Enrolment No: _____Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name:Electricity and Magnetism

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

Semester: 3 **Date: 03/05/2016** **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) What is Relative Permittivity (ε_r) and Absolute Permittivity (ε_0) ? Give relation between both. (01)

b) Define Electric Field Intensity ($\vec{E}$) and give its unit. (01)

c) Define Electric Flux Density ($\vec{D}$) and give its unit. (01)

d) On which factors does the capacity of a condenser depend? (01)

e) What is an electric dipole? (01)

f) Define and give SI unit and symbol of Electric dipole moment (01)

g) Define: ElectrostaticShielding. (01)

h) Obtain magnitude of isolated point electric charge Q with potential 300 V at a distance 30 cm away. (01)

i) What is the value of 1 Bohr Magneton? Give its unit. (01)

j) Define giving S.I. unit : Intensity of Field (Magnetization) M. (01)

k) Define giving S.I. unit and symbol : Magnetic Flux (01)

l) Define giving S.I. unit : Magnetic Induction (Flux Density)B (01)

m) Define giving S.I. unit :Magnetic Moment. (01)

n) Name different types of Magnetic Materials. (01)

Attempt any four from Q-2 to Q-8.

Q-2 a) Discuss Electric Field Lines and their characteristics. Draw electric field lines for (i) Isolated $+ve$ point charge (ii) Isolated $-ve$ point charge, (iii) between two unlike charges (iv) between two like charges. **(07)**

b) Two opposite electric charges of unknown magnitude are distance L apart in air; at what point does the electric field intensity becomes zero on the line joining them. **(03)**

c) Determine electric field strength and electric potential at 9 cm away from a charge of + (6.54×10^{-8}) C in air. **(04)**

Q-3 a) State and explain Coulomb's law. What are the experimental conclusions regarding electrostatic forces between charged bodies? **(08)**

b) Obtain formula of Electric Field Intensity for … (i) A point charge and (ii) A system of many charges. **(06)**

Q-4 a) State and prove Gauss's law theorem deriving necessary formulas. **(06)**

b) Explain applications of Gauss's Law to find out electric field intensity ($\vec{E}$) for theUniform Charge Distribution in case of : (i) A long straight wire and (ii) A long straight plane sheet. **(08)**

Q-5 a) Establish the formulas showing relations amongst Magnetic Flux Density (B), Magnetic Field (H), Magnetic Field Susceptibility (χ_m) and Relative Magnetic Permeability(μ_r). **(07)**

b) Discuss DiaMagmetic Materials & their properties in detail. Give some examples of DiaMagmetic Martials. **(07)**

Q-6 a) Give detailed account of ParaMagmetic Materials and their properties. Give some examples of ParaMagmetic Materials. **(07)**

b) Distinguish: Soft FerroMagnetic materials ***versus*** Hard FerroMagnetic materials. Draw the Hysteresis Loop of B→ H curve for each. **(07)**

Q-7 a) What do you mean by a Solenoid? What happens if a Solenoid is carrying electric current? How can you determine its magnetic polarity? **(07)**

b) Define self-induction. Obtain necessary formula for Coefficient of Self-Inductance (L) giving its unit. Discuss Self-Inductance of a Solenoid. **(07)**

Q-8 a) A solenoid of windings N=10 turns/cm, carries current I = 2 A has magneticinduction B=1 Wb/m^2. Calculate itsmagnetic intensity $\vec{H}$, Magnetisation $\vec{M}$, and magnetisation current I_M. **(04)**

b) If 2 A current is passing through a solenoid of core material with relative permeability 400 having 10 turns per cm length. Obtain value of each physical quantities. **(03)**

c) An iron bar of cross sectional area *0.3* $cm^2$is placed in an externally applied magnetic field of *1800 A/m* produces a magnetic flux of 3.5×10^{-5} *Wb*, calculate Magnetic Induction (B), Permeability(μ_m), Relative Permeability(μ_r), Magnetization (M) and Magnetic Susceptibility (χ_m). Give unit of each quantity. **(07)**