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

SUBJECT CODE : **PH/AC/PC23**

B.Sc. DEGREE EXAMINATION APRIL 2009
BRANCH IV – CHEMISTRY
SECOND SEMESTER

REG. No._____

COURSE : **ALLIED – CORE**
PAPER : **PHYSICS FOR CHEMISTRY – 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. For a line of positive charge, the direction of $\vec{E}$ is radially
   a) outward b) inward c) zero

2. Electric field and potential are related by
   a) $E = -\nabla V$ b) $V = -\nabla E$ c) $E = \nabla V$

3. The capacitance of the capacitor increases when the region between the two conductors is filled with
   a) vacuum b) air c) mica

4. Lorentz force acts on a charge that is
   a) static b) moving c) oscillatory

5. In paramagnetic substances, the relative permeability μ_r is
   a) $\mu_r > 1$ b) $\mu_r < 1$ c) $\mu_r = 1$

6. Figure of merit of a moving coil galvanometer is expressed in
   a) $\mu A/mm$ b) $\mu C/mm$ c) $\mu V/mm$

7. Under ordinary conditions of thermal equilibrium
   a) the number of atoms in the higher energy state is smaller than that in the lower energy state
   b) the number of atoms in the lower energy state is smaller than that in the higher energy state
   c) the number of atoms in both the energy states are equal

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8. In fibre optic cable, the core and the cladding
   a) have same refractive indices
   b) refractive index of cladding is greater than the core
   c) refractive index of core is greater than the cladding

9. In Boolean algebra '•' Sign indicates _____ operation
   a) OR b) AND c) NOT

10. The decimal equivalent of $(1100101)_2$ is
    a) 101 b) 110 c) 100

II FILL IN THE BLANKS:

11. Electromagnetic waves travel with the speed of _____

12. Curie temperature is the temperature above which _____ material becomes paramagnetic.

13. For a moving coil ballistic galvanometer, _____ should be large.

14. In atomic systems, _____ types of electronic transistion occur between two energy states.

15. Holography reproduces images in _____ dimensions.

16. In spherical charge distribution, the charge density is dependent on the distance of the point from the centre and independent of _____

17. A binary number having 4 bits is called _____

18. NOT gate is also known as _____

III STATE WHETHER TRUE OR FALSE:

19. Charges outside the Gaussian surface do not contribute to the flux.

20. Capacitance depends on the geometry of the conductors and the permittivity of the medium separating them

21. Diamagnetic materials when suspended freely align parallel to the external field.

22. Maxwell modified Ampere's law with the introduction of displacement current.

23. Fibre optics follow the phenomenon of total internal reflection of transmission signals.

24. An ideal OP AMP has infinite input resistance and zero output resistance.

VI ANSWER THE FOLLOWING:

25. Why two equipotential surfaces do not intersect?

26. Mention the application of capacitors.

27. State Right hand clasp rule.

28. Define voltage sensitivity of a moving coil galvanometer.

29. Explain the significance of optical pumping.

30. Give the symbolic representation of NAND gate and write the truth table.

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TIME : **2 HOURS** MAX. MARKS : 70

SECTION – B

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

1. Define electric potential. Derive an expression for potential at a point due to point charge.

2. Derive an expression for the capacitance of a parallel plate capacitor. Calculate the capacitance of the capacitor given, area of each of parallel plate capacitor is 4×10^{-2} sqm, thickness of the dielectric medium is 10^{-3}m and relative permittivity is 7.

3. Define hysteresis. Explain the properties of materials that can be obtained from the hysteresis curve.

4. Obtain an expression for the force experienced by a charge in a magnetic field.

5. Explain the principle, characteristics and classification of fibre optics.

6. What is hologram? Explain the recording and reconstruction of an image in a hologram.

7. State and verify De Morgan's theorem.

SECTION – C

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

8. State Gauss's law. Discuss in detail the different cases of determining the field at a point due to uniformly charged sphere.

9. Describe the principle, construction and working of a moving coil galvanometer. Obtain an expression for ballistic reduction factor K.

10. Explain the principle, construction, working and application of carbon dioxide laser.

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11. i) Discuss the construction and working of a difference and differential amplifier.

    ii) Using diodes and transistors, construct OR, NOT and AND gates also discuss their truth tables.

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