University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK2DSCPHY101**				
Course Title	**ELECTRICITY, MAGNETISM AND ACOUSTICS**				
Type of Course	**DSC**				
Semester	**II**				
Academic Level	**100 - 199**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 Hrs	-	2 Hrs	5 Hrs
Pre-requisites					
Course Summary	This course provides a comprehensive understanding of fundamental principles and Phenomenon of electricity, magnetism, and acoustics. This course enables to identify and explain chemical, thermal and magnetic effect of electric current, analyses and solves electrical circuits with dc and ac source.				

BOOKS FOR STUDY:

1. Brijlal and Subramaniam, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)
2. R. Murugeshan, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)
3. Textbook of Sound, D.R.Khanna and R.S. Bedi, Atmaram and sons, 1969.
4. A Text Book of Sound, N.Subrahmanyam and BrijLal, Vikas Publishing House - Second revised edition,1995.
5. Yarwood and Wittle; Experimental Physics for Students, Chapman & Hall Publishers.
6. A text book of practical physics, S. Viswanathan & Co., Chennai. Press.

BOOKS FOR REFERENCE:

1. David J Griffith,1997, Introduction to electrodynamics,2ND EDITION, New Delhi, Prentice Hall of India Pvt.Ltd.
2. Electricity and Magnetism -E.M.Pourcel, Berkley Physics Cource, Vol.2 (Mc Grraw-Hill)
3. Hugh D. Young and Roger A. Freedman, Sears & Zemansky's University Physics with Modern Physics,14th Edition (2015)
4. Fundamentals of Acoustics" by Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppens

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I	**INTRODUCTION TO KINEMATICS (Book :1 - Chapter: 2, 3,4; Book : 2- Chapter: 2,3,4; Book : 3; Chapter: 1-5)**		**11**	
	1	Electric charge and its properties	1	1
	2	Coulomb's Law -Electric intensity	1	1
	3	Electric field and electric field lines	1	1
	4	Gauss law- Electric field intensity due to a Uniformly charged sphere.	1	1
	5	Electrical potential–Equipotential surfaces	1	1
	6	Ohms law- Current density, Electric resistivity and Conductivity	1	1
	7	Kirchoff law of circuit analysis – Maxwell Bridge	2	1
	8	Carey–Foster Bridge – theory – temperature coefficient of resistance, Potentiometer – theory	3	1
II	**Magnetic Effect of Electric Current (Book: 1,2)**		**10**	
	9	Magnetic flux and magnetic induction ,Relation connecting B.M and H, Magnetic susceptibility and permeability	2	2
	10	Biot Savart law- magnetic induction at a point due to a straight conductor carrying current	2	2
	11	magnetic induction at a point on the axis of a circular coil carrying current	2	2
	12	Amperes circuital law-magnetic field inside a long solenoid	2	2
	13	Lorentz force on a moving charge- direction of force	1	2

	14	Torque on a current loop in a uniform magnetic field.	1	2
III	**Thermal and Chemical Effects of Electric Current (Book: 1,2)**		**06**	
	15	Thermoelectricity – Seebeck effect- laws of thermo e.m.f	2	3
	16	measurement of thermo e.m.f. using potentiometer	1	3
	17	Peltier effect and Peltier coefficient	1	3
	18	Thomson effect and Thomson coefficient	1	3
	19	Faraday's laws of electrolysis	1	3
IV	**AC and DC circuits (Book: 1,2)**		**09**	
	20	EMF induced in a coil rotating in a magnetic field	1	4
	21	Peak, average and RMS values of AC voltage and current	1	4
	22	j operator method –use of j operator in the study of AC circuits	1	4
	23	Resistance in an AC Circuit-Inductance in an AC circuit. Capacitance in an AC circuit-	2	4
	24	AC through an inductance and capacitance in series	1	4
	25	AC through an capacitance and resistance in series	1	4
	26	Growth and decay of current in LC and CR circuits with d.c.voltages	2	4
V*	**Ultrasonics and Acoustics (Book: 3,4)**		**09**	
	27	Ultrasonics	0.5	5
	28	Production – Piezoelectric crystal method - Magnetostriction method	2	5
	29	Properties and Applications of Ultrasonics	1.5	5
	30	Acoustics of building – Reverberation- Sabine's Reverberation formula	2	5
	31	Factors affecting acoustics of building- Sound distribution in an auditorium-	2	5
	32	Requisites for good acoustics.	1	5

DETAILED SYLLABUS: PRACTICALS

Part A – At least 5 Experiments to be performed		CO No
Sl No	**Name of Experiment**	
1	Deflection and vibration magnetometer- M and Bh	2,6
2	Circular coil- magnetization of a magnet	2,6
3	Searle's vibration magnetometer-comparison of magnetic moments	2,6
4	Potentiometer-Resistivity	1,6
5	Thermo-emf-measurement of emf using Potentiometer	5,6
6	Carey Foster‟s bridge – Measurement of unknown resistance of wire	1,6
7	Carey Foster's Bridge-Temperature coefficient of resistance	1,6
8	To study the frequency response of a series RC circuit	4,6
9	Sonometer-frequency of A.C	4,6
10	Melde's string-Frequency of fork	6
Part B* – At least One Experiment to be performed		
11	Verification of Ohms Law	1,6
12	Circular coil-dipole moment	2,6
13	Potentiometer – EMF of a thermocouple	3,6
14	To study the frequency response of a series LC circuit	4,6
15	Kundt's tube-determination of velocity of sound.	6

COURSE OUTCOMES

CO No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Discover the fundamental concepts of electric charge and electric fields. Use it and solve basic electric circuit problems using Ohm's Law and Kirchhoff's Laws.	U, Ap	PSO-1,2

CO-2	Review Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.	U, Ap	PSO-1,2
CO-3	Identify the basics Thermocouple effects	U	PSO-1,2
CO-4	Discuss the concepts of AC and DC circuits and solves electrical circuits with dc and ac source.	U, Ap	PSO-1,2
CO-5	Compare the different methods of producing ultrasonic waves and associate the theories used in building acoustics.	U	PSO-1,2
CO-6	Develop practical skills and understanding experimental setups in the context of the relevant physical principles of Electricity, Magnetism and Acoustics.	U,Ap	PSO - 1,3

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: ELECTRICITY, MAGNETISM AND ACOUSTICS

Credits: 3:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO / PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
CO-1	Discover the fundamental concepts of electric charge and electric fields. Use it and solve basic electric circuit problems using Ohm's Law and Kirchhoff's Laws.	PO-1/ PSO-1,2	U, Ap	C	L	-
CO-2	Review Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.	PO-1/ PSO-1,2	U, Ap	C	L	-

CO-3	Identify the basics Thermocouple effects	PO-1/ PSO-1,2	U	F, C	L	-
CO-4	Discuss the concepts of AC and DC circuits and solves electrical circuits with dc and ac source.	PO-1/ PSO-1,2	U, Ap	C	L	-
CO-5	Compare the different methods of producing ultrasonic waves and associate the theories used in building acoustics.	PO-1/ PSO-1,2	U	F, C	L	-
CO-6	Develop practical skills and understanding experimental setups in the context of the relevant physical principles of Electricity, Magnetism and Acoustics.	PO-1,6/ PSO - 1,3	U, Ap	C, P		P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	2	2	-	-	-	-	-	2	-	-	-	-	-	-	-
CO-2	2	2	-	-	-	-	-	2	-	-	-	-	-	-	-
CO-3	2	2	-	-	-	-	-	2	-	-	-	-	-	-	-
CO-4	2	2	-	-	-	-	-	2	-	-	-	-	-	-	-

CO-5	2	2	-	-	-	-	-	2	-	-	-	-	-	-	-
CO-6	2	-	2	-	-	-	-	2	-	-	-	-	-	-	-

Correlation Levels:

Level	-	1	2	3
Correlation	Nil	Slightly / Low	Moderate / Medium	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

CO No	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO-1	✓	-	-	✓
CO-2	✓	-	-	✓
CO-3	✓	-	-	✓
CO-4	✓	-	-	✓
CO-5	✓	✓	-	-
CO-6	✓	✓	-	-