

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086
(For candidates admitted from the academic year 2025 – 2026)

B.Sc. DEGREE EXAMINATION APRIL 2026
BRANCH I - MATHEMATICS
SECOND SEMESTER

COURSE : ELECTIVE
PAPER : PHYSICS FOR MATHEMATICS II
SUBJECT CODE : 25PH/ME/PM22
TIME : 3 HOURS **MAX. MARKS: 100**

Q. No.	SECTION A	CO	KL
	Answer ALL questions (4 x 3 = 12 marks)		
1.	What is electric flux?	1	1
2.	State Biot-Savart's law.	1	1
3.	List the methods used to minimize spherical aberration in lens.	1	1
4.	Define CMRR.	1	1
Q. No.	SECTION B	CO	KL
	Answer ALL questions (6 x 3 = 18 marks)		
5.	Calculate the work done in moving a charge.	2	2
6.	Explain Ampere's circuital law.	2	2
7.	Describe the conditions for interference between two light waves.	2	2
8.	What is angular magnification of telescopes?	2	2
9.	State De Morgan's theorem.	2	2
10.	Enumerate the characteristics of an ideal OpAmp.	2	2
Q. No.	SECTION C	CO	KL
	Answer any FOUR questions (4 x 5 = 20 marks)		
11.	Obtain an expression for the relation between Electric Field and Electric potential.	3	3
12.	Write short notes on the radio telescope.	3	3
13.	Write the Maxwell's electromagnetic equations and clarify their physical significance.	3	3
14.	Calculate the output voltage of an OpAmp summing amplifier.	3	3
15.	How is double refraction produced in a crystal?	3	3
Q. No.	SECTION D	CO	KL
	Answer any TWO questions (2 x 15 = 30 marks)		
16.	Utilize the Gauss theorem to find the electric field due to a uniformly charged hollow cylinder.	4	4
17.	Describe the construction of a ballistic galvanometer and give the theory to determine its charge and current sensitivity.	4	4

18.	What is chromatic aberration in lens? Derive the condition for achromatism of two lenses kept in contact.	4	4
19.	Give the theory of plane transmission grating and describe how it is used to determine the wavelength of light.	4	4
Q. No.	SECTION E Answer any FOUR questions (only problems) (4 x 5 = 20 marks)	CO	KL
20.	Four charges +3q, +q, -2q and -2q are placed respectively at the corners A, B, C, D of a square of side a, arranged in the given order. Calculate the potential at the center of the square.	5	5
21.	A parallel plate capacitor consists of two plates of area 100 sq. m each and separated by 1 cm. A square glass slab of thickness 1 cm and side 5 cm is placed between the plates. Find the Capacitance of a capacitor given that the $\epsilon_r = 10$.	5	5
22.	A straight wire with a length of 2 m is placed in a magnetic field of flux density 0.4 T, if the wire is oriented at an angle 30° to the magnetic field lines and conducts a current of 1.5 A, what is the magnitude of the magnetic force acting on it?	5	5
23.	A converging achromat of 40 cm focal length is to be constructed out of a thin crown glass and a thin flint glass. The surfaces in contact have a common radius of curvature of 25 cm. calculate radius of curvature of the second surface of each lens, given that the refractive indices and dispersive powers are 1.5 and 0.017 for crown glass and 1.7 and 0.034 for flint glass.	5	5
24.	Newton's rings are observed in reflected light from an air film formed between a plane surface and a spherical surface of radius of curvature 2m. If the diameter of the n^{th} and $(n+8)^{\text{th}}$ rings are 4.2 mm and 7 mm respectively. Find the wavelength of light.	5	5
25.	Prove the Boolean identity $(A + B)(A + \overline{B})(\overline{A} + C) = AC$	5	5
