Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Electricity and Magnetism

Subject Code : 4SC03PHC2 **Branch : B.Sc. (All)**

Semester : 3 Date : 12/12/2015 Time : 02:30 To 05:30 Marks : 70

Instructions:

(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.

Q-1 **Attempt the following questions:** **(14)**

a) Define charge. 01
b) Write mathematical formulation of the Coulomb's law. 01
c) Define electric field. 01
d) Define electric flux. 01
e) What is absolute permittivity (ε_0)? 01
f) Define electric field intensity (**E**) and give its units. 01
g) What is an electric diploe? 01
h) What is the value of absolute permeability (μ_0)? Write its unit. 01
i) Define magnetic moment. 01
j) Define magnetization (M) and write its unit. 01
k) Define Bohr Magneton (B) with its unit. 01
l) What is magnetic susceptibility? Write its unit. 01
m) Define capacity (C) of the condenser. 01
n) A current carrying solenoid resembles to which shape of the natural magnet? 01

Attempt any four 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) 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 (**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. 03

Q-4 **Attempt all questions** **(14)**

a) Explain potential and electric field due to electric dipole. 05

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) 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 cm^2. Calculate its self-inductance in henry. 04

Q-6 **Attempt all questions** **(14)**

a) Establish following relations : (i) $B = \mu_0 (M+H)$ and (ii) $\mu_r = 1+\chi_m$. 05

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 (μ_H). 07