22PHU308N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Third Semester)

Branch – **PHYSICS**

ELECTRICITY AND MAGNETISM

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	According to Gauss's law a) charges inside the surface will not contribute to φ b) charges outside the surface will not contribute to φ c) the total flux due to a charge outside the closed surface is q d) the total flux due to a charge inside the closed surface is zero	K1	CO1
	2	A test charge is moved from lower potential point to a higher potential point. The potential energy of test charge will a) remain the same b) increase c)decrease d)become zero	K2	CO1
2	3	The principle of potentiometer is a) p.d across any length is inversely proportional to length of the wire b) current is directly proportional to the length of the wire c) p.d across any length of the wire is directly proportional to current d) p.d across any length is directly proportional to length of the wire	K1	CO2
	4	Current density J = a) A/ I b) I / A c) m / M d) M / m	K2	CO2
3	5	Peltier effect is a)Reversible b)Irreversible c)Either (a) or (b) d)Neither (a) or (b)	K1	CO3
	6	The transport number nc from Hittorf's method is a) nc = v / u – q b) nc = u /v -q c) nc = u / u+v d) nc = u / u-v	K2	CO3
4	7	The instantaneous current in an a.c circuit containing a pure inductor is i=i0sinωt. The instantaneous emf is a) e = E0sin (ωt + π/2) b) e = E0sin (ωt - π/2) c) e = E0sin (ωt + π) d) e = E0sin (ωt – π)	K1	CO4
	8	RMS value of alternating current is a) 0.707 I_0 b) 1.11 I_0 c) 0.637 I_0 d) 0.736 I_0	K2	CO4
5	9	When a specimen of magnetic material is taken through a cycle of magnetization and magnetizing field is made zero then the residual magnetism left behind is called a)coercivity b) hysteresis c) hysteresis loss d) retentivity	K1	CO5
	10	According to Langevin's theory of diamagnetism the magnetic susceptibility is a) increases as the temperature of the substance increases b) decreases as the temperature of the substance increases c) remains the same as the temperature of the substance decreases d) independent of field strength and temperature	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	State and prove Gauss's law and give the differential form of Gauss's law.	K3	CO1
		(OR)		
	11.b.	Obtain the relation between D,E and P.		
2	12.a.	Derive equation of continuity.	K2	CO2
		(OR)		
	12.b.	Explain the theory of potentiometer. How will you use it to calibrate an ammeter?		
3	13.a.	State the laws of thermo e.m.f. Measure the thermo e.m.f using potentiometer.	K2	CO3
		(OR)		
	13.b.	State Faraday's law of electrolysis and explain how these laws lead to the idea of the atomic nature of electricity.		
4	14.a.	State and derive peak, average and RMS value of ac current.	K1	CO4
		(OR)		
	14.b.	Give the principle and measurement of high resistance by leakage.		
5	15.a.	Differentiate dia, Para and Ferro magnetic materials.	K2	CO5
		(OR)		
	15.b.	Using Ampere's circuital law to find the magnetic induction of toroid.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Define electric potential. Find electric potential as line integral of electric field. Obtain the relation between electric potential and electric field.	K3	CO1
2	17	Explain Carey Foster bridge with necessary theory. Determine resistivity and temperature co efficient of a material Carey Foster bridge.	K2	CO2
3	18	Explain Thomson effect. Define Thomson coefficient. Describe an experiment to demonstrate Thomson effect.	K2	CO3
4	19	Describe LCR parallel resonant circuit and compare series and parallel resonant circuits.	K1	CO4
5	20	Describe Langevin's theory of diamagnetism.	K2	CO4

Z-Z-Z END