

# NEW STANDARD ACADEMY

Date : 15-04-25

CLASS : 11<sup>TH</sup>

Marks: 150

Time: 2 hours

## PHYSICS

1.  $y = x \ln x$ , Find  $dy/dx$ ?

- (a)  $x + \ln x$  (b)  $1 + \ln x$   
(c)  $\ln x$  (d)  $x + x \ln x$

2.  $y = \sin x \cdot \cos x$ , Find  $dy/dx$ ?

- (a)  $\sin 2x$  (b)  $\cos 2x$   
(c)  $-\cos 2x$  (d)  $-\sin 2x$

3.  $y = (\sin x + \cos x)^2$ , Find  $dy/dx$ ?

- (a)  $\sin 2x$  (b)  $\cos 2x$   
(c)  $2\sin 2x$  (d)  $2\cos 2x$

4. Differentiate  $y = \ln x^2$  w.r.t. 'x':

- (a)  $\frac{dy}{dx} = \frac{1}{x}$  (b)  $\frac{dy}{dx} = 2$   
(c)  $\frac{dy}{dx} = \frac{2}{x}$  (d) none of these

5. Differentiate  $y = e^{x^2}$  w.r.t. 'x':

- (a)  $\frac{dy}{dx} = 2xe^{x^2}$  (b)  $\frac{dy}{dx} = e^{x^2}$   
(c)  $\frac{dy}{dx} = 2e^x$  (d) none of these

6. Differentiate  $y = ae^x$  w.r.t. 'x' (where a = constant):

- (a)  $\frac{dy}{dx} = axe^x$  (b)  $\frac{dy}{dx} = a$   
(c)  $\frac{dy}{dx} = ae^x$  (d) none of these

7. Differentiate  $F(x) = (x^2 - 1)(x + 5)$ , w.r.t. 'x':

- (a)  $F'(x) = 3x^2 + 10x - 1$   
(b)  $F'(x) = x^2 - 10x - 1$   
(c)  $F'(x) = (2x)(x)$   
(d) None of these

8. Differentiate  $F(x) = \sin x \cos x$ , w.r.t. 'x':

- (a)  $F'(x) = 1$   
(b)  $F'(x) = \cos^2 x - \sin^2 x$   
(c)  $F'(x) = \cos x - \sin x$   
(d) None of these

9. Differentiate  $y = \frac{e^x}{x}$ , w.r.t. 'x':

- (a)  $\frac{dy}{dx} = \frac{e^x}{x^2}$  (b)  $\frac{dy}{dx} = \frac{e^x}{x^2}(x + 1)$   
(c)  $\frac{dy}{dx} = \frac{e^x}{x^2}(x - 1)$  (d) none of these

10. Differentiate  $y = \frac{\sin x}{\cos x}$  w.r.t 'x':

- (a)  $\frac{dy}{dx} = \cos^2 x$  (b)  $\frac{dy}{dx} = \frac{\cos 2x - \sin^2 x}{\cos^2 x}$   
(c)  $\frac{dy}{dx} = \sec^2 x$  (d) None of these

11. Differentiate  $y = \frac{6x^2}{2-x}$  w.r. t 'x'

- (a)  $\frac{dy}{dx} = \frac{24x - 6x^2}{(2-x)^2}$   
(b)  $\frac{dy}{dx} = \frac{6x^2 - 12x^2 + 24x}{(2-x)^2}$   
(c)  $\frac{dy}{dx} = \frac{24x}{(2-x)^2}$   
(d) None of these

12. Find value of  $\frac{d^2y}{dx^2}$  at  $x = \frac{\pi}{2}$ , if  $y = \sin x$ :

- (a)  $\frac{d^2y}{dx^2} = -1$  (b)  $\frac{d^2y}{dx^2} = 1$   
(c)  $\frac{d^2y}{dx^2} = \text{zero}$  (d)  $\frac{d^2y}{dx^2} = 2$

13. If  $y = x^x$ ,  $\frac{dy}{dx} = ?$

- (a)  $x^x$  (b)  $x^x(1 + \ln x)$   
(c)  $x^{x-1}$  (d)  $x^{x+1}$

14. If  $y = e^x \cdot \cot x$  then  $dy/dx$  will be

- (a)  $e^x \cot x - \operatorname{cosec}^2 x$   
(b)  $e^x \operatorname{cosec}^2 x$   
(c)  $e^x [\cot x - \operatorname{cosec}^2 x]$   
(d)  $e^x \cot x$

15. Equation of straight line is  $2x + 3y = 5$ . Slope of the straight line is :

- (a)  $3/2$  (b)  $2/3$   
(c)  $-2/3$  (d)  $-3/2$

16. Double differentiation of displacement w.r.t. time is :

- (a) acceleration (b) velocity  
(c) force (d) none of these

17.  $\int x^3 dx$  is equal to :

- (a)  $3x^2$  (b)  $\frac{x^4}{4} + C$   
(c)  $\frac{x^4}{4}$  (d)  $4x^3$

18.  $\int 2\sin(x) dx$  is equal to

- (a)  $-2\cos x + C$  (b)  $2\cos x + C$   
(c)  $-2\cos x$  (d)  $2\cos x$

19. If  $y = x^2 \sin(x^3)$ , then  $\int y dx$  will be :

- (a)  $-\cos(x^3) + C$  (b)  $\left(-\frac{\cos x^3}{3}\right) + C$   
(c)  $\cos(x^3) + C$  (d)  $\left(\frac{\cos x^3}{3}\right) + C$

20. Evaluate

$$\int_0^{2\pi} 2\sin(x) dx$$

- (a) 0 (b) 1/3  
(c) 2/3 (d) 2

21. Value of

$$\int_0^{\pi/2} \cos 3t \, dt \text{ is}$$

- (a) 2/3 (b) -1/3  
(c) -2/3 (d) 1/3
22. Which of the following is a correct relation ?  
(a) Speed = |Velocity|  
(b) Average speed = |Average velocity|  
(c)  $\frac{d}{dt} \text{speed} = \left| \frac{d}{dt} \text{velocity} \right|$   
(d) Distance = |Displacement|
23. Find  $\frac{d^2y}{dx^2}$ , if  $y = e^x$ :  
(a)  $\frac{d^2y}{dx^2} = xe^x$  (b)  $\frac{d^2y}{dx^2} = e^x + 1$   
(c)  $\frac{d^2y}{dx^2} = e^x$  (d) None of these
24. Find  $\frac{d^2y}{dx^2}$ , if  $y = \ln x$ :  
(a)  $\frac{d^2y}{dx^2} = -x^2$  (b)  $\frac{d^2y}{dx^2} = -\frac{1}{x^2}$   
(c)  $\frac{d^2y}{dx^2} = \frac{1}{x^2}$  (d) None of these
25. Find double derivative of  $y = x^3 - x^2 + x - 1$ , w.r.t. 'x'  
(a)  $\frac{d^2y}{dx^2} = 3x^2 - 2x + 1$   
(b)  $\frac{d^2y}{dx^2} = 6x^2 - 2$   
(c)  $\frac{d^2y}{dx^2} = 6$   
(d) None of these

### CHEMISTRY

26. Which is an example of matter according to physical state at room temperature and pressure?  
(a) solid (b) liquid  
(c) gas (d) all of these
27. What are the types of compound?  
(a) Organic compounds  
(b) Inorganic compounds  
(c) Both (1) and (2)  
(d) None of these
28. Which of the following is an example of a homogeneous mixture?  
(a) Water + Alcohol (b) Water + Sand  
(c) Water + Oil (d) None of these
29. Which mixture is called solution?  
(a) Heterogeneous mixture  
(b) Homogeneous mixture  
(c) Both (1) and (2)  
(d) None of these

30. Which of the following is a compound?  
(a) Graphite (b) O<sub>2</sub>  
(c) Cl<sub>2</sub> (d) H<sub>2</sub>SO<sub>4</sub>
31. Which of the following statement(s) is/are true?  
(a) An element of a substance contains only one kind of atoms.  
(b) A compound can be decomposed into its components.  
(c) All homogeneous mixtures are called solutions.  
(d) All of these
32. A pure substance can only be  
(a) Compound  
(b) Element  
(c) Both element and compound  
(d) Heterogeneous mixture
33. Which one of the following is not a mixture?  
(a) Tap water (b) Distilled water  
(c) Salt in water (d) Oil in water
34. Which law directly explains the law of conservation of mass?  
(a) Dalton's law (b) Avogadro's law  
(c) Berzelius law (d) Hund's rule
35. Two gaseous samples were analysed. One contained 1.2 g of carbon and 3.2 g of oxygen. The other contained 27.3% carbon and 72.7% oxygen. The experimental data are in accordance with  
(a) Law of conservation of mass  
(b) Law of definite proportions  
(c) Law of reciprocal proportions  
(d) Law of multiple proportions
36. 3 g of a hydrocarbon on combustion with excess of oxygen produces 8.8 g of CO<sub>2</sub> and 5.4 g of H<sub>2</sub>O. The data illustrates the law of  
(a) Conservation of mass  
(b) Multiple proportions  
(c) Constant proportions  
(d) Reciprocal proportions
37. Irrespective of the source, pure sample of water always yields 88.89% mass of oxygen and 11.11% mass of hydrogen. This is explained by the law of  
(a) Conservation of mass  
(b) Constant composition  
(c) Multiple proportions  
(d) Constant volume
38. One gram mole of a gas at NTP occupies 22.4 L. This fact was derived from  
(a) Law of gaseous volumes  
(b) Avogadro's hypothesis  
(c) Dalton's atomic theory  
(d) Law of constant proportions
39. The law of multiple proportions was proposed by  
(a) Lavoisier (b) Dalton

- (c) Proust (d) Gay Lussac
40. A sample of calcium carbonate ( $\text{CaCO}_3$ ) has the following percentage composition: Ca = 40% C = 12% O = 48% If the law of constant proportions is true, the weight of calcium in 4 g of a sample of calcium carbonate from another source will be  
 (a) 0.016 g (b) 0.16 g  
 (c) 1.6 g (d) 16 g
41. Which one of the following pairs of compounds illustrates the law of multiple proportions?  
 (a)  $\text{H}_2\text{O}$ ,  $\text{Na}_2\text{O}$  (b)  $\text{MgO}$ ,  $\text{Na}_2\text{O}$   
 (c)  $\text{Na}_2\text{O}$ ,  $\text{BaO}$  (d)  $\text{SnCl}_2$ ,  $\text{SnCl}_4$
42. Different proportions of oxygen in the various oxides of nitrogen prove the law of  
 (a) Equivalent proportion  
 (b) Multiple proportion  
 (c) Constant proportion  
 (d) Conservation of matter
43. Which of the following is a correct relation for Gay-Lussac's law?  
 (a)  $V \propto T$  (At constant V)  
 (b)  $V \propto n$  (At constant T and P)  
 (c)  $V \propto T$  (At constant P)  
 (d)  $V \propto 1/P$  (At constant T)
44. The number of atoms in 0.1 mol of a triatomic gas is ( $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ )  
 (a)  $1.8 \times 10^{22}$  (b)  $6.026 \times 10^{22}$   
 (c)  $1.806 \times 10^{23}$  (d)  $3.600 \times 10^{23}$
45. A mixture of gases contains  $\text{H}_2$  and  $\text{O}_2$  gases in the ratio of A 1:4 (W / W). What is the molar ratio of the two gases in the mixture?  
 (a) 16:1 (b) 2:1  
 (c) 1:4 (d) 4:1
46. The number of water molecules is maximum in  
 (a) 18 gram of water  
 (b) 18 moles of water  
 (c) 18 molecules of water  
 (d) 1.8 gram of water

**For Question 22 to 25**

- (a) If both statements are true and Reason is the correct explanation of Assertion.  
 (b) If both statements are true but Reason is not the correct explanation of Assertion.  
 (c) If Assertion is true but Reason is false.  
 (d) If Assertion is false but Reason is true.

47. **Assertion:** 16 grams each of  $\text{O}_2$  and  $\text{O}_3$  contains  $N_A/2$  and  $N_A/3$  atoms, respectively.  
**Reason:** 16 grams  $\text{O}_2$  and  $\text{O}_3$  contains same no. of atoms.
48. **Assertion:** Carbon and oxygen combined together only in one fixed ratio.

**Reason:** In a chemical compound, the elements are combined together in a fixed ratio.

49. **Assertion:** At same temperature and pressure, 1 litre  $\text{O}_2$  and 1 litre  $\text{SO}_2$  contains equal no. of molecules.

**Reason:** According to Avogadro's hypothesis, equal volume of all gases under similar condition of temperature and pressure contains equal no. of molecules.

50. **Assertion:** 44 g of  $\text{CO}_2$  and 28 g of CO have same volume at STP.

**Reason:** Both  $\text{CO}_2$  and CO are formed by C and oxygen.

## **BIOLOGY**

51. Which of the following organisms are not composed of cells?  
 (a) Amoeba (b) Paramecium  
 (c) Euglena (d) None of these
52. Unicellular organisms are not capable of  
 (a) Independent existence  
 (b) Performing essential functions of life  
 (c) Both (a) and (b)  
 (d) None of these
53. Who was the first one to see a live cell?  
 (a) Robert Hook (b) Leeuwenhoek  
 (c) Robert Brown (d) None of these
54. Who was the German botanist to study the different cells forming plant tissues?  
 (a) Schleiden (b) Schwann  
 (c) Rudolf Virchow (d) None of these
55. In which year Matthias Schleiden examined a large number of plants and observed that all plants are composed of different kinds of cells which form the tissues of the plant?  
 (a) 1638 (b) 1738  
 (c) 1838 (d) 1938
56. In which year Schwann studied different types of animal cells?  
 (a) 1839 (b) 1739  
 (c) 1639 (d) 1938
57. The cell has a thin outer layer which is known as 'Plasma membrane'. Who reported this?  
 (a) Schleiden (b) Schwann  
 (c) Virchow (d) Robert Hooke
58. Cell wall is a unique structure of plant cells'. Who concluded this?  
 (a) Schleiden (b) Schwann  
 (c) Both (a) and (b) (d) None of these
59. Who proposed the hypothesis that the bodies of animals and plants are composed of cells and product of cells?  
 (a) Schleiden (b) Schwann  
 (c) Both (a) and (b) (d) None of these
60. Who formulated the cell theory?



- (a) Schleiden (b) Schwann  
(c) Both (a) and (b) (d) None of these
61. 'Omnis cellula e cellula' was given in the year \_\_\_\_\_

(a) 1756 (b) 1855  
(c) 1945 (d) 1839

62. Who was the one to describe that cells divided and new cells are formed from pre-existing cells?

(a) Schleiden (b) Schwann  
(c) Virchow (d) All of these

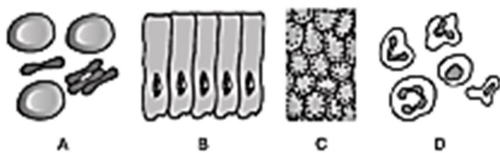
63. Which of the following statement is not a part of final cell theory?

(a) Cell has a thin outer layer called plasma membrane.  
(b) All living organisms are made up of cells and products of cells  
(c) All cells arise from pre-existing cells.  
(d) All of these

64. What is the outer covering of typical plant cell?

(a) Cell wall externally  
(b) Plasma membrane externally  
(c) Cell wall internally  
(d) Cell wall externally, plasma membrane internally

65. Identify the A, B, C and D in the given figure.



(a) A-WBC, B-Mesophyll cell, C-RBC, D-Columnar Epithelial cells  
(b) A-Columnar epithelial cells, B-Mesophyll cell, C-WBC, D-RBC  
(c) A-Mesophyll cell, B-WBC, C-Columnar epithelial cells, D-WBC  
(d) A-RBC, B-Columnar epithelial cells, C-Mesophyll Cell, D-WBC

66. In each cheek cell, there is a dense membrane bound structure which contains chromosome. This structure is

(a) Endoplasmic reticulum  
(b) Golgi bodies  
(c) Nucleus  
(d) Mitochondria

67. What does a nucleus of a typical animal cell contain?

(a) Chromosomes (b) Genes  
(c) DNA (d) All of these

68. The cell containing membrane bound nucleus can be called

- (a) Eukaryotic (b) Prokaryotic  
(c) Both (a) and (b) (d) None of these
69. Identify the figure given below.



(a) Tracheid (b) Nerve Cell  
(c) Lipid bilayer (d) None of these

70. If volume of the cell is filled with semi-fluid matrix called cytoplasm, what kind of cell is it?

(a) Eukaryotic  
(b) Prokaryotic  
(c) Both (a) and (b)  
(d) None of these

71. Identify the given below figure.



(a) A tracheid (b) A vessel  
(c) A parenchyma cell (d) A sieve cell

72. What is the main arena of cellular activities in eukaryotic cells?

(a) Nucleus (b) Cytoplasm  
(c) Plasma membrane (d) All of these

73. In an eukaryotic cell, where does the various chemical reactions occur to keep the cell in living state?

(a) Nucleus (b) Cytoplasm  
(c) Mitochondria (d) All of these

74. How many of the following organelles are found in prokaryotic cells?

**ER, Golgi complex, Lysosome, Mitochondria, Microbodies, Vacuoles**

(a) 1 (b) 3  
(c) 4 (d) 0

75. Where are the ribosomes found in prokaryotic cells?

(a) Cytoplasm  
(b) Mitochondria  
(c) Chloroplast  
(d) All of these

### MATH

51. Solve  $\frac{x}{4} < \frac{(5x-2)}{3} - \frac{(7x-3)}{5}$  for real x

- (a)  $(-4, \infty)$  (b)  $(5, \infty)$   
 (c)  $(4, \infty)$  (d)  $(-5, \infty)$   
 52. Solve  $x(2^x-1)(3^x-9)(x-3) < 0$ .  
 (a)  $x \in (2, 6)$  (b)  $x \in (2, -3)$   
 (c)  $x \in (2, 3)$  (d)  $x \in (-2, 3)$   
 53. Solve  $(x^2 - 4)\sqrt{x^2 - 1} < 0$   
 (a)  $x \in (2, -1) \cup (1, 2)$   
 (b)  $x \in (-2, -1) \cup (1, -2)$   
 (c)  $x \in (-2, 1) \cup (1, 2)$   
 (d)  $x \in (-2, -1) \cup (1, 2)$   
 54. The solution set for  $(2x+1)(x-3)(x+7) < 0$  is  
 (a)  $(-\infty, -7) \cup (-1/2, 3)$   
 (b)  $(-\infty, -7) \cup (1/2, 3)$   
 (c)  $(-7, -1/2) \cup (1/2, 3)$   
 (d)  $(-7, -1/2) \cup (3, \infty)$   
 55. Solve  $(x-1)^2(x+4) < 0$ .  
 (a)  $(-\infty, 4)$  (b)  $(-\infty, -4)$   
 (c)  $(\infty, 4)$  (d)  $(-\infty, -3)$   
 56. Solve  $\frac{2x-3}{3x-5} \geq 3$ .  
 (a)  $\left(\frac{5}{3}, -\frac{12}{7}\right]$  (b)  $\left(\frac{5}{3}, \frac{12}{7}\right]$   
 (c)  $\left(-\frac{5}{3}, \frac{12}{7}\right)$  (d)  $\left(\frac{5}{3}, 12\right)$   
 57. Solve  $|x| = x^2 - 1$ .  
 (a)  $\frac{1+\sqrt{5}}{2}, \frac{-1-\sqrt{5}}{2}$  (b)  $\frac{1+\sqrt{5}}{6}, \frac{-1-\sqrt{5}}{2}$   
 (c)  $\frac{1+\sqrt{5}}{2}, \frac{-1-\sqrt{5}}{2}$  (d)  $\frac{1+\sqrt{5}}{7}, \frac{-1-\sqrt{5}}{7}$   
 58. Solve  $|x^2+4x+3| = x+1$ .  
 (a)  $x = 1$  (b)  $x = 2$   
 (c)  $x = -2$  (d)  $x = -1$   
 59. Solve  $|3x-2| < 4$   
 (a)  $-2/3 < x < 2$  (b)  $2/3 < x < 2$   
 (c)  $-2/3 > x < 2$  (d)  $-2/3 > x > 2$   
 60. Solve  $\left|\frac{x-3}{x+1}\right| \leq 1$ .  
 (a)  $[1, \infty)$  (b)  $[2, \infty)$   
 (c)  $[3, \infty)$  (d)  $[7, \infty)$   
 61. Solve  $\frac{(x-3)(x+5)(x-7)}{|x-4|(x+6)} \leq 0$ .  
 (a)  $(6, 5] \cup [-3, -4) \cup (4, 7]$   
 (b)  $(-6, 5] \cup [3, 4) \cup (4, 7]$   
 (c)  $(-6, -5] \cup [3, 4) \cup (4, 7]$   
 (d)  $(-6, 5] \cup [3, 4) \cup (4, -7]$   
 62. The solution set for  $|2x-3|+|x-1|=|x-2|$  is  
 (a)  $[0, 2]$  (b)  $[2, 10]$   
 (c)  $(0, 2]$  (d)  $[-2, 0]$   
 63. Solve the given inequality for real  $x$ :  
 $\frac{(2x-1)}{3} \geq \frac{(3x-2)}{4} - \frac{(2-x)}{5}$   
 (a)  $(\infty, 2]$  (b)  $(-\infty, 3]$   
 (c)  $(-\infty, -3]$  (d)  $(-\infty, 2]$   
 64. The solution set  $|x|^2-5|x|+4 < 0$  is  
 (a)  $(-4, -1)$  (b)  $(1, 4)$   
 (c)  $(-4, -1) \cup (1, 4)$  (d)  $(-4, 4)$   
 65. The set of all real numbers satisfying the inequality  $x^2-|x+2|+x > 0$  is

- (a)  $[-2, -\sqrt{2}) \cup (\sqrt{2}, \infty)$   
 (b)  $(-\infty, -2) \cup (2, \infty)$   
 (c)  $[-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)$   
 (d)  $[-\infty, -2) \cup (\sqrt{2}, \infty)$   
 66. Which value of  $x$  satisfy the following inequalities simultaneously?  
 (i)  $-3 < 2x-1 < 19$  (ii)  $-1 \leq \frac{2x+3}{5} \leq 3$   
 (a)  $[-4, 10]$  (b)  $(-1, 6]$   
 (c)  $[-1, 6)$  (d)  $(-1, 6)$   
 67. If  $x \in [-4, 6)$  then  $\frac{1}{x} \in$   
 (a)  $[-1/4, 1/6)$   
 (b)  $[-1/4, 1/6]$   
 (c)  $(-\infty, -1/4] \cup (1/6, \infty)$   
 (d)  $(-\infty, -1/4] \cup [1/6, \infty)$   
 68. Which of the following does not satisfy  $\frac{(2x-1)(x+1)(x-2)^2}{(x+3)(x-4)^3} > 0$ ?  
 (a)  $(-\infty, -3)$  (b)  $(-1, 1/2)$   
 (c)  $(4, \infty)$  (d)  $(-3, -1)$   
 69. The solution set of  $(x-2)^{x^2-6x+8} > 1$  is  
 (a)  $(2, \infty)$   
 (b)  $(2, 3) \cup (4, \infty)$   
 (c)  $(4, 5) \cup (5, \infty)$   
 (d)  $(2, 3) \cup (4, 5)$   
 70. Which of the following equation has maximum number of real roots?  
 (a)  $x^2-|x|-2=0$   
 (b)  $x^2-2|x|+3=0$   
 (c)  $x^2-3|x|+2=0$   
 (d)  $x^2+3|x|+2=0$   
 71. Sum of roots the equation  $\left|\frac{x+2}{x-1}\right| = 2$  is  
 (a) 2 (b) 6  
 (c) 4 (d) 5  
 72. Which of the following equations has maximum number of real roots?  
 (a)  $x^2-|x|-2=0$   
 (b)  $x^2+2|x|+3=0$   
 (c)  $x^2-3|x|+2=0$   
 (d)  $x^2+3|x|+2=0$   
 73. Product of all roots of the equation  $|x-3|+2|x+1|=4$  is  
 (a)  $3/5$  (b) 2  
 (c) -1 (d) 6  
 74. Number of positive integers for which  $\frac{(x+3)(x-1)}{x^2(x-2)^3} \leq 0$   
 (a) 4 (b) 1  
 (c) 3 (d) 2  
 75. Number of solution of the equation  $|x^2-x-6|=x+2$  is  
 (a) -3 (b) -2  
 (c) 2 (d) 3

