

Reg. No.:



Name:

University of Kerala

U9125

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

PHYSICS

UK2DSCPHY101 - Electricity, Magnetism and Acoustics

Academic Level: 100-199

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark
Each.Answer all questions

Qn No.	Question	CL	CO
1	Recall the first law of thermoelectric E.M.F.	RE	3
2	State inversion temperature.	RE	3
3	Summarize the principle of superposition when applied to the calculation of net electric force when multiple charges are present	UN	1
4	Explain why a coil rotating in a uniform magnetic field experiences an induced EMF	UN	1
5	Summarize how the temperature difference between the hot and cold junctions influence the E.M.F. produced in a thermocouple	UN	3
6	Describe how the right-hand thumb rule is used to determine the direction of the magnetic field around a straight conductor.	UN	2

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Express the electric field intensity at a point due to a source charge Q using Coulomb's law.	UN	1
8	Describe how the impedance of a series LC circuit varies with the frequency of the applied AC signal.	UN	1
9	Compute the expression for resonance in an LC circuit.	AP	4
10	A paramagnetic material is placed in an external magnetic field of 0.5 T, and its magnetization is 0.01 A/m. Apply the concept of magnetic susceptibility to calculate its value.	AP	2

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) Consider a solid sphere of radius R uniformly charged with a total charge Q. Using Gauss's Law, derive expressions for the electric field both inside ($r < R$) and outside ($r > R$) the sphere. Determine how the electric field varies with distance from the center of the sphere and analyze the behavior in different regions. OR B)	AP	1, 1

Qn No.	Question	CL	CO
	Determine the differences in the shapes and orientations of equipotential surfaces near a single isolated point charge versus those near a uniformly charged infinite plane.		
12	A) Examine the influence of inductance and capacitance in AC circuits. OR B) Examine the graphical representation of current and voltage in LC circuit.	AN	4, 4
13	A) Evaluate the impact on power dissipation in a resistive load when switching from a sinusoidal AC source with a peak voltage of 150 V to a DC source with the same RMS voltage. OR B) Evaluate the effectiveness of using Faraday's laws in predicting outcomes in industrial electroplating processes. What limitations might arise in practical applications?	EV	1, 3
14	A) a)Design an AC circuit with inductance and discuss the amplitude and phase variation of voltage and current. b)Combine a capacitor to this circuit and discuss the changes in the amplitude and phase of the current and voltage with necessary diagrams. OR B) Design an ac circuit containing inductance only. Obtain expression for current and voltage using operator method.	CR	4, 4