# ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
### *(Department of Physics)*

**Course: Physics (3404)**  **Semester: Autumn, 2012**
**Level: BCS**  **Total Marks: 100**

## ASSIGNMENT No. 1
### (Units: 1–4)

*Note: Attempt all questions. All questions carry equal marks.*

Q. 1 a) What is Coulomb's Law? Verify it experimentally. **(10+10=20)**

b) An electrically neutral penny, of mass m =- 3.11g contains equal amounts of positive and negative charge.

   i) Assuming that the penny is made entirely of copper, what is the magnitude q of the total (positive or negative) charge in the coin?

   ii) Suppose that the positive charge and the negative charge in a penny could be concentrated into two separate bundles, 100m apart. What attractive force would act on each bundle?

Q. 2 Discuss planar symmetry and spherical symmetry as an application of Gauss's Law. **(20)**

Q. 3 a) Calculate the capacity of a parallel plate, spherical capacitor. **(10+10=20)**

b) Find the equivalent capacitance of the combination shown in the given figure. Assume $C_1=12.0\mu F$, $C_2=5.30\mu F$ and $C_3= 4.50\mu F$.
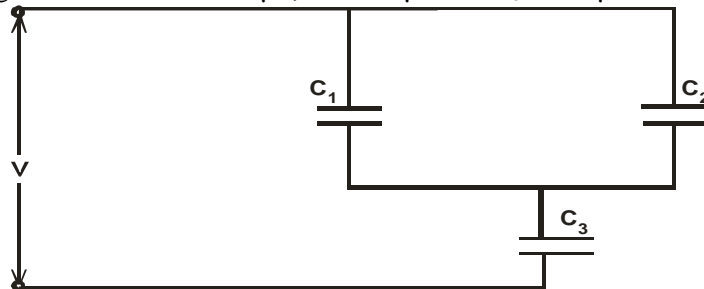


Q. 4 a) State and explain Ohm's law. Also discuss equation of continuity. **(10+10=20)**

b) A uniform magnetic field B, with magnitude 1.2mT, points vertically upward throughout the volume of a laboratory chamber. A proton with kinetic energy

5.3MeV enters the chamber, moving horizontally from south to north. What deflecting force acts on the proton as it enters the chamber? The proton mass is 1.67 x 10-27 kg.

Q. 5 What is magnetic induction vector? Discuss Biot Savarat's Law in detail and illustrates with the help of examples. **(20)**

# ASSIGNMENT No. 2
## (Units: 5–9)

*Note: Attempt all questions. All questions carry equal marks.*

Q. 1 a) Calculate the magnetic field due to Solenoid and a Toroid.
  b) The figure shows two long parallel wires carrying currents $i_1$ and $i_2$ in opposite directions. What are the magnitude and direction of the resultant *magnetic field t point P? Assume the following values:* $i_1 = 15A$, $i_2 = 32A$ *and d = 5.3cm.* **(12+08=20)**
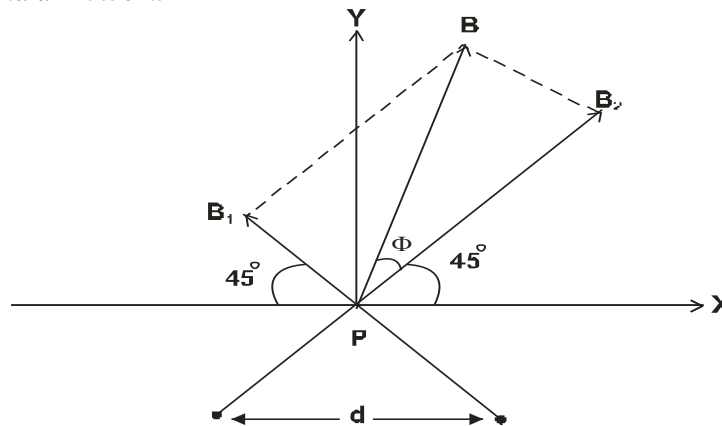


Q. 2 a) Sate and explain Faraday's law of electromagnetic induction and discuss its differential form.
  b) A solenoid has an inductance of 53mH and a resistance of $0.37\Omega$. If it is connected to a battery, how long will the current take to reach half its final equilibrium value? **(12+08=20)**

Q. 3 Discuss the phenomenon of Paramagnetism and Ferromagnetism. Also discuss hysteresis. **(20)**

Q. 4 a) Discuss LC oscillations quantitatively. **(10+10)**
  b) Discuss the phase constant in series RLC circuit derived from the AC source.

Q. 5 a) Discuss Maxwell's equations. Give their plane wave solution in free space. **(15+05)**
  b) Describe Poynting vectors.