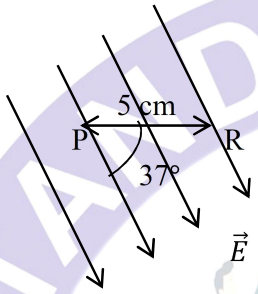
NEW STANDARD ACADEMY

Marks: 60

Date : 06-05-24 **CLASS : 12TH** **Time: 90 min.**

PHYSICS

1. A uniform field of magnitude 2000 NC^{-1} is directed 37° below the horizontal. Then potential difference between P and R



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a) 100V c) 76V
b) 700V d) 300V

2. An electric dipole consists of charges -1nC and +1nC separated by a distance of 4×10^{-14}m. then potential at an axial point P at a distance of 2×10^{-6}m from centre of dipole.

a) 1.8×10^{-7} V c) 8×10^{-7} V
b) 2.3×10^{-6} V d) 6.4×10^{-5} V

3. Twenty seven drops of same size are charged at220V each. They coalesce to from a bigger dorp. Then potential of bigger drop.

a) 1980 V c) 2800V
b) 3000V d)700V

4. The electric potential V at any point x, y, z in space is given by $V= 4x^2$ volt. Then the electric filed at the point (1 m, 0, 2 m).

a) 6i c) 2j
b) 8i d)-8i

5. Angle between equipotential surface and electric field lines is

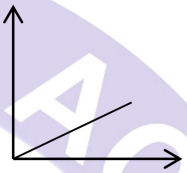
a) Zero c) 90°
b) 45° d) 180°

6. Electric potential due to an electric dipole at a point having distance r from its center and on the axial line varies as

a) R c)r^{-1}
b) R^2 d) r^{-2}

7. Variation of electric potential due to a point charge q<0 with $\frac{1}{r}$ (r is distance from point charge) is shown by graph.

a)



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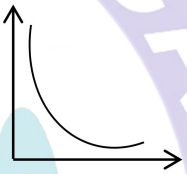
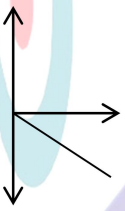
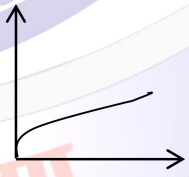


c)



d)

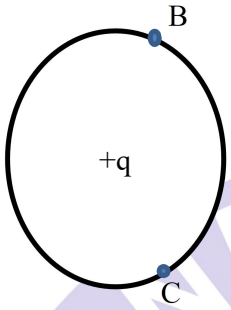
e)



8. When a conductor is held in an electric field the field inside the conductor is always.

a) Positive c) negative
b) Constant d) zero

9. A circle of radius r is drawn with charge +q at the center. A charge q_o is brought from the point B to C on the circle the work done is



a) Positive
b) infinite
c) negative
d) zero

10. The energy density of electric field E is
a) $\epsilon_0 E$
b) $2\epsilon_0 E^2$
c) $\epsilon_0 E^2$
d) $\frac{1}{2}\epsilon_0 E^2$

CHEMISTRY

1. Which of the following expression correctly represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$? Given that $\lambda°_{Al^{3+}} + \lambda°_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions.
a) $2\lambda°_{Al^{3+}} + 3\lambda°_{SO_4^{2-}}$
b) $\lambda°_{Al^{3+}} + \lambda°_{SO_4^{2-}}$
c) $\left(2\lambda°_{Al^{3+}} + \lambda°_{SO_4^{2-}}\right) \times 6$
d) $\frac{1}{3}\lambda°_{Al^{3+}} + \frac{1}{2}\lambda°_{SO_4^{2-}}$

2. Given the standard reduction potential(E°) Value of :
$Fe^{3+} + e^- \longrightarrow Fe^{2+}$, $E°$=0.77v ……(1)
$Fe^{3+} + 3e^- \longrightarrow Fe$, $E°$= -0.04v ……(2)
What is the value of E° for
$Fe^{2+} + 2e^- \longrightarrow Fe$
a) 0.730v
b) -0.445v
c)-0.195v
d)-0.89v

3. The potential of hydrogen electrode at pH=10 is:
c) 0.59v
d) -0.59v
c) 0.00v
d) -0.059v

4. Calculate the reduction potential of a half-cell consisting of platinum electrode immersed in 2.0 M Fe^{2+} and 0.02 M Fe^{3+} : [Given $E° = _{Fe3+/Fe2+} = 0.771v$]
a) 0.653v
b) 0.683v
c) 0.889v
d) 2.771v

5. If the $E°_{cell}$ for a given reaction has a negative value, then which of the following gives the correct relationsh for the values of $\triangle$ G° and K_{eq}?
a) $\triangle$G°>0; Keq<1
b) $\triangle$ G°>0; Keq>1
c) $\triangle$ G°<0; Keq>1
d) $\triangle$ G°<0; Keq<1

6. For the following electrochemical cell at 298K
$Pt_{(s)}|H_{2(g)},(1bar)|H^+_{(aq.)}(1M)||\ M^{4+}_{(aq.)}, M^{2+}_{(aq.)}|Pt_{(s)}$
$E°_{cell} = 0.092v$ when $\frac{M^{2+}_{(aq.)}}{M^{4+}_{(aq.)}} = 10^x$
Given: $E°_{M^{4+}/M^{2+}} = 0.151v, 2.303\frac{RT}{F} =$ 0.059v. The value of x is :
a) -2
b) 1
c) -1
d) 2

7. Given:
$E°_{Cl_2/Cl^-}$ =13.6v, $E°_{Cr^{3+}/Cr}$ = -0.74v,
$E°Cr_2O_7^{2-}/Cr^{+3} = 1.33v$, $E°_{Mno_4^-/Mn^{2+}} = 1.51v$
Among the following the strongest reducing agent is:
a) Cr^{3+}
b) Cr
c) Cl^-
d) Mn^{2+}

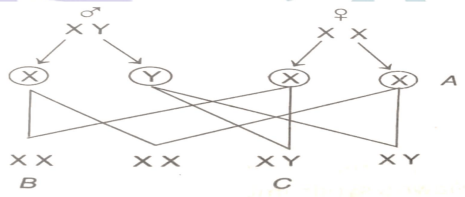
8. On electrolysis of dil sulphuric acid using platinum (Pt) electrode the product obtained at anode will be:
a) Hydrogen gas
b) Oxygen gas
c) H_2S gas
d) SO_2 gas

9. The correct order of reduction potentials of the following pair is
a) Cl_2/Cl^-
b) I_2/I^-
c) Ag^+/Ag
d) Na^+/Na
e) Li^+/Li
Choose the correct answer from the the options given below:
a) (a) > (c) > (b) > (d) > (e)
b) (a) > (b) > (c) > (d) > (e)
c) (a) > (c) > (b) > (e) > (d)
d) (a) > (b) > (c) > (e) > (d)

10. The standard electrode potential of M^+/M in aqueous solution does not depend on:
a) Ionization of a solid metal atom
b) Ionization of a gaseous metal atom
c) Hydration of a gaseous metal ion
d) Sublimation of a solid metal

BIOLOGY

1. In XO type of sex- determination,
   a) Females produce two different types of gametes
   b) males produce two different types of gametes
   c) females produce gametes with Y-chromosomes
   d) Males produce single type of gametes
2. Which of the following is incorrect regarding ZW-ZZ type of sex-determination?
   a) It occurs in birds and some reptiles
   b) Females are homegametic and males are heterogametic
   c) 1:1 sex ratio is produced in the offspring
   d) All of the above
3. Find out A,B and C in the diagram given below.



   a) A- Male gamete, B- Female, C- Gametes
   b) A- Male, B- Female, C –Sperm
   c) A- Female, B- Male, C- Gametes
   d) A- Gametes,B-Female, C-Male
4. Which of the following is /are Mendelian disorder?
   a) Thalassemia c) Cystic fibrosis
   b) Phenylketonuria d) All of Thess
5. Colour blindness in humans
   a) Results in defect in either red or green cone of eyes
   b) Is caused due to the mutation in gene found on X- chromosome
   c) Affects males more frequently than females
   d) All of the above
6. A man whose father was colorblind marries a woman, who had a colorblind mother and normal father. What percentage of male children of this couple will be colorblind?
   a) 25% c) 0%
   b) 50% d) 75%
7. In haemophilia, the affected protein is a part of a cascade of protein which is involved in the
   a) Formation of RBCs
   b) Formation of WBCs and platelets
   c) Coagulation of blood
   d) Anticoagulation
8. Thalassemia in humans
   a) is an autosome linked recessive blood disorder
   b) can transmit from parents to offspring when both parents are unaffected carriers(heterozygous)
   c) caused due to the mutation or deletion of one of the α or β- globin chain
   d) All of the above
9. Klinefelter's syndrome results from
   a) XX egg and Y from sperm
   b) XX egg and XY sperm
   c) X egg and XY sperm
   d) Both (a) and (c)
10. In Down's syndrome karyotyping has shown that the disorder is associated with trisomy of chromosome number-21 usually due to non-disjunction during formation of egg cells.
    a) True
    b) False
    c) Cannot say
    d) Partially true or false

MATHS

1. If A = $\begin{bmatrix} a+ib & c+id \\ -c+id & a-ib \end{bmatrix}$ and $a^2+b^2+c^2+d^2=1$, then A^{-1} is equal to
   a) $\begin{bmatrix} a-ib & -c-id \\ c-id & a+ib \end{bmatrix}$
   b) $\begin{bmatrix} a+ib & -c+id \\ -c+id & a-ib \end{bmatrix}$
   c) $\begin{bmatrix} a-ib & -c-id \\ -c-id & a+ib \end{bmatrix}$
   d) None of these

2. 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) $(AB)^TC$ iii) C^TAB
ii) $C^TC(AB)^T$ iv) A^TABB^TC
a) Exactly one is defined
b) Exactly two is defined
c) Exactly Three is defined
d) All four are defined

3. If $\begin{bmatrix}1 & 2 & a\\ 0 & 1 & 4\\ 0 & 0 & 1\end{bmatrix}^n=\begin{bmatrix}1 & 18 & 2007\\ 0 & 1 & 36\\ 0 & 0 & 1\end{bmatrix}$ then the value of (n+a) is
a) 100 c) 150
b) 200 d) 250

4. Let three matrices be $A=\begin{bmatrix}2 & 1\\ 4 & 1\end{bmatrix}$; $B=\begin{bmatrix}3 & 4\\ 2 & 3\end{bmatrix}$ and $C=\begin{bmatrix}3 & -4\\ -2 & 3\end{bmatrix}$. *Then the value of the sum* $tr(A)+\text{tr}\left(\frac{ABC}{2}\right)+tr\left(\frac{A(BC)^2}{4}\right)+tr\left(\frac{A(BC)^3}{8}\right)+\cdots+\infty=$
a) 6 c) 9
b) 12 d) none of these

5. For $A=\begin{bmatrix}1 & tanx\\ -tanx & 1\end{bmatrix}$, *let us define* a function f(x) =det. (A^TA^{-1}) then which of the following cannot be the value of $\underbrace{f\left(f\left(f(f\ldots\ldots f(x))\right)\right)}_{\text{n times}}$ if n≥ 2?
a) $f^n(x)$ c) 1
b) $f^{n-1}(x)$ nf(x)

6. If $A_1=[a_1]$, $A_2=\begin{bmatrix}a_2 & a_3\\ a_4 & a_5\end{bmatrix}$, $A_3=\begin{bmatrix}a_6 & a_7 & a_8\\ a_9 & a_{10} & a_{11}\\ a_{12} & a_{13} & a_{14}\end{bmatrix}$..., A_n =[…]and so on, where $a_r=[\log_2 r]$ (where [.] denotes the greatest integer function), then $T_r(A_{10})$ is equal to (T_r stands for trace of the matrix)
a) 800 c) 80
b) 792 d)160

7. Let $P=\begin{bmatrix}1 & 0 & 0\\ 4 & 1 & 0\\ 16 & 4 & 1\end{bmatrix}$ and *I* be the identity matrix of order 3. If $Q=[q_{ij}]$ is a matrix such that $P^{50}-Q=I$, then $\frac{q31+q32}{q_{21}}$ Equals
a) 52 c) 103
b) 201 d) 205

8. If $A_r=\begin{pmatrix}r & r-1\\ r-1 & r\end{pmatrix}$ where r is a natural number then $|A_1|+|A_2|+|A_3|+\ldots.+|A_{2006}|$must be equal to
a) 2006 c) $(2006)^2$
b) $(2006)^3$ d) 2007

9. If A = [a ij] $_{4\times4}$such that that a_{ij} $=\begin{cases}2, & when\ i=j\\ 0, & when\ i\neq j\end{cases}$, then $\left\{\frac{\det(adj(adj\ A))}{7}\right\}$ is (where {.} represent fractional part function)
a) 1/7 c) 2/7
b) 3/7 d) none of these

10. The number of solutions of the matrix equation $X^2=\begin{bmatrix}1 & 1\\ 2 & 3\end{bmatrix}$ *is*
a) more than 2 c) 2
b) 0 d)1