

B.Sc. DEGREE EXAMINATION APRIL 2019
BRANCH IV – CHEMISTRY
FOURTH SEMESTER

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

MAX. MARKS:100

SECTION – A

ANSWER ALL QUESTIONS: (30x1=30)

Choose the correct Answer:

- The work done on a unit positive charge in bringing it from infinity to any point is called _____.
a) Electric intensity at infinity b) electric potential at that point
c) Electric potential at that point d) electric intensity at that point
- The unit of electric flux is _____.
(a) $\text{Nm}^2/\text{Coulomb}$ (b) $\text{Nm}/\text{Coulomb}^2$ (c) $\text{N}/\text{Coulomb}$ (d) $\text{Nm}/\text{Coulomb}$
- The capacity of a parallel plate capacitor when it is completely filled with a dielectric is $C =$ _____.
(a) $\epsilon_0 A/d$ (b) $K\epsilon_0 A/d^2$ (c) $K\epsilon_0 A_1 A_2/d$ (d) $K\epsilon_0 A/d$
- The tangent to a line of magnetic induction at any point gives the direction of _____.
a) Magnetic field vector, **B** b) electric field vector, **E**
c) Force **F** d) polarisation vector **P**
- An electron with velocity 'v' is injected into a uniform field \vec{B} . The force on it is _____.
a) Perpendicular to the direction of the motion of the electron
b) along the direction of the motion of the electron
c) perpendicular to the direction of the magnetic field
d) Perpendicular to the direction of the motion of the electron and the magnetic field.
- The permeability μ in magnetic phenomena is analogous to _____ in electric phenomena.
a) inductance b) conductivity c) reluctance d) resistivity
- Charge sensitivity of a ballistic galvanometer is _____ times its current sensitivity.
(a) $2\pi/T$ (b) π/T (c) $\pi/2T$ (d) π/T^2 .
- The damping of ballistic galvanometer is kept small to make _____.
a) it oscillate b) it stay stable c) amplitude of first oscillation small
d) amplitude of first oscillation large

9. According to right-hand rule for circular current, the thumb points in the direction of _____
 a) magnetic field b) current carrying conductor c) circular current
 d) torque
10. Under conditions of thermal equilibrium, if N_1 and N_2 are number of atoms in higher and lower energy states, by Boltzmann Law, _____
 (a) $N_2 < N_1$ (b) $N_2 > N_1$ (c) $N_2 = N_1$ (d) $N_2 = 0$
11. _____ materials are used to make fibre optic cables.
 a) insulating b) conducting c) semi-conducting d) dielectric
12. Construction of optical fibres is based on this optical phenomena.
 a) Total internal reflection b) refraction
 c) diffraction d) interference
13. Unit of measurement of slew rate is _____
 (a) V/min (b) A/sec (c) V/ μ sec (d) A/ μ sec
14. According to de Morgan's I theorem, NAND = _____
 a) Bubbled OR b) Bubbled AND c) NOR d) Ex-OR
15. The open – loop gain for practical OP-AMP like 741 is _____
 (a) 200,000 (b) ∞ (c) 1 (d) 0

Fill in the blanks:

16. The electrostatic field due to the charge distribution at a point is given by _____
17. The Maxwell's equations $\nabla \times \vec{E}$ and $\nabla \times \vec{B}$ imply that a changing electric field can generate a _____ and vice-versa.
18. A current carrying coil is equivalent to a magnetic _____
19. The arrangement of reflectors to energise the pulse of coherent photons in a laser beam is called _____
20. The RC time constant in wave shaping circuits decide the _____

State whether true or false :

21. The flux of electric field \vec{E} through any closed surface is equal to ϵ_0 times the total charge enclosed by the surface.
22. The unit of measurement of χ_m is amp/metre.
23. Forces that are equal in magnitude and opposite in direction constitute a couple.
24. In holography, 2 dimensional images are produced.
25. The value of CMRR for a differential amplifier is infinity.

Answer briefly:

26. Define relative permittivity of a medium.
27. State any one physical significance of Maxwell's equations.
28. Define figure of merit of a ballistic galvanometer.
29. List the different types of optical fibre systems that are in common use.
30. State any two laws of Boolean algebra.

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

31. Five thousand lines of force enter a certain volume of space and three thousand lines leave it. Find the total charge contained in it.
32. A uniform magnetic field of magnitude 1.5Wb/m^2 points horizontally from south to north. A proton of energy 5.0MeV moves vertically downward through this field. Calculate the force on it.
33. A condenser charged to 2 volts is discharged through a ballistic galvanometer, when the corrected deflection is 9.6cms and current sensitivity is $4.54 \times 10^2\text{mm}/\mu\text{A}$ and the periodic time is 12 seconds. Calculate the capacity of the condenser.
34. With the help of neat ray diagram, explain how images are produced in holography technique.
35. Write a brief note on use of fibre optic cables in telecommunication systems.
36. Realise the given Boolean expression using only NAND gates.
$$Y = A\bar{B} + \bar{A}B$$
37. In an inverting OP-AMP circuit, the input resistance $R_i = 10\text{K}\Omega$, input voltage $V_i = 1\text{V}$, feedback resistance $R_f = 100\text{K}\Omega$ and load resistance $= 25\text{K}\Omega$. Find the output voltage and current.

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

38. What is the necessary condition for applying Gauss's law? Use the law to find the expression for electric field due to a uniformly charged sphere.
39. Draw the hysteresis curve of a magnetic material and explain the terms retentivity and coercivity based on it. What are the uses of hysteresis curve?
40. Outline the construction and working of moving coil ballistic galvanometer.
41. Draw a neat diagram and explain the population inversion process that takes place in CO_2 laser.
42. Discuss the working of OP-AMP as integrator and differentiator. What are the shapes of output waveforms possible for different input waves?
