

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086**  
(For candidates admitted during the academic year 2023 – 2024 & thereafter)

**B.Sc. DEGREE EXAMINATION APRIL 2026**  
**BRANCH IV - CHEMISTRY**  
**FOURTH SEMESTER**

**COURSE : ALLIED – CORE**

**PAPER : PHYSICS FOR CHEMISTRY II**

**SUBJECT CODE : 23PH/AC/PC43**

**TIME : 3 HOURS**

**MAX. MARKS: 100**

Q. No.	SECTION A Answer ALL the questions (20x1=20)	CO	KL
1.	A charged particle moves through a magnetic field directed perpendicular to its direction of motion. Which of the following quantities of the particle will not change? a) Momentum    b) speed    c) velocity    d) acceleration	1	1
2.	If 'r' is the distance of a point P from a cylindrical charge distribution, the electric field at P is proportional to a) 1/r    b) 1/r <sup>2</sup> c) 1/r <sup>3</sup> d) r	1	1
3.	Electric field due to a point charge a) is inversely proportional to the distance b) is inversely proportional to the square of the distance c) is inversely proportional to the square root of the distance d) does not change with the distance	1	1
4.	The dimensions of potential are same as that of a) work    b) electric field / unit charge c) work/unit charge    d) force / unit charge	1	1
5.	The unit for the magnetic field is a) Weber    b) Weber/m <sup>2</sup> c) Weber <sup>-1</sup> d) Weber.m <sup>2</sup>	1	1
6.	The rule used to find the direction of the field acting at a point near a current-carrying straight conductor. a) Cork rule    b) right-hand thumb rule c) swimming rule    d) Fleming's rule	1	1
7.	Ampere's circuital law be derived from _____. a) Gauss Law    b) Coulomb's Law c) Kirchhoff's Law    d) Biot-Savart Law	1	1
8.	What is a moving coil galvanometer used for? a) Measurement of voltage only    b) Measurement of resistance c) Measurement of small currents    d) Measurement of electric field	1	1
9.	When a substance is placed in a magnetic field, its ability to be magnetized depends upon its a) permeability    b) susceptibility c) magnetic intensity    d) none of the above	1	1
10.	The Susceptibility of the diamagnetic substance is: a) Very large    b) positive and small    c) zero    d) negative	1	1
11.	Magnetization (M) is defined as a) Magnetic moment per unit area b) Magnetic flux per unit area c) Magnetic moment per unit volume d) Magnetic field strength	1	1



32.	Explain the recording and reconstruction of holograms with a neat diagram.	3	3
33.	Describe the construction and working of ammonia MASER.	3	3
34.	Describe the hysteresis loop and explain its significance in magnetic materials	3	3
<b>Q. No.</b>	<b>SECTION D</b> <b>Answer any TWO questions</b> (2x10=20)	<b>CO</b>	<b>KL</b>
35.	Explain the principle of capacitance and derive an expression for the capacitance of a spherical capacitor	4	4
36.	Describe the construction and working of a moving coil ballistic galvanometer and deduce an expression for the charge flowing through it.	4	4
37.	Explain with necessary theory how an Op-Amp can be used as a) differentiator, b) integrator.	4	4
38.	Describe the construction and working of the carbon-di-oxide LASER.	4	4
	<b>SECTION E</b> <b>Answer any FOUR questions</b> (4 x 5= 20)		
39.	Find the potential at the center of a 1 m square having charges q, -2q, 3q, and 2q at its corners. ( $q = 1 \times 10^{-8} \text{ C}$ )	5	5
40.	The current sensitivity of a ballistic galvanometer is $2.2 \times 10^{-9}$ amp for a deflection of 1mm on a scale kept at a distance of 1m. Calculate the charge sensitivity of the galvanometer if the time period of the coil is 6.2 seconds.	5	5
41.	A rod of magnetic material, 0.5 m in length has a coil of 200 turns wound over it uniformly. If a current of 2 ampere is sent through it, calculate (a) the magnetizing field H, (b) the intensity of magnetization M, (c) the magnetic induction B. Given $\chi_m = 6 \times 10^{-3}$	5	5
42.	Calculate the acceptance angle and numerical aperture of an optical fibre, if the refractive index of the core and cladding are 1.55 and 1.50, respectively.	5	5
43.	Using Boolean algebraic techniques, simplify the following expression $Y = AB + A(B+C) + B(B+C)$	5	5
44.	The radii of the inner and outer spheres of a spherical capacitor are $4 \times 10^{-2}$ m and $6 \times 10^{-2}$ m. If the dielectric medium between the plates is air, calculate the capacitance of the spherical capacitor if the outer sphere is earthed and the inner sphere is positively charged.	5	5

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