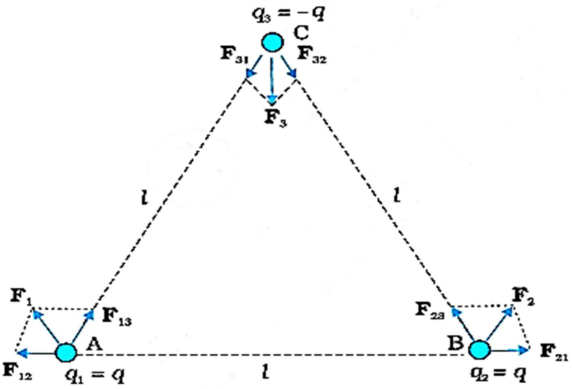
NEW STANDARD ACADEMY

Marks: 60

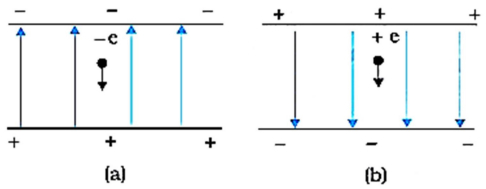
Date : 13-04-2026 **CLASS : 12TH** **Time: 3 hours**

PHYSICS

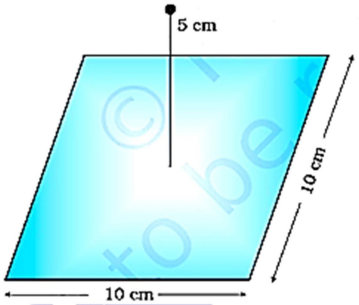
1. If 10^9 electrons move out of a body to another body every second, how much time is required to get a total charge of 1 C on the other body?
2. Consider the charges q, q, and -q placed at the vertices of an equilateral triangle, as shown in Fig. What is the force on **-q** charge?



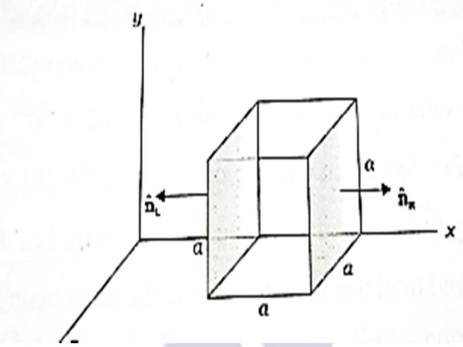
3. An electron falls through a distance of 1.5 cm in a uniform electric field of magnitude 2.0×10^4 N C^{-1} [Fig. (a)]. The direction of the field is reversed keeping its magnitude unchanged and a proton falls through the same distance [Fig(b)].Compute the time of fall in each case.



4. Consider a uniform electric field E = 3×10^3 î N/C. What is the flux of this field through a square of 10 cm on a side whose plane is parallel to the *yz* plane?
5. Careful measurement of the electric field at the surface of a black box indicates that the net outward flux through the surface of the box is 8.0×10^3 Nm²/C. What is the net charge inside the box?
6. A point charge +10 μC is a distance 5 cm directly above the centre of a square of side 10 cm, as shown in Fig. What is the magnitude of the electric flux through the square?



7. The electric field components in Fig. are $E_x = ax^{1/2}$, $E_y = E_z = 0$, in which a = 800 N/C $m^{1/2}$. Calculate (a) the flux through the cube, and (b) the charge within the cube. Assume that a = 0.1 m.



8. Two large, thin metal plates are parallel and close to each other. On their inner faces, the plates have surface charge densities of opposite signs and of magnitude 17.0×10^{-22} C/m². What is E: in the outer region of the first plate?
9. A point charge causes an electric flux of -10^3 N m^2 / C to pass through a spherical Gaussian surface of 10.0 cm radius centred on the charge. If the radius of the Gaussian surface were doubled, how much flux would pass through the surface?
10. If dielectric constant of medium is unity then what will be its permittivity?

CHEMISTRY

1. E^0_{cell} for the cell $Ni/Ni^{2+}(1M)||Cu^{2+}/Cu$ is 0.59V. If E° Ni^{2+}/Ni = - 0.25V, what is E° for copper electrode?

2. Potential of hydrogen electrode at one atmospheric pressure and 25℃ is -0.118V. Calculate the pH of the solution.
3. What is cell reaction and EMF of the following cell?
   $Ni \mid Ni^{2+}(0.1M) \| Ag^{+}(0.1M) \mid Ag$
   Given: $E°(Ni^{2+} \mid Ni) = -0.25V$,
   $E°(Ag^{+} \mid Ag) = +0.80\ V$
4. Calculate the potential of the following cell:
   $Sn^{4+}(1.5M) + Zn \rightarrow Sn^{2}+(0.5M) + Zn^{2+}(2M)$
   Given $E°(Sn^{4+} \mid Sn^{2+}) = 0.13V$,
   $E°(Zn^{2+} \mid Zn) = -0.76$
   Will the cell potential increase or decrease if the concentration of Sn^{4+} is increased?
5. The EMF of a cell is 0.28 V and following reaction occurs in the cell:
   $Zn + 2H^{+} = Zn^{2+}(0.1M) + H_2$ (one atm)
   Make the cell and calculate the pH.
   $E°(Zn^{2+} / Zn) = -0.76V$
6. Calculate the EMF of the electrode $Zn \mid Zn^{2+}$ (0.1M) at 298 K. Given that $E°_{(Zn)} = -0.76V$
7. Calculate the EMF of $Cu \mid CuSO_4$ (0.1M). The salt is 90% dissociated. Given that $E°(Cu^{2+} \mid Cu) = +0.34$ V.
8. Calculate the EMF of the cell at 25 °C
   $Cu \mid Cu^{2+}(4M) \| Ag^{+}(0.1M) \mid Ag$
   Given that $E°(Cu^{2+} / Cu) = 0.34$ V and $E°(Ag^{+} \mid Ag) = 0.80$ V
9. Calculate the EMF of the cell:
   $Cr \mid Cr^{3+}(0.1M) \| Fe^{2+}(0.01\ M) \mid Fe$
   Given that $E°(Cr^{3+} \mid Cr) = -0.75$ V: and $E°(Fe^{2+} \mid Fe) = -0.45$ V
10. For the cell reaction given below EMF at 25 °C is 1.3 V .
    $Zn(S) + Cu^{2+}(1M) \rightleftharpoons Cu(S) + Zn^{2+}(0.1M)$
    Calculate $E°$ of the cell reaction.

BIOLOGY

1. What's the difference between infectious diseases and noninfectious diseases?
2. what is the explain of viral diseases
3. What causes pneumonia Give its Symptoms
4. explain the life circle of the plasmodium.
5. Why is the immune system important
6. Explain the structure of HIV and labelled diagram
7. Should a benign tumor be removed?
8. Give difference between primary and secondary lymphoid organ.
9. Define cancer.
10. What is cellular barrier

MATH'S

1. Find the principal value of $\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)$
2. Find the value of
   $\cos(\sec^{-1}x + \operatorname{cosec}^{-1}x), |x| \geq 1$
3. Write $\cot^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right), > 1$ in the simplest form.
4. Show that
   (i) $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}x, -\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$
   (ii)) $\sin^{-}\left(2x\sqrt{1-x^2}\right) = 2\cos^{-1}x, -\frac{1}{\sqrt{2}} \leq x \leq 1$
5. Prove that:- $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right) = \frac{x}{2}, x\epsilon\left(0, \frac{\pi}{4}\right)$
6. Solve the following equations
   (i) $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$
   (ii) $\tan^{-1}\frac{1-x}{1+x} = \frac{1}{2}\tan^{-1}x, (x>0)$
7. Find the value of the following:
   (i) $\cos^{-1}\left(\cos\frac{13\pi}{6}\right)$ (ii) $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$
8. Solve $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{400}$
9. Simplify $\tan^{-1}\left[\frac{a\cos x - b\sin}{b\cos x + a\sin}\right], if\ \frac{a}{b}\tan x > -1$
10. Show that $\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{4}{5} + \tan^{1}\frac{63}{16} = \pi$