



## Sample Paper (Class – 12<sup>th</sup> Engineering)

ISE Year - 2021

### Physics

- The speed of the light 'c', gravitational constant 'G', and Planck's constant 'h' are taken as the fundamental units in a system. The dimension of time in this new system should be
  - (1)  $[G^{1/2}h^{1/2}c^{1/2}]$
  - (2)  $[G^{1/2}h^{1/2}c^{-5/2}]$
  - (3)  $[G^{1/2}h^{1/2}c^{-3/2}]$
  - (4)  $[G^{-1/2}h^{1/2}c^{1/2}]$
- In C.G.S. system, the magnitude of a force is 100 dynes. In another system where the fundamental physical quantities are kilogram, metre and minute, the magnitude of the force is
  - (1) 36
  - (2) 3.6
  - (3) 0.36
  - (4) 0.036
- The magnitude of a given vector with end points (4, -4, 0) and (-2, -2, 0) must be
  - (1) 4
  - (2)  $5\sqrt{2}$
  - (3) 6
  - (4)  $2\sqrt{10}$
- A man walks on a straight road from his home to a market 2.5 km away with a speed of 5km/hr. Finding the market closed, he instantly turns and walks back home with a speed of 7.5 km/hr. The average speed of the man over the interval of time 0 to 40 min is equal to
  - (1) 5 km/hr
  - (2)  $30/4$  km/hr
  - (3)  $25/4$  km/hr
  - (4)  $45/8$  km /hr
- Radius of the curved road on national highway is R, width of the road is b. The outer edge of the road is raised by h with respect to inner edge so that a car with velocity v can pass over it. The value of h is

$$(1) \frac{v}{Rg}$$

$$(2) \frac{v^2 b}{Rg}$$

$$(3) \frac{v^2 b}{R}$$

$$(4) \frac{v^2 R}{g}$$

6. Galileo writes that of angles of projection of a projectile at angles  $(45 + \theta)$  and  $(45 - \theta)$ , the horizontal ranges described by the projectile are in the ratio of (if  $\theta \leq 45$ )

$$(1) 1:1$$

$$(2) 1:2$$

$$(3) 2:1$$

$$(4) 2:3$$

7. A body is moving with a constant acceleration in a straight line. If the velocity at point A and point B are  $u$  and  $v$  respectively, find the velocity at C if  $AC = CB$

$$(1) \sqrt{\frac{u^2 + v^2}{2}}$$

$$(2) \sqrt{\frac{2u^2 + v^2}{2}}$$

$$(3) \sqrt{\frac{u^2 + 2v^2}{2}}$$

$$(4) \sqrt{\frac{u^2 + v^2}{4}}$$

8. A bullet is fired from a gun. The force on the bullet is given by

$F = 600 - 2 \times 10^5 t$ , where  $F$  is in Newtons and  $t$  in seconds. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet?

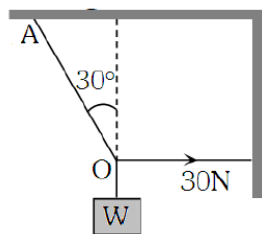
$$(1) 0.9 \text{ Ns}$$

$$(2) 1.8 \text{ Ns}$$

$$(3) 9 \text{ Ns}$$

$$(4) \text{Zero}$$

9. As shown in figure the tension in the horizontal cord is 30 N. The weight  $W$  and tension in string  $OA$  in Newton are



$$(1) 30\sqrt{3}, 30$$

$$(2) 30\sqrt{3}, 60$$

$$(3) 60\sqrt{3}, 30$$

$$(4) \text{None of these}$$



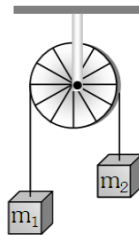
14. The speed of a homogeneous solid sphere after rolling down an inclined plane of vertical height  $h$ , from rest without sliding, is

- (1)  $\sqrt{gh}$                       (2)  $\sqrt{\frac{4}{3}gh}$                       (3)  $\sqrt{\frac{6}{5}gh}$                       (4)  $\sqrt{\frac{10}{5}gh}$

15. A body travels uniformly a distance of  $(13.8 \pm 0.2)$  m in a time  $(4.0 \pm 0.3)$ s. The velocity of the body within error limits is

- (1)  $(3.45 \pm 0.2)$  m/s                      (2)  $(3.45 \pm 0.3)$  m/s  
(3)  $(3.45 \pm 0.5)$  m/s                      (4)  $(3.45 \pm 0.6)$  m/s

16. Two masses  $m_1$  and  $m_2$  are attached to a string, which passes over a frictionless smooth pulley. When  $m_1 = 10$  kg and  $m_2 = 6$  kg, the acceleration of masses is

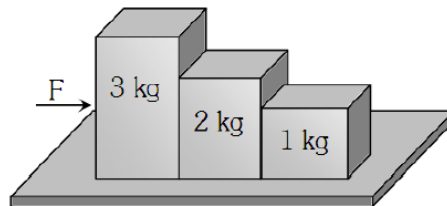


- (1)  $5 \text{ m/s}^2$                       (2)  $2.5 \text{ m/s}^2$                       (3)  $10 \text{ m/s}^2$                       (4)  $20 \text{ m/s}^2$

17. A man sitting in a bus travelling in a direction from west to east with a speed of 40 km/h observes that the rain-drops are falling vertically down. To the another man standing on ground the rain will appear

- (1) to fall vertically down.  
(2) to fall at an angle going from east to west.  
(3) to fall at an angle going from west to east.  
(4) the information given is insufficient to decide the direction of rain.

18. Consider the following statements about the blocks shown in the diagram that are being pushed by a constant force on a frictionless table



A. All blocks move with the same acceleration.  
B. The net force on each block is the same. Which of these statements are/is correct?

- (1) B only                      (2) A only  
(3) Both A and B                      (4) Neither A nor B

19. Ampere-hour is a unit of  
(1) energy (2) power  
(3) quantity of electricity (4) strength of electric current

20. Action and reaction forces act on  
(1) different bodies. (2) the same body.  
(3) the horizontal surface. (4) nothing can be said.

### **CHEMISTRY**

21. When a sample was weighted using two different balances, the results were 3.929 g and 4.0g. How would the weight of the sample be reported?

- (1) 3g (2) 3.9g  
(3) 3.93g (4) 3.929g

22. Find the number of moles of Oxygen in 1 L of air containing 21% Oxygen by volume, in standard conditions

- (1) 2.10 mol (2) 0.0093 mol  
(3) 0.186 mol (4) 0.21 mol

23. Hydrogen combines with oxygen in which 16 g of oxygen combine with 2 g of hydrogen to form  $H_2O$ . Hydrogen also combines with carbon to form  $CH_4$  in which 2 g of hydrogen combine with 6 g of carbon. If carbon and Oxygen combine together then they will be in the ratio of:

- (1) 12:24 (2) 1:2  
(3) 6:18 (4) 6:16 or 12:32

24. If the distance between  $Na^+$  and  $Cl^-$  ions in sodium chloride crystal is X pm, the length of the edge of the unit cell is

- (1)  $X/2$  pm (2)  $2X$  pm  
(3)  $X/4$  pm (4)  $4X$  pm

25. Pressure exerted by 1 mole of methane in a 0.25 litre container at 300 K using vander Waal's equation ( $a = 2.253 \text{ atm l}^2 \text{ mol}^{-2}$ ,  $b = 0.0428 \text{ lit mol}^{-1}$ ) is

- (1) 70.52 atm (2) 82.82 atm  
(3) 152.51 atm (4) 190.52 atm

26. If 1.2g of metal displace 1.12 litre hydrogen at normal temperature and pressure, equivalent weight of metal would be

- (1)  $1.2 \times 11.2$  (2)  $1.2 \div 11.2$   
(3) 12 (4) 24

27. Oxidation state of chlorine in perchloric acid is  
(1) -7 (2) -1  
(3) 0 (4) +7
28. The interatomic distances in  $H_2$  and  $Cl_2$  molecules are 74 and 198 pm respectively. The bond length of HCl is  
(1) 124 pm (2) 136 pm  
(3) 248 pm (4) 272 pm
29. The ratio between the root mean square velocity of  $H_2$  at 50 K and that of  $O_2$  at 800 K is  
(1) 1/4 (2) 1  
(3) 2 (4) 4
30. Out of the following hybrid orbitals, the one which forms the bond at angle  $120^\circ$ , is  
(1) sp (2)  $sp^2$  (3)  $sp^3$  (4)  $d^2sp^3$
31. The maximum number of electrons that can be accommodated in 'f' sub-shell is  
(1) 32 (2) 14 (3) 8 (4) 2
32. The mass of a photon with a wavelength equal to  $1.54 \times 10^{-8}$  cm is  
(1)  $1.8884 \times 10^{-32}$  kg (2)  $1.4285 \times 10^{-32}$  kg  
(3)  $1.2876 \times 10^{-33}$  kg (4)  $0.8268 \times 10^{-34}$  kg
33. Which of the following is correct for critical temperature?  
(1) At critical temperature ( $T_c$ ) the surface tension of the system is zero.  
(2) It is the highest temperature at which liquid and vapour can coexist.  
(3) Beyond the critical temperature, there is no distinction between the two phases and a gas cannot be liquefied by compression.  
(4) All of above.
34. The number of moles of  $KMnO_4$  reduced by one mole of KI in alkaline medium is  
(1) two. (2) one. (3) five. (4) one fifth.
35. Find the equivalent weight of  $K_2Cr_2O_7$  in standardization of  $Na_2S_2O_3$  using  $K_2Cr_2O_7$  by iodometry.  
(1) MW/1 (2) MW/2 (3) MW/3 (4) MW/6



44. If  $C$  is any arbitrary constant, then the general solution of differential equation  $ydx - xdy = xydy$
- (1)  $y = cxe^{-x}$       (2)  $x = cye^x$       (3)  $y + e^x = cx$       (4)  $ye^x = cx$
45. If  $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \infty$ , then  $\frac{dy}{dx} =$
- (1)  $y-1$       (2)  $y+1$   
(3)  $y$       (4) None of these
46. The point  $(4,1)$  undergoes the following two successive transformation  
(i) Reflection about the line  $y = x$   
(ii) Translation through a distance 2 units along the positive  $x$ -axis  
Then the final coordinates of the point are
- (1)  $(7/2, 7/2)$       (2)  $(1,4)$   
(3)  $(3,4)$       (4)  $(4,3)$
47. Equation of angle bisector between the lines  $3x + 4y - 7 = 0$  and  $12x + 5y + 17 = 0$  are
- (1)  $\frac{3x + 4y + 7}{\sqrt{25}} = \frac{12x + 5y + 17}{\sqrt{169}}$       (2)  $\frac{3x + 4y - 7}{\sqrt{25}} = \pm \frac{12x + 5y + 17}{\sqrt{169}}$   
(3)  $\frac{3x + 4y + 7}{\sqrt{25}} = \pm \frac{12x + 5y + 17}{\sqrt{169}}$       (4) None of these
48.  $1 + \frac{3}{2} + \frac{5}{2^2} + \frac{7}{2^3} + \dots \infty$  is equal to
- (1) 12      (2) 9      (3) 6      (4) 3
49. If  $a > 0, b > 0, c > 0$ , then both the roots of the equation  $ax^2 + bx + c = 0$
- (1) are real and negative.      (2) have negative real parts.  
(3) are rational numbers.      (4) none of these.
50. The sum of the series  $6 + 66 + 666 + \dots$  upto  $n$  terms is
- (1)  $(10n-1-9n+10)/81$       (2)  $2(10n+1-9n-10)/27$   
(3)  $2(10n-9n-10)/27$       (4) None of these
51.  $112+122+132+\dots+202 =$
- (1) 2487      (2) 2485      (3) 2483      (4) 2481



52. What will be the R, if R be a relation on set N defined by  $\{(x, y) | x, y \in N, 2x + y = 41\}$ ?
- (1) Symmetric (2) Reflexive  
(3) Transitive (4) None of these
53. In a school, out of 800 students 224 played cricket, 240 played hockey and 336 played basketball. Of the total, 64 played both basketball and hockey, 80 played cricket and basketball, 40 played cricket and hockey, 24 played all the three games. How many students did not play any game?
- (1) 216 (2) 240 (3) 160 (4) 128
54. For all real values of x, increasing function f(x) is
- (1)  $X^4$  (2)  $X^3$  (3)  $X^2$  (4)  $X^{-1}$
55. Two finite sets have elements m and n. Determine the value of m and n if the total number of subsets of the first set is 56 more than the total number of subsets of the second set.
- (1) 5, 1 (2) 8, 7 (3) 7, 6 (4) 6, 3
56. If a, b, c, d, e are in A.P. then the value of  $a + b + 4c - 4d + e$  in terms of a, if possible is
- (1) 3a (2) 2a  
(3) 4a (4) None of these
57. If  $ax^2 + bx + c = 0$  and  $bx^2 + cx + a = 0$  have a common root,  $a \neq 0$ , then  $\frac{a^3 + b^3 + c^3}{abc} =$
- (1) 3 (2) 2  
(3) 1 (4) None of these
58. The point on the line  $x + y = 4$  which lie at a unit distance from the line  $4x + 3y = 10$ , are
- (1) (1,3), (-7,11) (2) (-3,1), (-7,11)  
(3) (3,1), (7,11) (4) (3,1), (-7,11)
59. What is the relation R defined in N as  $aRb \Leftrightarrow b$  is divisible by a?
- (1) Symmetric but not transitive (2) Reflexive but not symmetric  
(3) Symmetric and transitive (4) None of these
60. The equation of the tangent to the curve  $x = 2 \cos^3\theta$  and  $y = 3 \sin^3\theta$  at the point  $\theta = \pi/4$  is
- (1)  $2x - 3y = 3\sqrt{2}$  (2)  $2x + 3y = 3\sqrt{2}$   
(3)  $3x - 2y = 3\sqrt{2}$  (4)  $3x + 2y = 3\sqrt{2}$



67. One-fifth of the boys and one-fourth of the girls in a class exclusively joined a swimming camp. Two-thirds of boys and three-fifths of girls exclusively joined a sports camp. If the total number of boys and girls in the class is 65, how many girls joined the sports camp?
- (1) 12 (2) 4  
(3) 16 (4) Can't be determined
68. The ratio of the ages of Anjali and Smita is 2:3. After 6 years the ratio of their ages becomes 5:7. What is the present age of Smita?
- (1) 24 years (2) 30 years  
(3) 36 years (4) 18 years
69. The profit percentage earned by selling a watch for Rs. 820 is as much as the loss percentage incurred when it is sold for Rs. 650. What is the cost price of the watch?
- (1) Rs. 750 (2) Rs. 690  
(3) Rs. 735 (4) Rs. 710
70. A sum of Rs. 1,000 is borrowed at a certain rate of interest. After 4 months, Rs. 500 is again borrowed, but this time at a rate of interest that is thrice the original rate. At the end of the year, the total interest on both the amounts is Rs. 100. What is the original rate per annum?
- (1) 3.33% (2) 5 % (3) 8% (4) 10%
71. 'A' introduces 'B' as the 'daughter of the only sister of his mother's husband'. How is B related to A?
- (1) Daughter (2) Sister  
(3) Cousin (4) Mother
72. Sailesh introduces Mahipal as the son of the only brother of his father's wife. How is Mahipal related to Sailesh.
- (1) Cousin (2) Son  
(3) Maternal uncle (4) Son in law
73. The respective ratio of the present age of x and y is 7:1. Four years ago the respective ratio of their age was 19:1. x what will be x age four years from now?
- (1) 42 years (2) 38 years  
(3) 46 years (4) 36 years

74. Father is five year older than mother and mother's age now is thrice the age of the daughter. The daughter is now 10 years old. What was father's age when the daughter is born?

(1) 20 years

(2) 15 years

(3) 25 years

(4) 30 years

75. When seen through a mirror, a clock shows 8:30. The correct time is

(1) 2:30

(2) 3:30

(3) 5:30

(4) 8:30

