STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.

(For candidates admitted during the academic year 2008-09 & thereafter)

SUBJECT CODE : **PH/AC/PM23**

B.Sc. DEGREE EXAMINATION APRIL 2010
BRANCH I – MATHEMATICS
SECOND SEMESTER

REG. No._____

COURSE : **ALLIED – CORE**
PAPER : **PHYSICS FOR MATHEMATICS – II**
TIME : **30 MINS.** MAX. MARKS : 30

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

1. A dipole placed in uniform electric field with its axis parallel to the field experiences
   a) only a net force
   b) only a torque
   c) both net force and torque
   d) neither net force nor a torque

2. The unit of permittivity is
   a) $NC^{-2}m^{-2}$
   b) Hm^{-1}
   c) $C^2N^{-1}m^{-2}$
   d) Nm^2C^{-2}

3. The number of lines of force that radiate outwards from one coulomb charge is
   a) 1.129×10^{11}
   b) 8.85×10^{-12}
   c) 9×10^9
   d) infinite

4. Magnetic field is not associated with
   a) a charge in uniform motion
   b) an accelerated charge
   c) a decelerated charge
   d) a stationary charge

5. Speed C of e.m. waves through vaccum is given by
   a) $C = \sqrt{\mu_\circ \in_\circ}$
   b) $C = \dfrac{1}{\sqrt{\mu_\circ \in_\circ}}$
   c) $C = \sqrt{\dfrac{\mu_\circ}{\in_\circ}}$
   d) $C = \sqrt{\dfrac{\in_\circ}{\mu_\circ}}$

6. When a drop of water is introduced between the glass plate and plano convex lens in Newton's rings experiment, the rings system
   a) contracts
   b) expands
   c) remains same
   d) first expends then contracts

7. When a ray of light is incident on a glass surface at polarizing angle of $57.5°$, the angle between the incident ray and the reflected ray is
   a) $57.5°$
   b) $32.5°$
   c) $115°$
   d) $90°$

..2..

8.   Unpolarised light is passed through a tourmaline crystal and the emergent light is analysed by an analyzer. When the analyzer is rotated through $90°$, the intensity of light.
a) remains uniformly bright   b) remains uniformly dark
c) varies between maximum and minimum
d) varies between maximum and zero.

9.   The magnifying power of an astronomical telescope can be increased, if we
a) increase the focal length of the objective
b) increase the focal length of the eye-piece
c) decrease the focal length of the objective
d) decrease the focal length of the objective and at the same time increase the focal length of the eye-piece.

10.   Chromatic observation in the formation of image by a lens arises because
a) of non-paraxial rays
b) the radii of curvature of the two sides are not same
c) of the defect in grinding
d)   of focal length varies with wavelength

11.   The Boolean expression $\overline{ABC}$ can be simplified as
a) $AB + \overline{C}$ b) $\overline{A}.\overline{B}.\overline{C}$ c) $AB + BC + CA$ d) $\overline{A} + \overline{B} + \overline{C}$

12.   Digital circuits can be made by repetitive use of
a) OR gate   b) AND gate   c) NOT gate   d) NAND gate

13.   If A=B=1 then in terms of Boolean Algebra $A + \overline{B}$ equals
a) $\overline{A}$ b) $\overline{B}$ c) A and B   d) $\overline{A + B}$

14.   In the Boolean Algebra Y=A.B indicates that
a) output y exists when either input A exists or input B exists
b)   output y exists only when both input A and B exits
c) output y exists when either input A exists or input B exists but not when both inputs A and B exists
d) product of A and B is y.

15.   In the Boolean Algebra $\overline{A}.\overline{B}$ equals
a) $A + B$ b) $\overline{A + B}$ c) $A.B$ d) $\overline{A}.B$

II   FILL IN THE BLANKS:

16. $\left(\dfrac{T}{2\pi}\right)\left(\dfrac{C}{NBA}\right)$ is called the ………………………………

17.   The failure of a lens to form a point image of a point object on the axis is ……………………

18.   Distance between the two coaxial lenses must be equal to half the sum of their focal lengths for ………………………….

19.   An optical device made from a calcite crystal is …………………………

20. The complement of the sum of two or more variable is equal to the product of the complements of the variables is known as ………………

III   STATE WHETHER TRUE OR FALSE:

21. When a charged particle having charge q travels with velocity V in a magnetic field of induction B, the direction of force is parallel to V and B.

22. The B.G. is used to measure electric charge.

23. In Newton's Rings, the radii of the dark rings are proportional to the square roots of the natural numbers.

24. The phenomenon of bending of light waves around concerns and their spreading into the geometrical shadow of an object is called polarization.

25. Operational amplifies is used as summing, difference, integral and differential amplifier.

IV   ANSWER THE FOLLOWING BRIEFLY:

26. What is a aplanatic lens?

27. State Coulomb's Law.

28. What is the principle of a moving coil Ballastic galvanometer?

29. Why the center of the Newton's ring is dark?

30. What is optical activity?

✕✕✕✕✕✕✕

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2008-09 & thereafter)

SUBJECT CODE : **PH/AC/PM23**

B.Sc. DEGREE EXAMINATION APRIL 2010
BRANCH I – MATHEMATICS
SECOND SEMESTER

COURSE : **ALLIED – CORE**
PAPER : **PHYSICS FOR MATHEMATICS – II**
TIME : **2 HOURS**   MAX. MARKS : 70

SECTION – B
ANSWER ANY FIVE QUESTIONS: (5 x 6 = 30)

1. State and prove De Morgans theorems. Give necessary truth tables.
2. Light of wavelength 5000 A° is incident normally on a plane transmission grating. Find the difference in the angles of deviation in the first and third order spectra. The number of lines per cm on the grating surface is 6000.
3. Calculate the loss in electro static energy of two capacitors of capacitance 1 μf and 2 μf which are charged to potentials of 100 v and 200 v when they share their charge.
4. A condenser charged to 2 volts is discharged through a ballistic galvanometer when the deflection corrected through is 9.6 cms and the current sensitivity is 2.2 x 10^{-8} amp/cm and period is 12 secs. Find the capacity of the condenser.
5. Using Boolean Algebra show that $A + \overline{A}.B = A + B$.
6. A 200 mm long tube and containing 48 cm^3 of sugar solution produces an optical rotation of 11° when placed in a saccharimeter. If the specific rotation of sugar is 66°, calculate the quantity of sugar contained in the tube in the form of a solution.
7. Give the construction and working of a Nicol prism

SECTION – C
ANSWER ANY TWO QUESTIONS: (2 x 20 = 40)

8. What is meant by a chromatic observation? Find the condition for the achromatism of two thin lenses mounted coaxially when (a) they are in contact and   (b) they are separated by a distance.

9. Give the construction of a moving coil ballistic galvanometer. Derive an expression between the quantity of charge flowing through it and the throw obtained. Show how to correct the observed throw for damping.

10.a. State and prove Gauss theorem in Electro statistics.
   b. Drive an expression for the capacity of a parallel plate condenser with a dielectric medium filled between the plates.

11. What is an operational amplifier? Explain the application of op amp in the construction of adder, substractor, differentiator and integrator circuits.

✗ ✗ ✗ ✗ ✗ ✗ ✗