

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2015-16& thereafter)

SUBJECT CODE :15PH/AC/PH23
B.Sc. DEGREE EXAMINATION APRIL 2018
BRANCH I - MATHEMATICS
SECOND SEMESTER

COURSE : ALLIED – CORE
PAPER : PHYSICS - II
TIME : 3 HOURS

MAX. MARKS :100

SECTION – A

ANSWER ALL QUESTIONS:

(30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

1. There are two charges 1C and 5C .The ratio of the forces acting on them will be
a)1:5 b)1:1 c)5:1 d)1:25
2. The field strength due to a point charge at a distance of 3m from it is 500NC^{-1} .The magnitude of charge is
a)2.5 μC b)2 μC c)1 μC d)0.5 μC
3. The electric potential V is given by $V=5x^2+10x-9$.The value of electric field at $x=1$ in Vm^{-1} is
a)-20 b)6 c)11 d)-23
4. A parallel plate condenser has a capacitance 50 μF and 110 μF when immersed in an oil. The dielectric constant K of the oil is
a) 0.45 b)0.55 c)1.10 d)2.20
5. Angle between equipotential surface and lines of force is _____ degree.
a)0 b)180 c)90 d)45
6. When a charged particle enters a uniform magnetic field of strength B. The frequency of revolution is
a) $Bq/2\pi m$ b) $Bq/2\pi m$ c) $2\pi m/Bq$ d) $Bm/2\pi q$
7. Which one of the following is a non magnetic substance
a)Iron b)Nickel c)Cobalt d)Brass
8. Magnetic permeability is maximum for
a)diamagnetic substance b)paramagnetic substance
c)ferromagnetic substance d)all of the above
9. The SI unit of magnetic permeability is
a) Am^{-1} b)A-m c) Hm^{-1} d)no unit
10. A current carrying loop is placed in a magnetic field. The torque acting on it does not depend on
a)shape of the loop b)area of the loop
c)number of turns in the loop d)strength of the current

11. Two galvanometers A and B require 3mA and 5mA respectively to produce the same deflection of 1 division. Then
 a) A is more sensitive than B b) B is more sensitive than A
 c) A and B are equally sensitive d) sensitiveness is 5/3 times of A
12. In order to increase the sensitivity of a moving coil galvanometer one should decrease
 a) strength of magnet b) The torsional constant of its suspension
 c) the number of turns in its coil d) the area of its coil
13. A circular coil of 20 turns and radius 10 cm is placed in uniform magnetic field of 0.1 T normal to the plane of the coil is carrying a current of 5A, then the torque acting on the coil will be
 a) 31.4Nm b) 3.14Nm c) 0.314Nm d) zero
14. Which gate can be obtained by shorting both the input terminals of a NOR gate
 a) NOT b) OR c) AND d) NAND
15. Output impedance of an ideal op-amp
 a) infinity b) 1 c) 0 d) high

II. Fill in the blanks :

16. The unit of permittivity is _____
 17. The electric field inside a spherical shell is _____
 18. The force on a charge moving along the direction of the magnetic field is _____
 19. The direction of force on a current carrying conductor in a magnetic field is found using _____
 20. The method of producing population inversion is called _____

III. True or False :

21. Electric field and equipotential surface are perpendicular to each other
 22. Water is a diamagnetic substance
 23. The magnitude of the velocity of an electron is same when it enters a magnetic field
 24. The area of hysteresis curve of soft iron is small
 25. The unit of charge sensitivity is N/C.

IV. Answer Briefly :

26. State Coulombs law.
 27. What is Lorentz force?
 28. How is Ballistic galvanometer different from table galvanometer?
 29. Give two applications of LASER.
 30. What is CMRR?

SECTION – B**ANSWER ANY FIVE QUESTIONS:****(5 x 5 = 25)**

31. Four electric charges $+q, +q, -q$ and $-q$ are placed at the corners of a square of side $2L$. Find the electric potential at point A, midway between the two charges $+q$ and $+q$.
32. An electron is moving in a circular path under the influence of a transverse magnetic field of $3.57 \times 10^{-2} \text{ T}$. If the value of e/m is $1.76 \times 10^{11} \text{ C/Kg}$ find the frequency of revolution of the electron.
33. A moving coil galvanometer has 100 turns and each turn has area of 2 cm^2 . The magnetic field produced by the magnet is 0.01 T . The deflection in the galvanometer coils 0.5 rad when a current of 10 mA is passed through it, Find the torsional constant of the spring.
34. For an Op-amp, the input voltages are $100 \mu\text{V}$ and $80 \mu\text{V}$. Assume open loop gain of the Op-amp as $100,000$. Calculate output voltage when CMRR is infinity.
35. Show that $\bar{A}B + \bar{B}C + \bar{C}A = A\bar{B} + B\bar{C} + C\bar{A}$
36. Give the applications of Hologram.
37. Explain the principle of capacitance.

SECTION – C**ANSWER ANY THREE QUESTIONS:****(3 X 15 = 45)**

38. State Gauss law and give its applications.
39. a) Explain magnetometer method of drawing hysteresis curve and give its uses.
b) Write the Maxwell's electromagnetic equation.
40. Explain the working of CO_2 LASER and give its applications.
41. Explain inverting, difference, integral and differential amplifier.
42. a) Explain the construction and working of ballistic galvanometer.
b) State and prove De Morgans theorem.
