KU1DSCPHY114: Electricity and Magnetism

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC	100	KU1DSCPHY114	4	75

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture+ Tutorial	Practical	CE	ESE	Total	
3	2	35	65	100	2

Course Description:

This course covers the fundamental principles and mathematical formalism related to static electric and magnetic fields as well as electric current. Students can verify the fundamental laws of electricity and magnetism through laboratory experiments.

Course Prerequisite: Higher secondary level Physics

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the fundamental concepts of electric charge, conductors, insulators, and induced charges,	*U*
2	Understand coulomb's law and apply it to determine electric force and field	*U, A*
3	Understand Gauss's law and apply it to determine electric field due to different charge distributions	*U, A*
3	Understand magnetism, magnetic field properties, magnetic flux, and l analyse the force and torque on current loops	*U, An*
4	Understand and apply Ampere's circuital law to determine magnetic field due to current distribution	*U, A*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	2	3	2	1
CO 2	3	2	0	2	3	2	0
CO 3	3	2	1	2	3	2	1
CO 4	3	2	2	3	3	2	1

Correlation level 0-None, 1-Slight, 2-Medium, 3-High

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1		**Electric Charge and Electric Fields**	**12**
	1	Electric charge ,Conductors, insulators and induced charges	3
	2	Coulomb's law - Electric field and electric forces - Electric field calculations - Electric field lines , Electric dipole	3
	3	Charge and electric flux- Calculating electric flux, Gauss's law- point charge inside a spherical surface	3
	4	Applications of Gauss's law- Field due to point charge, charged hollow sphere, Charge on conductors	3
		Sections: 21.1 - 21.7, 22.1 - 22.5	
2		**Electric potential**	**10**
	1	Electric potential energy - Electric potential, Equipotential surfaces	3
	2	Capacitors and capacitance, capacitors in series and parallel	3
	3	Current - Resistivity - Resistance	2

	4	Electromotive force and circuits - Energy and power in electric circuits.	2
		Sections: 23.1 -23.2, 23.4, 24.1, 25.1 - 25.5	
3	**Magnetic field and magnetic forces**		**12**
	1	Magnetism, Magnetic field - Magnetic field lines and magnetic flux	4
	2	Motion of charged particle in a magnetic field, Magnetic force on a current carrying conductor -	4
	3	Force and torque on a current loop- The direct current motor	4
		Sections: 27.1 - 27.4, 27.6 - 27.8	
4	**Sources of magnetic field**		**11**
	1	Magnetic field of a moving charge - Magnetic field of a current element	2
	2	Magnetic field of a straight current carrying conductor - Force between parallel conductors	3
	3	Magnetic field of a circular current loop	2
	4	Ampere's law - Applications of Ampere's law	4
		Sections: 28.1 - 28.7	
5	**Practical Module**		**30**
	Directions : **At least 4** experiments from the following + 2 Activities (can be selected from the list or designed by course faculty)		
	1. Find the moment of inertia of a rod, disc, ring familiarisation of Vernier callipers, screw gauge 2. Find the radius of a capillary tube using travelling microscope 3. Determine angle of the prism using spectrometer 4. Determine resistance and resistivity of given wire using potentiometer 5. Find the current sensitivity of a galvanometer. 6. Forward and reverse characteristics of pn junction diode. 7. Half wave rectifier using a diode. Study ripple factor with and without filter. 8. Simulational Experiments in electricity and magnetism using PhET		

	simulations / Amritha V-lab simulations	

Essential Readings:

1. University physics with modern physics, 14th edition, Young & Freedman, 2016.

Suggested Readings:

1. Fundamentals of Physics, Halliday, Resnick and Walker, John Wiley &Sons, 2011.
2. Practical Physics, P. R. Sasikumar, PHI Learning Pvt Limited, 2011.

Assessment Rubrics:

Evaluation Type			**Marks**	**Evaluation Type**			**Marks**	**Total**
Lecture			**75**	**Practical**			**25**	
a)	**ESE**		**50**	a)	**ESE**		**15**	
b)	**CCA**		**25**	b)	**CCA**		**10**	
	i	*Test Paper	10		i	Punctuality	3	**100**
	ii	**Assignment/ Book-Article review	10		ii	Skill	4	
	iii	Seminar/ Viva-Voce	5		iii	Record	3	

*Best out of two test papers

** or any other activities like ,quiz, open book exam, group activity