Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name: Electricity and Magnetism

Subject Code: 4SC03ELM1 Branch: B.Sc. (All)

Semester: 3 Date: 10/12/2018 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) Explain Magnetic Induction briefly.
b) What can you say about the direction of $\vec{\mathbf{E}}$ and $\vec{\mathbf{B}}$ in EM waves?
c) What is the main reason for hysteresis loss in magnetic materials?
d) State Coulomb's law for system of charges.
e) Define Retentivity
f) Give the relation connecting Flux density and Electric field.
g) Define Magnetic Vector Potential
h) Differentiate between electric and magnetic flux?
i) Give the expressions for divergence and curl of $\vec{\mathbf{B}}$
j) State Gauss' law in electricity
k) Give the general expression for Electric Field Strength for a point charge.
l) State Biot-Savart's law
m) What is Magnetic Susceptibility?
n) Write two applications of Polarization of light.

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

Q-2 Attempt all questions (14)

a) Derive the expression for Electric Field due to an infinite line of charge **07**
b) Enumerate on the concept of Electric Potential. **07**

Q-3 Attempt all questions (14)

a) Give the mathematical proof for Gauss' law in electricity. **07**
b) Deduce the expression for potential due to a point charge **07**

Q-4 Attempt all questions (14)

a) Deduce the capacitance for a spherical condenser. **06**
b) Using Ampere's Law in Magnetostatics, find the amount of magnetic field produced in a solenoid. **08**

Q-5		**Attempt all questions**	**(14)**
	a)	'Capacitance of a Parallel plate capacitor depends on area and distance between the plates'. Justify the above statement by deriving the expression.	**07**
	b)	Compare the properties of Paramagnetic and Diamagnetic materials.	**07**
Q-6		**Attempt all questions**	**(14)**
	a)	Obtain the expression for magnetic field due to a straight conductor carrying current using Biot-Savart's law.	**07**
	b)	Discuss Hall effect's usefulness in semiconductor characterization.	**07**
Q-7		**Attempt all questions**	**(14)**
	a)	Trace the hysteresis loop shown by magnetic materials and elucidate the process of hysteresis.	**07**
	b)	Explain how magnetic permeability and susceptibility plays an important role in identifying magnetic materials?	**07**
Q-8		**Attempt all questions**	**(14)**
	a)	Write a note on transverse nature of EM waves.	**05**
	b)	Give the Maxwell's equations and their physical significance.	**05**
	c)	Discuss the importance of Poynting's Vector in EM wave propagation	**04**