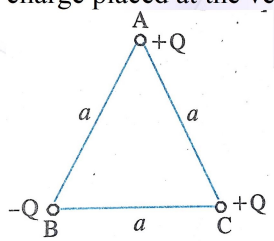
NEW STANDARD ACADEMY

Marks: 60

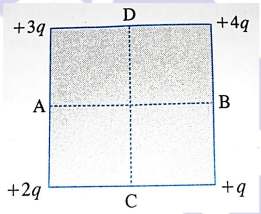
Date : 01-04-25 **CLASS : 12TH** **Time: 90 min.**

PHYSICS

1. A small uncharged conducting sphere is placed in contact with an identical sphere but having 4×10^{-8} C charge and then removed to a distance such that the force of repulsion between them is 9×10^{-3} N. The distance between them is (Take as 9×10^{9} in SI units)
   (a) 2 cm (b) 3 cm
   (c) 4 cm (d) 1 cm
2. The force between two small charged spheres having charges of 1×10^{-7}C and 2×10^{-7}C placed 20 cm apart in air is
   (a)4.5×10^{-2} N (b)4.5×10^{-3} N
   (c)5.4×10^{-2} N (d)5.4×10^{-3} N
3. The charge is quantized, this is shown by:
   (a) Davisson-Germers experiment.
   (b) Compton scattering experiment.
   (c) Milikans oil drop experiment.
   (d) Raman effect
4. On charging a soap bubble its size:
   (a) decreases (b) increases
   (c) remains same (d) cannot be said
5. Which of the following can not be charged easily by friction?
   (a) A woolen cloth (b)An inflated balloon
   (c) A plastic scale (d) A copper rod
6. If two conducting spheres are separately charged and then brought in contact:
   (a) The total energy of the two spheres is conserved
   (b) The total charge on the spheres is conserved
   (c) Both the total energy and charge are conserved
   (d) The final potential is always the mean of the original potential of the two spheres
7. Three charges are placed at the vertices of an equilateral triangle of side a as shown in the figure. The force experienced by the charge placed at the vertex A in a Direction normal to BC is



   (a) $\frac{Q^2}{4\pi\epsilon_0 a^2}$ (b) $-Q^2 4\pi\epsilon_0 a^2$
   (c) zero (d) $\frac{Q^2}{2\pi\epsilon_0 a^2}$
8. Four charges are arranged at the corners of a square as shown in the figure. The direction of electric field at the centre of square is along



   (a) DC (b) BC
   (c) AB (d) AD.
9. SI unit of permittivity is
   (a) $C^2\ m^{-2}\ N^{-2}$
   (b) $C^2\ m^{-2}\ N^{-1}$
   (c) $C^{-2}\ m^{2}\ N^{-1}$
   (d) $C^{-1}\ m^{2}\ N^{-2}$
10. **Directions:** In each of the following questions, a statement of **assertion (A)** is followed by a statement of **reason (R).** While answering questions, choose the correct one and mark it as
    (a) If both **assertion (A)** and **reason (R)** are true and **reason (R)** is the correct explanation of the **assertion (A).**
    (b) If both **assertion (A)** and **reason (R)** are true but **reason (R)** is not the correction explanation of the **assertion (A).**
    (c) If **assertion (A)** is true and **reason (R)** is false.
    (d) If both **assertion (A)** and **reason (R)** are false/**assertion (A)** is false but **reason (R)** is true
    Assertion: Electrons in an atom are held due to coulomb forces.
    Reason: The atom is stable only because centripetal force due to Coulomb's law is balanced by centrifugal force.

CHEMISTRY

1. 8g of NaOH is dissolved in 18g of H_2O Mole fraction of NaOH in solution and molality (in mol kg^{-1}) of the solutions respectively are:
   (a) 0.167, 11.11 (b) 0.2, 22.20
   (c) 0.2, 11.11 (d) 0.167, 22.20
2. Given below are two statements. one is labelled as Assertion (A) and the other is labelled as Reason (R).
   Assertion (A): At 10 °C the density of a 5 M solution of KC1 is 'x' g ml^{-1}. The solution is cooled to - 21 ° C . The molality of the solution will remain unchanged.
   Reason (R): The molality of a solution does not change with temperature as mass remains unaffected with temperature. In the light of the above statements, choose the correct answer from the options given below.
   (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
   (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
   (c) (A) is true but (R) is false.
   (d) (A) is false but (R) is true
3. 250 g solution of D-glucose in water contains 10.8% of carbon by weight. The molality of the solution is nearest to
   (a) 1.03 (b) 2.06
   (c) 3.09 (d) 5.40
4. Given below are two statements one is labelled as Assertion A and the other is labelled as Reason R
   Assertion A: 3.1500 g of hydrated oxalic acid dissolved in water to make 250.0 mL solution will result in 0.1 M oxalic acid solution
   Reason (R): Molar mass of hydrated oxalic acid is 126$gmol^{-1}$ In the light of the above statements, choose the correct answer from the options given below:
   (a) A is true but R is false
   (b) Both A and R are true and R is the correct explanation of A
   (c) A is false but R is true
   (d) Both A and R are true but R is not the correct explanation of A
5. If a substance 'A' dissolves in solution of a mixture of 'B' and 'C' with their respective number of moles as n_A , n_B and n_c Mole fraction of C in the solution is
   (a) $\frac{n_C}{n_A \times n_B \times n_C}$ (b) $\frac{n_C}{n_A + n_B + n_C}$
   (c) $\frac{n_C}{n_A - n_B - n_C}$ (d) $\frac{n_B}{n_A + n_B}$
6. The density of 'x' M solution ('x' molar) of NaOH is 1.12gmL^{-1},While in molality, the concentration of the solution is 3m(3molal). Then x is
   (a) 3.8 (b) 3.5
   (c) 2.8 (d) 3.0
7. Molality (m) of of 3M aqueous solution of NaCl is: (Given: Density of solution= 1.25 gmL^{-1},Molar mass in g mol^{-1}:Na-23,Cl-35.5)
   (a) 2.90 m (b) 2.79 m
   (c) 1.90 m (d) 3.85 m
8. Which one of the following statements regarding Henry's law is not correct?
   (a) The value of K_H increases with function of the nature of the gas.
   (b) Higher the value of K_H at a given pressure, higher is the solubility of the gas in the liquids.
   (c) The partial pressure of the gas in vapour phase is proportional to the mole fraction of the gas in the solution.
   (d) Different gases have different K_H (Henry's law constant) values at the same temperature.
9. Henry's constant (in Kbar) for four gases α, β, γ and δ in water at 298 K is given below:

	α	β	γ	δ
K_H	50	2	2×10^{-5}	0.5

   (density of water = 10^3 kg m^{-3} at 298 K), This table implies that:
   (a) Solubility of γ at 308 K is lower than at 298 K
   (b) The pressure of a 55.5 molal solution of γ is 1 bar
   (c) The pressure of a 55.5 molal solution of δ is 250 bar
   (d) α has the highest solubility in water at a given pressure
10. The vapour pressures of A and B at 25°C are 90 mm Hg and 15 mm Hg respectively. If A and B are mixed such that the mole fraction of A in the mixture is 0.6, then the mole fraction of B in the vapour phase is $x \times 10^{-1}$. The value of x is _____.

BIOLOGY

1. Sporogenous tissue of microsporangia is
   (a) Groups of compactly arranged homogenous cells
   (b) Occupies the center of microsporangium
   (c) Present inside young anther
   (d) All are correct
2. The process of formation of microspores

(1) From pollen mother cell through____A____ formed _____B____
(II) Microspore are arranged in____C____
(III) Microspore changes into the____D____
A to D in the above statements are
(a) A-Pollen grains, B-Microspore tetrad, C-Microsporo-genesis, D-Meiosis
(b) A-Microspore tetrad, B-Microsporogenesis, C-Meiosis, D-Pollen grains
(c) A-Microsporogenesis, B-Microspore tetrad, C-Pollen grain, D-Meiosis
(d) A-Meiosis, B-Microspore, C-Microspore tetrad, D-Pollen grains

3. Arrange the following in a sequence of stages of microsporogenesis:
(I) Microspore tetrads
(II) Microspore mother cell
(III) Sporogenous tissue
(IV) Microspores dissociate from each other
(V) Release of pollen grains
The correct sequence of stages is
(a) III, (V), (I), (II), (IV)
(b) (IV), (III), (I), (V), (II)
(c) (II), (I), (V), (III), (IV)
(d) (III), (II), (I), (IV), (V)
4. In angiosperms microspores are
(a) Well-developed male gametophyte
(b) Partially developed male gametophyte
(c) Partially developed male sporophyte
(d) Well-developed sporophyte

5. Pollen grains
(A) Represent gametophytic phase of plant
(B) Can cause severe allergies like asthma and bronchitis
(C) Are rich in nutrient
(D) Are used as food supplements
(E) Are available in form of tables and syrups in market of western countries
(a) Only (A) is correct
(b) All are correct
(c) All are wrong
(d) Only (A), (B) and (C) are correct
6. It has become a fashion in recent years to use tablets as food supplements. In western countries, a large number of products in the form of tablets and syrups are available in the market consumption has been claimed to increase the performance of athletes and race horses
(a) Aril, latex, resin
(b) Pollen, pollen, pollen
(c) Pollen, megaspore, pills
(d) Integument, endothelial, exudation
7. Asymmetric shape of spindle is observed during:
(a) Pollen mitosis
(b) Microsporogenesis
(c) Megasporogenesis
(d) Endosperm development
8. Read the following statements and find out the incorrect statement:
(A) All flowering plants shows sexual reproduction
(B) Fruits and seeds are the end products of sexual reproduction.
(C) Rich colours, scents and perfumes of flowers aid in sexual reproduction.
(D) Flowers are objects of aesthetic, ornamental, social, religious and cultural values.
(E) Flowers have always been used as symbols for conveying important human feelings such as love, affection, happiness, grief, mourning, etc.
(a) (A), (D) and (E)
(b) (B), (C) and (D)
(c) (A), (C) and (E)
(d) None of the above
9. In anther wall which of the following constitutes third layer from outside?
(a) Endothecium
(b) Endothelium
(c) Aleurone layer
(d) Middle layers

10. The typical angiospermic stamen has two parts: the long and slender stalk called the_____a____ a and the terminal generally bilobed structure called the ____b____
(a) a-pedicel, b-anther
(b) a-petiole, b-microsporangia
(c) a-peduncle, b-pollen sac
(d) a-filament, b-anther

MATHS

1. If the functions are defined as $f(x) = \sqrt{x}$ and g, $g(x) = \sqrt{1-x}$, than what is the common domain of the following functions: $f+g, f-g, f/g, g/f, g-f$ where $(f \pm g)(x) = f(x) \pm g(x), \left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$.
(a) $0 \leq x \leq 1$ (b) $0 \leq x < 1$
(c) $0 < x < 1$ (d) $0 < x \leq 1$
2. Let A = {1, 2, 3, 4, 5, 6, 7}. Then the relation R={(x, y) ∈ A×A : x + y = 7} is
(a) reflexive but neither symmetric nor transitive
(b) symmetric but neither reflexive nor transitive
(c) transitive but neither symmetric nor reflexive
(d) an equivalence relation
3. Let A = {2, 3, 6, 8, 9, 11} and B = {1, 4, 5, 10, 15} Let R be a relation on A×B defined by (a, b) R(c, d) if and only if 3ad - 7bc is an even integer. Then the relation R is
(a) reflexive and symmetric but not transitive.
(b) an equivalence relation.
(c) transitive but not symmetric.
(d) reflexive but not symmetric.
4. The domain of the function $f(x) = \frac{cos^{-1}\left(\frac{x^2-5x+6}{x^2-9}\right)}{log_e(x^2-3x+2)}$ is
(a) $(-\infty, 1) \cup (2, \infty)$
(b) $(2, \infty)$
(c) $\left[-\frac{1}{2}, 1\right) \cup (2, \infty)$
(d) $\left[-\frac{1}{2}, 1\right) \cup (2, \infty) - \left\{\frac{3+\sqrt{5}}{2}, \frac{3-\sqrt{5}}{2}\right\}$
5. If the domain of the function $f(x) = \frac{\sqrt{x^2-25}}{(4-x^2)} + log_{10}(x^2 + 2x - 15)$ is $(-\infty, \alpha) \cup [\beta, \infty), then\ \alpha^2 + \beta^2$ is equal to
(a) 140 (b)175
(c) 125 (d) 150
6. If R is a relation on the set of all straight lines drawn in a plane defined by l_1 R l_2 iff $l_1 \perp l_2$, then R is
(a) reflexive (b) symmetric
(c) transitive (d) an equivalence Relation
7. If R is a relation on **R** (set of all real numbers) defined by aRb iff a ≥ b, then R is
(a) an equivalence relation
(b) reflexive, transitive but not symmetric
(c) symmetric, transitive but not reflexive
(d) neither reflexive nor transitive but Symmetric
8. If R is a relation on the set A (1, 2, 3) defined by R = {(1, 2)}, then R is
(a) reflexive (b) symmetric
(c) transitive (d) none of these
9. If R is a relation on the set A = (1, 2, 3) given by R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)}, then R is
(a) reflexive but not symmetric
(b) reflexive but not transitive
(c) symmetric and transitive
(d) neither symmetric nor transitive
10. If A = {1, 2, 3}, then the maximum number of equivalence relations on A is
(a) 2 (b) 3
(c) 4 (d) 5