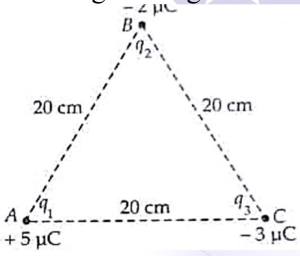
NEW STANDARD ACADEMY

Marks: 60

Date : 05-05-25 **CLASS : 12TH** **Time: 3 hours.**

PHYSICS

1. Calcucate the electric potential at the centre of a square of side $\sqrt{2}$m , having charges 100 $\mu C, -50\mu C, 20\mu C$ *and* $-60\ \mu C$ at the four corners of this square.
2. Three charges of 3×10^{-8} C each are placed at the vertices of an equilateral triangle of sides 4 m each. Calculate the electric potential at the point of intersection of the medians (also called the centroid of the triangle). Also find the electric field intensity there.
3. A charge of 12 μC is given to a hollow metallic sphere of radius 0.1 m. Find the potential at (i) the surface of the sphere and (ii) the centre of the sphere.
4. Two charges 3×10^{-8} C and -2×10^{-8} C are located 15 cm apart. At what point line joining the two charges, is the electric potential zero? Take the potential at infinity to be zero.
5. Find the potential at the centre of a square having charges -2×10^{-9} C, 1×10^{-9} C, -2×10^{-9} C and 3×10^{-9} C at the corners. The side of the square is $\sqrt{2}$ m
6. Two positive point charges of 0.2 μC and 0.01 μC are placed 10 cm apart. Calculate the work done in reducing the distance to 5 cm.
7. A proton is accelerated from rest in van de graaff accelerator by a potential difference of 0.9MV. What is the kinetic energy of the proton acceleration?
8. Compute the electric potential energy U, For the charge configuration shown in figure



9. Show that the electric fieldline at a point on the suface of a charged conductor or just outside it is perpendicular to the surface.
10. An electric flux -6×10^3Nm^2/C passes normally through a spherical Gaussian surface of radius 10 cm due to a point charge place at the centre.
    (a) What is the charge enclosed by this Gaussian surface?
    (b) If the radius of the Gaussian surface is doubled how much flux would pass through the surface?

CHEMISTRY

1. A current of 2 ampere is passed for 10 minutes in $CuSO_4$ solution . Calculate the volume of O_2obtained at STP.
2. Calculat the quantity of electricity required to convert 10 gram NaCl into NaOH by electrolysis.
3. How many hours does it take to reduce 3 moles of Fe^{3+} to Fe^{2+} with a current of 2 ampere?
4. How many moles of mercury will be produced by electrolyzing 1.0 M $Hg(NO_3)_2$ solution with a current of 2.00 A for 3 Hours?[$Hg(NO_3)_2$= 200.6 g mol^{-1}]
5. The resistance of a conductivity cell with 0.1 M KCl solution is 200 ohm . When the same cell is filled with 0.02 M NaCl solution , The resistance is 1100 ohm .Given that the conductivity of 0.1 M KCl solution is 1.29 ohm^{-1}m^{-1}.Calculate the cell constant and molar conductivity of 0.02 M Nacl Solution.
6. Molar conductivity of a 1.5M solution of an electrolyte is 138.9 simen cm^{2}mol^{-1}. What would be the specific conductance of the solution?
7. In a cell the resistance of 0.01 M KCl solution and 0.01 M HCl solution comes out to be 150 ohm and 51.4 ohm respectively . If specific conductance of 0.01 M kCl solution is 0.0014088 ohm $^{-1}$cm^{-1},what is the molar conductivity of HCl solution?
8. The conductivity of an aqueous solution of sodium chloride in a cell is 92ohm^{-1} cm^{-1} The resistance offered by this cell is 247.8 ohm. Calculate the cell constant for this cell.
9. 0.04 N solution of a weak electrolyte has specific conductance $4.23\times 10^{-4}\ Scm^{-1}$ *If degree of dissociation* of the weak electrolyte is 0.0612 , calculate equivalent conductivity at infinite dilution.
10. Conductivity 0.00241 M acetic acid is 7.896×10^{-5} Scm^{-1}. Calculate its molar molar

conductivity .If λ_m^0 for acetic acid is 390.5 $Scm^2\ mol^{-1}$, what would be its dissociation constant ?

BIOLOGY

1. Mention the fate of Corpus leteum it`s a effect on uterus in the absence of fertilization of ovum in the human female.
2. Give the schematic representation of oogenesis in human female.
3. Define-
   1. Implantation
   2. Trophoblast
   3. Chroinc Velli
   4. Factal ejection reflex
4. Draw a lebelled diagram of section through ovary.
5. Draw a level diagram of a grafian follicle.
6. What are parturition which hormone are involve in induction of parturition.
7. What is lactation why breast feeding advise during initial period of infant growth.
8. State the significance of cervix in the female reproductive system.
9. How is polyspermy checked by the zona pellucida of the ovum?
10. Give the difference between Menarche and menapouse.

MATH

1. Construct a 3× 4 matrix , Whose elements are given by aij=$\frac{1}{2}|-3i+j|$
2. Find the value of x,y and z from the equation: $\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$
3. If F(x) = $\begin{bmatrix} cosx & -sinx & 0 \\ sinx & cosx & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then show that F(x) F(y) = F(x+y).
4. If A= $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ prove that $A^3-6A^2+7A+2I$ = 0
5. For two matrices A= $\begin{bmatrix} 2 & 1 & 3 \\ 4 & 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \\ 5 & 0 \end{bmatrix}$ verify that $(AB)^T = B^T A^T$
6. If ω is complex cube root of unity and A =$\begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$, then prove that A^{100} = A.
7. If A =$\begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and I =$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$,then the value of k so that A^2=kA-2I is
8. If A = $\begin{bmatrix} 1 & sin\theta & 1 \\ -sin\theta & 1 & sin\theta \\ -1 & -sin\theta & 1 \end{bmatrix}$ then for all $\theta \epsilon \left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$ det (A) lies in the interval
9. Let the numbers 2 ,b,c be in an A.P and $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & b & c \\ 4 & b^2 & c^2 \end{bmatrix}$ if det.(A) $\in [2,16], then\ c\ lies\ in\ the\ interval$
10. Let A+2B = $\begin{bmatrix} 1 & 2 & 0 \\ 6 & -3 & 3 \\ -5 & 3 & 1 \end{bmatrix}$ and 2A-B = $\begin{bmatrix} 2 & -1 & 5 \\ 2 & -1 & 6 \\ 0 & 1 & 2 \end{bmatrix}$ if Tr(A) denotes the sum of all diagonal elementys of the matrix A , Then tr(A)- Tr(B) has value equal to