

# NEW STANDARD ACADEMY

Marks: 30

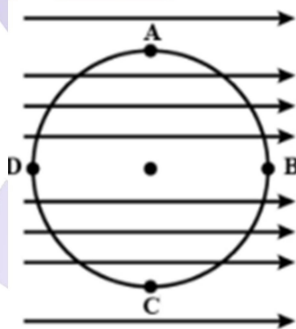
Date : 20-04-2026

CLASS : 12<sup>TH</sup>

Time: 2 hours

## PHYSICS

- At any point on the perpendicular bisector of the line joining two equal and opposite charges.
  - the electric field is zero
  - the electric potential is zero
  - the electric potential decreases with increasing distance from their mid point
  - the electric field is perpendicular to the line joining the charges
- What is the electric potential at a distance 'x' from the centre, inside a conducting sphere having a charge Q and radius R?
  - $\frac{1}{4\pi\epsilon_0} \frac{Q}{R}$
  - $\frac{1}{4\pi\epsilon_0} \frac{Q}{X}$
  - $\frac{1}{4\pi\epsilon_0} \frac{QX}{R^2}$
  - zero
- Four charges 2C, -3C, -4C and 5C respectively are placed at the four corners of a square. Which of the following statements is true for the point of intersection of the diagonals?
  - $E=0, V=0$
  - $E \neq 0, V=0$
  - $E=0, V \neq 0$
  - $E \neq 0, V \neq 0$
- A circle of radius R is drawn in a uniform electric field E as shown in the fig.  $V_A, V_B, V_C$  and  $V_D$  are respectively the potentials of points A, B, C and D on the circle then:-



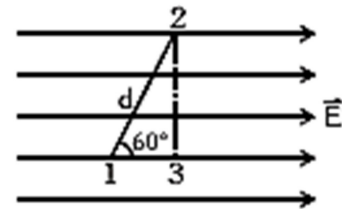
- $V_A > V_C, V_B = V_D$
- $V_A < V_C, V_B = V_D$
- $V_A = V_C, V_B < V_D$
- $V_A = V_C, V_B > V_D$

- The electric potential V is given as a function of distance x (metre) by  $V = (5x^2 -$

$10x - 9)$  volts. The value of electric field at  $x = 1$  m is:-

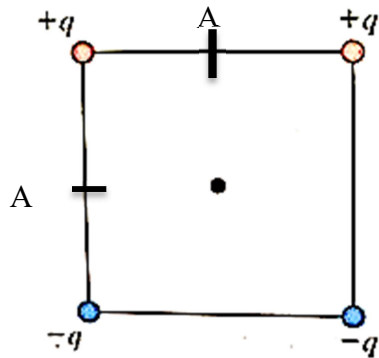
- 20 V/m
- 6 V/m
- 11 V/m
- zero

- The electric field  $\vec{E}$  is constant in both magnitude and direction. Consider a path of length d at an angle  $\theta = 60^\circ$  with respect to field lines as shown in figure. The potential difference between points 1 and 2 is:



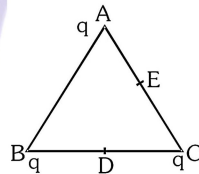
- $\frac{E}{d \sin 60^\circ}$
- $Ed \cos 60^\circ$
- $\frac{Ed}{\cos 60^\circ}$
- $\frac{E}{d} \sin 60^\circ$

- The electric potential at a point due to an electric dipole will be :-
  - $k \frac{\vec{p} \cdot \vec{r}}{r^3}$
  - $k \frac{\vec{p} \cdot \vec{r}}{r^2}$
  - $k \frac{\vec{p} \times \vec{r}}{r^3}$
  - $k \frac{\vec{p} \times \vec{r}}{r^2}$
- If an electric dipole is placed in an electric field generated by a point charge then :
  - the net electric force on the dipole must be zero
  - the net electric force on the dipole may be zero
  - the torque on the dipole due to the field must be zero
  - the torque on the dipole due to the field may be zero
- Four electric charges +q, +q, -q and -q are placed at the corners of a square of side 2L (see figure). The electric potential at point A, midway between the two charges +q and +q, is:



- (a)  $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 + \sqrt{5})$  (b)  $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 + \frac{1}{\sqrt{5}})$   
 (c)  $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 - \frac{1}{\sqrt{5}})$  (d) Zero

10. Three charges each  $+q$  are placed at the three corners of an isosceles triangle ABC with sides BC and AC each equal to  $2a$ . D and E are the mid points of BC and CA respectively. The work done in taking a charge Q from D to E is:



- (a)  $\frac{3qQ}{4\pi\epsilon_0 a}$  (b)  $\frac{3qQ}{8\pi\epsilon_0 a}$   
 (c)  $\frac{qQ}{4\pi\epsilon_0 a}$  (d) Zero

### CHEMISTRY

11. Unit of molar conductivity is :  
 (a)  $\text{ohm}^{-1}\text{cm}^{-2} \text{mol}^{-1}$  (b)  $\text{ohm cm}^{-2} \text{mol}^{-1}$   
 (c)  $\text{ohm}^{-1}\text{cm}^2 \text{mol}^{-1}$  (d)  $\text{ohm cm}^2 \text{mol}$
12. Reaction taking place at anode is :  
 (a) ionization (b) reduction  
 (c) oxidation (d) hydrolysis
13. Which of the following is not used in salt bridge ?  
 (a)  $\text{CH}_3\text{COOK}$  (b)  $\text{NH}_4\text{NO}_3$   
 (c) KCl (d)  $\text{KNO}_3$
14. Correct formula is:  
 (a)  $\lambda_m = k \times V$  (b)  $\lambda_{eq} = \frac{k \times 1000}{c}$   
 (c)  $\lambda_m = \frac{c}{k \times 1000}$  (d)  $\lambda_m = \frac{k \times 100}{c}$
15. For cell,  $\text{Ni}/\text{Ni}^{2+} (1.0 \text{ M}) \parallel \text{Au}^{3+} (1.0 \text{ M}) / \text{Au}$ , (if for  $\text{Ni}^{2+} / \text{Ni}$ ,  $E^\circ = -0.25 \text{ V}$  and for  $\text{Au}^{3+} / \text{Au}$ ,  $E^\circ = 1.50 \text{ V}$ )  $E_{\text{cell}}$  is:  
 (a)  $+4.0 \text{ V}$  (b)  $-1.75 \text{ V}$   
 (c)  $+1.75 \text{ V}$  (d)  $+1.25 \text{ V}$
16.  $\lambda_m^\circ$  for which electrolyte may be determined with the help of a plot between  $\sqrt{c}$  and molar conductivity ?  
 (a) NaCl and NaOH  
 (b) KCl and  $\text{CH}_3\text{COOH}$

- (c) NaOH & HCOOH  
 (d)  $\text{NH}_4\text{OH}$  and  $\text{H}_2\text{SO}_4$
17. Molar conductance of  $\text{CH}_3\text{COONa}$  HCl and NaCl at infinite dilution in  $\text{ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$  respectively are 91, 426.16 and 126.45.  $\lambda_m^\circ$  for  $\text{CH}_3\text{COOH}$  is:  
 (a) 390.71 (b) 453  
 (c) 390 (d) 290
18. Standard reduction electrode potentials of three metals A, B and C are  $+0.5 \text{ V}$ ,  $-3.0 \text{ V}$ , and  $-1.2 \text{ V}$  respectively. The reducing power of these metals are:  
 (a)  $B > C > A$  (b)  $A > B > C$   
 (c)  $C > B > A$  (d)  $A > C > B$
19.  $\lambda_{\text{H}^+}^\circ$  and  $\lambda_{\text{CH}_3\text{COO}^-}^\circ$  are respectively 349.8 and  $40.9 \text{ ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$ . At a given concentration,  $\lambda_m^c$  for  $\text{CH}_3\text{COOH}$  is 5.2. Degree of dissociation ( $\alpha$ ) for  $\text{CH}_3\text{COOH}$  at this concentration is:  
 (a) 0.026 (b) 0.013  
 (c) 0.13 (d) 0.02
20.  $\lambda_{\text{NH}_4\text{OH}}^\circ$  may be calculated from the formula :  
 (a)  $\lambda_m^\circ = \lambda_{\text{NH}_4^+}^\circ + \lambda_{\text{OH}^-}^\circ$   
 (b)  $\lambda_m^\circ = \lambda_{\text{NH}_4\text{Cl}}^\circ + \lambda_{\text{NaOH}}^\circ$   
 (c)  $\lambda_m^\circ = \lambda_{\text{NH}_4^+}^\circ + \lambda_{\text{OH}^-}^\circ$   
 (d)  $\lambda_m^\circ = \lambda_{\text{NH}_4\text{Cl}}^\circ + \lambda_{\text{NaOH}}^\circ - \lambda_{\text{NaCl}}^\circ$

### BIOLOGY

21. The dough, which is used for making bread, is fermented using  
 (a) Brewer's yeast  
 (b) Baker's yeast  
 (c) Propionibacterium sharmanii  
 (d) Both (a) and (b)
22. Blood cholesterol lowering agent is  
 (a) Statin (b) Streptokinase  
 (c) Cyclosporin A (d) Protease
23. Monascus purpureus is a yeast which is commercially used in the production of  
 (a) Butanol  
 (b) Blood cholesterol lowering agents  
 (c) Ethanol  
 (d) Streptokinase for removing clots from the blood vessels
24. During sewage treatment the microorganisms participate under which step?  
 (a) Primary (b) Secondary  
 (c) Tertiary (d) None above
25. Primary treatment of sewage is  
 (a) Removal of large objects, sand and grit  
 (b) Treatment in aeration tanks  
 (c) Treatment of sewage in oxidation pond

- (d) Digestion of organic mass by microorganism
26. Secondary sewage treatment is mainly a  
 (a) Chemical process (b) Biological process  
 (c) Physical process  
 (d) Mechanical process
27. If BOD of sample water is very high, the sample is  
 (a) Highly polluted  
 (b) Less polluted  
 (c) Not polluted (d) Potable
28. A microbial insecticide is  
 (a) Bacillus polymixa  
 (b) B. Sublilis  
 (c) B. thuringiensis  
 (d) B. brevis
29. What is the role of ladybirds as biocontrol agents?  
 (a) Harmful to crops  
 (b) Prey on other beneficial insects  
 (c) Control aphids  
 (d) Transmit diseases to plants
30. Which of the following is a symbiotic nitrogen fixer?  
 (a) Frankia (b) Azolla  
 (c) Glomus (d) Azotobacter

### MATH'S

21. If  $A = [a_{ij}]_{2 \times 2}$  where  $a_{ji} = \begin{cases} 1, & i \neq j \\ 0, & i = j \end{cases}$  then  $A^2$  is equal to  
 (a) I (b) A  
 (c) O (d) none of these
22. The number of all possible matrices of order  $3 \times 3$  with each entry 0 or 1 is  
 (a) 18 (b) 27  
 (c) 81 (d) 512
23. If A and B are symmetric matrices of same order, then  $AB - BA$  is a  
 (a) symmetric matrix  
 (b) skew-symmetric matrix  
 (c) zero matrix  
 (d) identity matrix
24. If  $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ , then  $A^{2023}$  is equal to  
 (a)  $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$  (b)  $\begin{bmatrix} 0 & 2023 \\ 0 & 0 \end{bmatrix}$   
 (c)  $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$  (d)  $\begin{bmatrix} 2023 & 0 \\ 0 & 2023 \end{bmatrix}$
25. If for the matrix  $A = \begin{bmatrix} \tan x & 1 \\ -1 & \tan x \end{bmatrix}$ ,  $A + A' = 2\sqrt{3}I$  then the value of  $x \in \left[0, \frac{\pi}{2}\right]$  is

- (a) 0 (b)  $\frac{\pi}{4}$   
 (c)  $\frac{\pi}{3}$  (c)  $\frac{\pi}{6}$
26. If  $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$  and  $A^2 - kA - 5I = O$ , then the value of k is  
 (a) 3 (b) 5  
 (c) 7 (d) 9
27. If  $A = \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$  then the value of  $I - A + A^2 - A^3 + \dots$  is  
 (a)  $\begin{bmatrix} -1 & -1 \\ 4 & 3 \end{bmatrix}$  (b)  $\begin{bmatrix} 3 & 1 \\ -4 & -1 \end{bmatrix}$   
 (c)  $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$  (d)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
28. The matrix  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$  is a  
 (A) scalar matrix  
 (B) diagonal matrix  
 (C) skew-symmetric matrix  
 (D) symmetric matrix  
 Choose the correct answer from the options given below:  
 (a) (A), (B) and (D) only  
 (b) (A), (B) and (C) only  
 (c) (A), (B), (C) and (D)  
 (d) (B), (C), and (D) only
29. The number of symmetric matrices of order 3, with all the entries from the set  $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$  is  
 (a)  $10^6$  (b)  $9^{10}$   
 (c)  $6^{10}$  (d)  $10^9$
30. Let  $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \alpha & \beta \\ 0 & \beta & \alpha \end{bmatrix}$  and  $|2A|^3 = 2^{21}$  where  $\alpha, \beta \in \mathbb{Z}$ . Then a value of  $\alpha$  is  
 (a) 5 (b) 9  
 (c) 3 (d) 17