Class-11 Diwali Break Assignment (Chemistry)

Date-26/10/2016 **Submission date-7/11/2016**

Chapter-1(Some basic concepts of chemistry)

1. Explain different laws of chemical combination.
2. Explain various terminologies related to atomic mass.
3. How to calculate empirical formula for molecular formula? Give an example of your own.
4. Explain mass percentage , mole fraction, morality and molality with an example.
5. Solve question no. 1.34 and 1.35 of book.

Chapter-5 (States of matter)

1. Explain various intermolecular forces by using diagrams.
2. Explain various gas laws by graphical representation.
3. Explain the behavior of real gases.
4. Show that at a given temperature density of a gas is preoperational to gas pressure ρ by using ideal gas equation (pV=nRT).
5. Solve question n0.- 5.11, 5.15 , 5.19 and 5.22

Chapter-6(Thermodynamics)

1. Explain why internal energy 'U' of a system changes?
2. Explain various application of thermodynamics.
3. Explain enthalpies for different types of reactions.
4. Explain entropy & spontaneity with an example.
5. Solve question no. -6.19

Class-11 Diwali Assignment (Physics)

Chapter-6 (Work , Power and Energy)

1. What is work energy theorem? Define various conditions of work under the influence of force.
2. Explain work done by variable force with graph and work-energy theorem for variable forces.
3. What is conservation of mechanical energy? Explain this phenomenon for spring by writing derivation.
4. How many types of collision are there? Explain one dimension and two dimension collision.
5. Solve question 6.26 and 6.28

Chapter-7 (System of particles and rotational motion)

1. What is centre of mass? Derive expression for its coordinates. Explain motion of centre of mass.
2. What is momentum? Describe its various types. Describe relation between angular and linear velocity.
3. Find expression for torque and angular momentum for a system of particles.
4. Define kinematics, dynamics and angular momentum for rotation about a fixed axes.
5. Find kinetic energy for rolling motion.
6. Solve question – 7.24 and 7.31

Chapter-9 (Mechanical Properties of solid)

1. What is the difference between stress and strain? Draw a relation between them.
2. Define and derive expression for:-

(a) Young's modulus of material of a wire

(b) Shear modulus and Bulk Modulus

3. Solve question no. – 9.18, 9.20 and 9.21

Class-11 Diwali Assignment (Mathematics)

BINOMIAL THEOREM

1. In the binomial expansion of $(1 + a)^{m+n}$, prove that the coefficient of a^m and a^n are equal.

2. Indicate which number is larger (using Binomial Theorem to explain your answer) $(1.1)^{10000}$ or 1000

3. Using Binomial Theorem, prove the identity $C_0 + \frac{C_2}{3} + \frac{C_4}{5} + \ldots\ldots = \frac{2^n}{n+1}$

4. Prove that the coefficient of x^r in the expansion of $(1 - 4x)^{1/2}$ is $\frac{(2r)!}{(r!)^2}$.

5. Find the coefficient of x^4 in the expansion of $\left(\frac{1-x}{1+x}\right)^2$

COMPLEX NUMBER

6. Plot $-\frac{1}{2} - i3$ numbers and its complex conjugates on a complex number plane and find its values.

7. Find the multiplicative inverse of $\sqrt{5} + i3$.

8. Evaluate and write in polar form

$\frac{7(\cos 135^0 + i sin\ 135^0)}{14\ (\cos 90^0 + i \sin 90^0)}$.

9. Prove that

$$(2 - \omega)(2 - \omega^2)(2 - \omega^{10})(2 - \omega^{11}) = 49$$

10. If $1, \omega, \omega^2$ are the cube roots of unity then prove that $(3 + 3\omega + 5\omega^2)^6 - (2 + 6\omega + 2\omega^2)^3 = 0$

CONIC SECTION

11. For parabola $y^2 = -12x$ find the coordinates of the focus and the equation of the directrix.

12. Find the equation of the ellipse satisfying the given conditions of Foci $(0, \pm 5)$ vertices $(0, \pm 13)$

13. Find the coordinates of the vertices, the foci, the eccentricity and the equations of the directrices on the hyperbola $y^2 - 16x^2 = 16$

14. Find the equation of the set of all points such that the difference of their distances from (4,0) and (−4,0) is always equal to 2.

15. A man running a race-course notes that the sum of the distances from the two flag posts from him is always 10 m and the distance between the flag post is 8 m. Find the equation of the path traced by the man.

LINEAR INEQUALITIES

16. Solve linear in equation $\frac{1}{x-1} \leq 2$.

17. Solve system of equations:-

$$\frac{2x-3}{4} - 2 \geq \frac{4x}{3} - 6\ , 2(2x + 3) < 6(x - 2) + 10$$

18. The marks scored by Rohit in two tests were 65 and 70. Find the minimum marks should score in the third test to have an average of at least 65 marks.

19. Represent the solution set of inequations $x \leq 8 - 4y$ graphically in two dimensional plane.

20. Show that the solution set of the following linear inequations is an unbounded set:

$5x + y \geq 10\ ,\quad 2x + 2y \geq 12,\quad x + 4y \geq 12$

$x \geq 0, y \geq 0$

MATHEMATICAL INDUCTION

Prove the following by the principle of mathematical induction for every natural number n.

21. $2^n > n$

22. 1.2.3 + 2.3.4 + 3.4.5 + …… + n(n+1)(n+2)= $\frac{n(n+1)(n+2)(n+3)}{4}$

23. $x^n - y^n$ is divisible by $(x - y)$, where $x - y \neq 0$

24. Prove that $2.7^n + 3.5^n - 5$ is divisible by 24.

25. Prove that $2n + 7 < (n + 3)^2$

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PERMUTATION AND COMBINATION

26. How many different signals can be generated from 6 flags of different colors, if each signal makes use of all the flags at a time, placed one below the other?

27. If ${}^{n}C_8 = {}^{n}C_6$, find ${}^{n}C_2$

28. In an examination, Aasha has to select 4 questions from each part. There are 6, 7 and 8 questions in Part I, Part II and Part III, respectively. What is the number of possible combinations in which she can choose the questions?

29. How many numbers of six digits can be formed from the digits 0,1,3,5,7 and 9 when no digit is repeated? How many of them are divisible by 10?

30. The English alphabet has 5 vowels and 21 consonants. How many words with two different vowels and 2 different consonants can be formed from the alphabet?

RELATION AND FUNCTION

31. $f(x) = \begin{cases} x^2; 0 \le x \le 4 \\ 4x; 4 \le x \le 15 \end{cases}$ and $g(x) = \begin{cases} x^2; 0 \le x \le 5 \\ 4x; 5 \le x \le 15 \end{cases}$

f(x) and g(x) are two relations .(i) Is f(x) a function?(ii) Is g(x) a function?

32. Let f = {(1,1) (2,3),...}be a function from Z to Z, defined by f(x) = ax +b , for some integers a and b. Determine a and b.

33. Find the domain and range of $f(x) = \sqrt{x-7}$

34. From the given table , is y a function of x . Justify your answer .

X	-2	-1.5	-1	-0.5	0.25	0.5	1	1.5	2
Y=1/x	-0.5	-0.67	-1	-2	4	2	1	0.67	0.5

35. Let A = {a, b} and B = {c, d}. Find the number of relations from A to B.

SEQUENCE AND SERIES

36. The p^{th} ,q^{th} and r^{th} terms of an A.P. are a,b,c, respectively. Show that
(q − r)a + (r − p)b + (p − q)c = 0 .

37. The 5th, 8th and 11th terms of a G.P. are p. q and s respectively. Show that q^2 = ps.

38. The sum of first two terms of an infinite geometric series is 15 and each term is equal to the sum of the terms following it. Find the series.

39. If a, b, c are in H.P., then prove that
$\frac{1}{b-a} + \frac{1}{b-c} = \frac{1}{c} + \frac{1}{a}$

40. A square is drawn by joining the mid points of the sides of a given square. A third square is drawn inside the second square in the same way, and the process continues indefinitely. If a side of the first square is 16 cm, determine the areas of all the squares.

SETS

41. If A = {3,5,7,9,11} and B ={7,9,11,13} and C = {11,13,15}, D = {15,17} find
(i) $(A \cap B) \cap (B \cup C)$
(ii) $(A \cup D) \cap (B \cup C)$

42. Let U = {1,2,3,4,5,6,7,8,9}, A = {2,4,6,8} and B = {2,3,5,7}. Verify that
(i) $(A \cup B)' = A' \cap B'$
(ii) $(A \cap B)' = A' \cup B'$

43. If $B' \subset A'$, show that $A \subset B$.

44. In each of the following, determine whether the statement is true or false. If it is true, prove it. If it is false, give an example.
(i) If $x \in A$ and $A \in B$, then $x \in B$.
(ii) If $A \subset B$ and $B \in C$, then $A \in C$.
(iii) If $A \notin B$ and $B \notin C$, then $A \notin C$.
(iv) If $x \in A$ and $x \notin A$, then $x \in B$.
(v) If $A \subset B$ and $x \notin B$, then $x \notin A$.

45. Let A and B be sets. If $A \cap X = B \cap X = \Phi$ and $A \cup X = B \cup X$ for some set X, prove that A = B.

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STATISTICS

46. The lengths (in cm) of 10 rods in a shop are given below:
42.0, 52.3, 55.2, 72.9, 52.8, 79.0, 32.5, 15.2, 27.9, 30.2
Find mean deviation from median, find the mean deviation from mean also.

47. Find the mean and standard deviation for the following data:

X_i	92	93	97	98	102	104	109
f_i	3	2	3	2	6	3	3

48. The diameters of circles (in mm) drawn in a design are given below:
Calculate the standard deviation and mean diameter of the circles.

Diameter (in mm)	33-36	37-40	41-44	45-48	49-52
No of circles	15	17	21	22	25

49. The mean and variance of 7 observations are 8 and 16, respectively. If five of the observations are 2, 4, 10, 12, 14, find the remaining two observations.

50. The mean and standard deviation of 20 observations are found to be 10 and 2 respectively. On rechecking, it was found that an observation 8 was incorrect. Calculate the correct mean and standard deviation in each of the following cases:
(i) If the wrong item is omitted.
(ii) If it is replaced by 12.

STRAIGHT LINES

51. Find the lines through the point (0,2)making angles $\frac{\pi}{3}$ and $\frac{2\pi}{3}$ with the x-axis. Also find the lines parallel to them cutting the y-axis at a distance of 2 units below the origin.

52. Find the equation of the line where the perpendicular distance of the origin from the line, p=5 and the angle made by the perpendicular, $\omega = 30^0$.

53. Find the coordinates of the foot of the perpendicular from a point $(-1,3)$ to the line $3x - 4y - 16 = 0$

54. Find the length of the perpendicular from the origin to the line joining two points whose coordinates are $(\cos\theta, \sin\theta)$ and $(\cos\phi, \sin\phi)$.

55. One side of a rectangle lies along the line 4x + 7y + 5 = 0. Two of its vertices are $(-3,1)$ and (1,1). Find the equation of the other 3 sides.

TRIGONOMETRIC FUNCTIONS

56. Find the value of other 5 trigonometric ratios if $\sin\theta = \frac{3}{5}$, θ lies in second quadrant.

57. Prove that $\cos\left(\frac{\pi}{4} - \theta\right)\cos\left(\frac{\pi}{4} - \phi\right) - \sin\left(\frac{\pi}{4} - \theta\right)\sin\left(\frac{\pi}{4} - \phi\right) = \sin(\theta - \phi)$

58. Prove that $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

59. Sketch the graph of y = 3 sin 2x

60. If α and β are two distinct real numbers satisfying the equation a cos x + bsin x = c, prove that $\tan(\alpha + \beta) = \frac{2ab}{a^2 - b^2}$