## C.U.SHAH UNIVERSITY Winter Examination-2015

## Subject Name : Electricity and Magnetism

## Subject Code : 4SC03PHC2

Branch : B.Sc. (All)

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- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

0-1		Attempt the following questions:	(14)
C C	a)	Define charge.	01
	<b>b</b> )	Write mathematical formulation of the Coulomb's law.	01
	<b>c</b> )	Define electric field.	01
	<b>d</b> )	Define electric flux.	01
	<b>e</b> )	What is absolute permittivity $(\varepsilon_0)$ ?	01
	<b>f</b> )	Define electric field intensity (E) and give its units.	01
	<b>g</b> )	What is an electric diploe?	01
	h)	What is the value of absolute permeability $(\mu_0)$ ? Write its unit.	01
	i)	Define magnetic moment.	01
	j)	Define magnetization (M) and write its unit.	01
	<b>k</b> )	Define Bohr Magneton (B) with its unit.	01
	<b>l</b> )	What is magnetic susceptibility? Write its unit.	01
	<b>m</b> )	Define capacity (C) of the condenser.	01
	n)	A current carrying solenoid resembles to which shape of the natural magnet?	01
Attempt	any f	our questions from Q-2 to Q-8	
Q-2	·	Attempt all questions	(14)
•	a)	State Gauss's law and prove Gauss's theorem in electrostatics.	05
	<b>b</b> )	Explain electric field around charged straight conductor (wire).	05
	c)	Discuss Coulomb's law.	04
Q-3		Attempt all questions	(14)
	a)	If two unlike electric charges of different magnitude are placed at distance (d) apart in air then at what point does the electric field strength ( $\mathbf{E}$ ) becomes zero on the line joining between these two charges?	05
	b)	Obtain formula of electric field intensity for (i) a point charge and (ii) a system of many charges.	06
	c)	Two positive charges of $12X10^{-10}$ Coulomb and $8X10^{-10}$ Coulomb are placed 10 cm apart. Find the work done in bringing the charges 4 cm closer. Page 1    2	03



Q-4		Attempt all questions	(14)
	a)	Explain potential and electric field due to electric dipole.	05
	<b>b</b> )	Explain potential gradient and electric field.	05
	c)	Explain potential of charged sphere (shell).	04
Q-5		Attempt all questions	(14)
	a)	Explain capacitance of parallel plate capacitor.	05
	<b>b</b> )	Explain in detail electric potential.	05
	c)	An air cored solenoid has 300 turns, its length is 25 cm and its cross section is $3 \text{ cm}^2$ . Calculate its self-inductance in henry.	04
Q-6		Attempt all questions	(14)
	<b>a</b> )	Establish following relations : (i) $B = \mu_0 (M+H)$ and (ii) $\mu_r = 1 + \chi_m$ .	05
	<b>b</b> )	What do you mean by a solenoid? How can you determine its polarity?	05
	c)	Write applications of ferrites.	04
Q-7		Attempt all questions	(14)
	a)	Explain classifications of magnetic materials.	06
	b)	Write short notes on (i) self-inductance and (ii) mutual inductance.	08
Q-8		Attempt all questions	(14)
	a)	What is meant by magnetic hysteresis? Draw hysteresis loop of $B \rightarrow H$ curve for ferromagnetic materials and explain its each segment.	07
	b)	Discuss Hall effect in detail derive formula of Hall electric field ( $E_H$ ), Hall voltage ( $V_H$ ), Hall coefficient ( $R_H$ ) and Hall mobility ( $\mu_H$ ).	07

