NEW STANDARD ACADEMY

Semri Kothi Super Market, Raebareli
CLASS 12 (Academy) 05-05-2025

PHYSICS

1. When a battery is connected across a parallel plate capacitor, each plate acquires a charge of equal magnitude. Is this true for a capacitor consisting of plates of different sizes or shapes?
2. Why a dielectric is used for separating plates of a capacitor?
3. How the introduction of a dielectric slab between the plates of a capacitor decreases the electric field and electric potential difference between the plates?
4. If a metal slab is introduced between the plates of a capacitor, its capacitance is infinity. What does this means?
5. Why two spheres one solid and other hollow of same radius have same charge. When they are charged to same potential?

CHEMISTRY

1. Given the standard electrode potentials,
   $K^+ / K = -2.93V$.
   $Ag^+ / Ag = 0.8V$
   $Hg^{2+} / Hg = 0.79V$.
   $Mg^{2+} / Mg = -2.37V$,
   $Cr3^+ / Cr = -0.74V$
   Arrange these metals in their increasing order of reducing power.
2. Depict the galvanic cell in which the reaction,
   $Zn(s)+2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$
   takes place. Further show:
   (i) which of the electrode is negatively charged ?
   (ii) the carriers of the current in the cell.
   (iii) individual reaction at each electrode.
3. Calculate the standard cell potentials of galvanic cell in which the following reactions take place:
   (i) $2Cr(s)+3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd$
   (ii) $Fe^{2+}(aq)+Ag^+(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$
   Calculate the $\Delta_r G°$ and equilibrium constant of the reactions.
4. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1}. Calculate its molar conductivity.
5. The conductivity of sodium chloride at 298 K has been determined at different concentrations and the results are given below:

Concentration (M)	0.001	0.010	0.020	0.050	0.100
Conductivity ($10^2 \times k$ / S m^{-1})	1.237	11.85	23.15	55.53	106.74

   Calculate Λ_m for all concentrations and draw a plot between ^m and $c^{1/2}$ Find the value of $\Lambda m°$

BIOLOGY

1. What is ART?
2. What is the IUDs?
3. What are physical devices of birth control?
4. Give the example of hormonal IUDs
5. What is the population growth rate in India ?
6. What is RCH?
7. When family planning started in India?
8. If the example of STD ?
9. Give the example of contraceptive pills
10. What is the full form of IVF

MATH

1. If 4 is a 3 × 3 skew-symmetric matrix, then prove that tr. (A) = |A|.
2. For the matrix A = $\begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$. verify that
   (i) (A+A') is a symmetric matrix
   (ii) (A-A') is a skew-symmetric matrix
3. Assume that X, Y, Z, W and Pare matrices of order 2 × n, 3×k, 2×p, n×3, and p×k, respectively. Then find the restrictions on n, k and p so that PY+ WY will be defined.
4. A trust fund has₹30,000 that must be invested in two different types of bonds. The first bond pays 5% interest per year, and the second bond pays 7% interest per year. Using matrix multiplication, determine how to divide₹ 30,000 among the two types of bonds. If the trust fund must obtain an annual total interest of
   (a) ₹1,800 (b) 2,000
5. If A is square matrix such that $A^2 = A$, then prove that $(I+A)^3 - 7A = I$.
6. If AB + BA = O, then prove that $A^3 - B^3 = (A + B)(A2-AB-B^2)$.
7. A and B are symmetric matrices of same order, then prove that AB - BA is a skew-symmetric matrix.

8. Let A be an orthogonal matrix, and B a matrix such that AB = BA Then show that $AB^T = B^TA$

9. Consider the matrices $A = \begin{bmatrix} 4 & 6 & -1 \\ 3 & 0 & 2 \\ 1 & -2 & 5 \end{bmatrix}, B = \begin{bmatrix} 2 & 4 \\ 0 & 1 \\ -1 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$ Out of the given matrix products
(i) $(AB)^TC$ (ii) $C^TC(AB)^T$ (iii) C^TAB and (iv) A^TABB^TC, how many are defined?

10. IFA= $\begin{pmatrix} p & q \\ 0 & 1 \end{pmatrix}$, then show that $A^8 = \begin{bmatrix} 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \end{bmatrix}, n \in N.$