12$  V. How much charge will pass through the equivalent combination? 4.5



- (b) What happens when a dielectric slab is placed in uniform electric field? 5
- (c) Define dielectric constant. A parallel-plate capacitor has a capacitance of 1.3 F. The separation of the plates is doubled, and wax is inserted between them. The new capacitance is 2.6 F. Find the dielectric constant of the wax. 3
3. (a) State and explain Ampere's law. By using Ampere's law find out an expression of magnetic field due to a long ideal solenoid carrying a current  $i$ . 7  
 (b) What is Lorentz force? An electron traveling at  $23.0^\circ$  with respect to the direction of a magnetic field of strength  $2.6 \times 10^{-3}$  T experiences a magnetic force of  $6.5 \times 10^{-17}$  N. Calculate (a) the electron's speed and (b) kinetic energy? 5.5

**Group B**

*(Answer any one question)*

4. (a) What do you mean by magnetic induction? 3  
 (b) Establish a relationship between induced emf and inductance while current,  $i$  is changing through an inductor. 2  
 (c) Show that the dimension of  $L/R$  is equal to the dimension of time. 5  
 (d) A 12 H inductor carries a current of 2.0 A. At what rate must the current be changed to 2.5

produce a 60 V emf in the inductor?

- 5 (a) Write down the origin of magnetism of a magnetic material. 4.5  
 (b) Differentiate among para, ferro and ferromagnetic materials. 4  
 (c) Prove that  $V_{rms} = \frac{V_{peak}}{\sqrt{2}}$ , where the symbols have their usual meanings. 4

**Group C**  
**(Compulsory)**

- 6 (a) Write down the differences between the Thevenin's theorem and Norton's theorem. 3.5  
 (b) Find the Thevenin's equivalent voltage and resistance & hence calculate current 9  
 through the  $R_L = 8\Omega$  resistor for the circuit shown in the following Fig.

