# IMPORTANT INSTRUCTIONS

- The maximum marks are 360. Time allotted is **120 MINUTES.**
- There are three sections in the question paper having total **90 questions:**
  - Section – A : Chemistry (30 Questions)
  - Section – B : Maths (30 Questions)
  - Section – C : Physics (30 Questions)
- Each question carries **4 marks.**
- **Negative Marking : ¼ (One-fourth) mark** will be deducted for every incorrect answer.
- **Use only BLUE / BLACK ball pen to fill the circles in bubble sheet.**
- Use of PENCIL is strictly **not allowed.**
- **Use of marker and correction pen is strictly prohibited.**

## SECTION – A
## CHEMISTRY

**Choose the correct option.**

1) On combustion 0.210 g of an organic compound containing C, H and O gave 0.127 g $H_2O$ and 0.307 g $CO_2$. The percentages of hydrogen and oxygen in the given organic compound respectively are:

a) 7.55, 43.85 b) 6.72, 53.41

c) 6.72, 39.87 d) 53.41, 39.6

2) Mass of magnesium required to produce 220 mL of hydrogen gas at STP on reaction with excess of dil. HCl is
(Given : Molar mass of Mg is 24 g/mol).

a) 0.24 mg b) 235.7 g

c) 2.444 g d) 236 mg

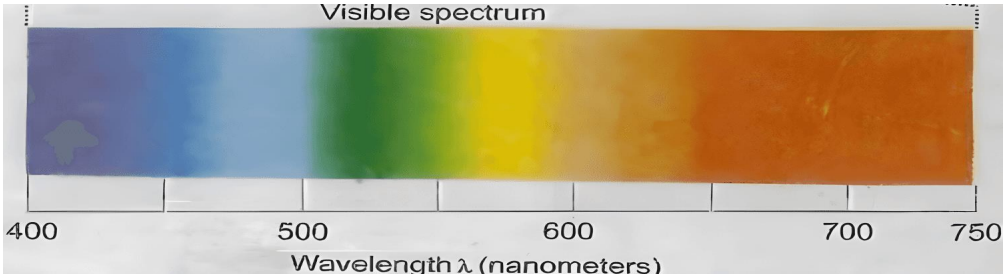
3) The extra stability of half-filled subshell is due to :

i) Symmetrical distribution of electrons
ii) Smaller coulombic repulsion energy
iii) The presence of electrons with the same spin in non-degenerate orbitals
iv) Larger exchange of energy
v) Relatively smaller shielding of electrons by one another

a) ii), iv), v) b) i), ii), iii), iv)

c) ii), iii), iv) d) i), ii), iv)

4) Which of the following statements are correct, if the threshold frequency of caesium is $5.16 \times 10^{14}$ Hz?




i) When Cs is placed inside a vacuum chamber with an ammeter connected to it and yellow light is focused on Cs , the ammeter shows the presence of current.

ii) When the brightness of the yellow light is dimmed, the value of the current in the ammeter is reduced.

iii) When a red light is used instead of the yellow light, the current produced is higher with respect to the yellow light.

iv) When a blue light is used, the ammeter shows the formation of current.

v) When a white light is used. the ammeter shows formation of current.

Choose the correct answer from the options given below:

a) ii), iii), iv) b) i), iii), iv), v)

c) i), ii), iv), v) d) i), iv), v)

5) $KMnO_4$ acts as an oxidising agent in acidic medium. ' X ' is the difference between the oxidation states of Mn in reactant and product. ' Y ' is the number of ' d ' electrons present in the brown red precipitate formed at the end of the acetate ion test with neutral ferric chloride. The value of X+Y is _____.

a) 5 b) 8

c) 10 d) 12

6) 0.1 M solution of KI reacts with excess of $H_2SO_4$ and $KIO_3$ solutions. According to equation

$KIO_3 + 5KI + 3H_2SO_4 \longrightarrow 3I_2 + 3K_2SO_4 + 3H_2O$

Identify the correct statements

a) 200 mL of KI solution reacts with 0.004 mol of $KIO_3$

b) 200 mL of KI solution reacts with 0.006 mol of $H_2SO_4$

c) 0.5 L of KI solution produced 0.005 mol of $I_2$

d) Equivalent weight of KI is equal to $(\frac{Molecular\ weight}{2})$

7) In the following system, $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ at equilibrium, upon addition of xenon gas at constant T & P, the concentration of

a) $PCl_5$ , $PCl_3$, $Cl_2$ remains constant b) $PCl_3$ will increase

c) $Cl_2$ will decrease d) $PCl_5$ will increase

8) For reaction : $SO_2 + \frac{1}{2}O_2 \rightarrow SO_3$ At 27°C and 1 atm pressure. The $K_c$ for the same reaction is_____ $10^{13}$(Nearest integer) (Given $R = 0.082$ L atm $K^{-1}$ $mol^{-1}$ )

a) 4 b) 3

c) 1 d) 2

9) Match the List I with List II.

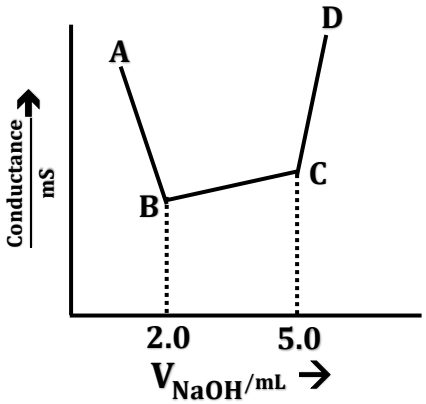
| | List – I<br>Molecule/Ion | | List – II<br>Bond Pair : lone pair (on the central atom) |
|---|---|---|---|
| A) | $ICl_2^-$ | i) | 4 : 2 |
| B) | $H_2O$ | ii) | 4 : 1 |
| C) | $SO_2$ | iii) | 2 : 3 |
| D) | $XeF_4$ | iv) | 2 : 2 |

Choose the correct answer from the options given below:

a) A) – iii), B) – iv), C) – ii), D) – i)
b) A) – ii), B) – iii), C) – i), D) – iv)
c) A) – i), B) – ii), C) – iii), D) – iv)
d) A) – iv), B) – ii), C) – iii), D) – i)

10) 40 mL of a mixture of $CH_3COOH$ and HCl (aqueous solution) is titrated against 0.1 M NaOH solution conductometrically. Which of the following statement is correct?

a) The concentration of $CH_3COOH$ in original mixture is 0.005 M
b) The concentration of HCl in original mixture is 0.005 M
c) $CH_3COOH$ is neutralized first followed by neutralization of HCl.
d) None of these

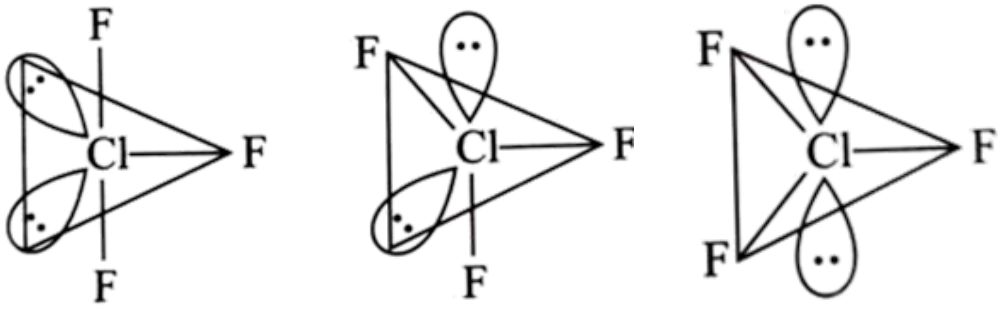



11) Total number of π* electrons present in molecular orbitals of $O_2$, $O_2^+$, and $O_2^-$ is

a) 6
b) 5
c) 10
d) 8

12) Given below are two statements:

Statement (I): For $ClF_3$, all three possible structures may be drawn as follows.




(I) (II) (III)

Statement (II): Structure III is most stable, as the orbitals having the lone pairs are axial, where the lp – bp repulsion is minimum.

In the light of the above statements, choose the most appropriate answer from the options given below:

a) Both statement I and II are correct.
b) Both statement I and II are incorrect.
c) Statement I is correct but statement II is incorrect.
d) Statement I is correct but statement II is correct

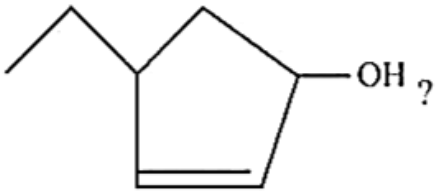
13) Match the List I with List II.

| | List – I | | List – II |
|---|---|---|---|
| A) | Carbocation | i) | Species that can supply a pair of electrons |
| B) | C-Free radical | ii) | Species that can receive a pair of electrons |
| C) | Nucleophile | iii) | $sp^2$ hybridize carbon with empty p-orbital. |
| D) | Electrophile | iv) | $sp^2/sp^3$ hybridize carbon with one unpaired electron |

Choose the correct answer from the options given below:

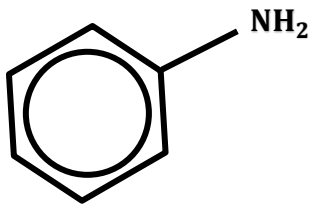
a) A) – iv), B) – ii), C) – iii), D) – i)
b) A) – ii), B) – iii), C) – i), D) – iv)
c) A) – iii), B) – iv), C) – i), D) – ii)
d) A) – iii), B) – iv), C) – ii), D) – i)

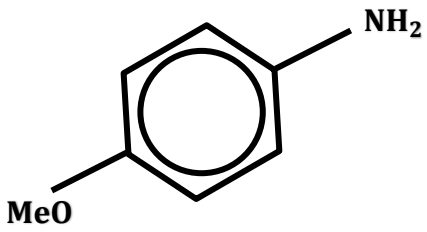
14) What is the correct IUPAC name of the compound?

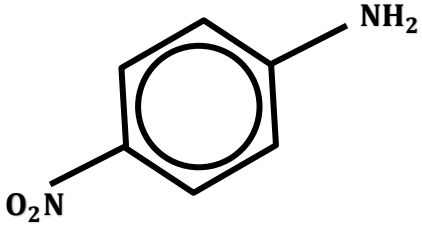



a) 4-ethylcyclopent-2-en-1-ol.
b) 3-ethylcyclopent-5-en-1-ol.
c) 5-Methylcyclopent-2-en-1-ol.
d) 3-Methylcyclopent-1-en-2-ol.

15) The descending order of basicity of the following amines is :

i) 


ii) 


iii) 


iv) $\mathbf{CH_3NH_2}$ v) $\mathbf{(CH_3)_2NH}$

a) v) > iv) > ii) > i) > iii)
b) v) > iii) > ii) > i) > iv)
c) iii) > iv) > ii) > v) > i)
d) v) > ii) > iv) > i) > iii)

16) The possible number of stereoisomers for 5-phenylpent-4-en-2-ol is

a) 6
b) 4
c) 8
d) 2

17) In Carius method for estimation of halogens, 180 mg of an organic compound produced 143.5 mg of AgCl. The percentage composition of chlorine in the compound is _____ %.

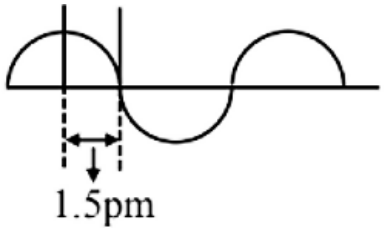
a) 35.8
b) 30.9
c) 20.0
d) 5.5

18) The number of white coloured salts, among the following is

$CuSO_4 \cdot 5H_2O$, $FeCl_3$, $MnSO_4$, $MnCl_2$, $NiSO_4$, $NiCl_2$, $K_2Cr_2O_7$, $Cr_2O_7^{2-}$, $KMnO_4$, $MnO_4^-$, $ZnSO_4$, $Al_2(SO_4)_3$, $Pb(NO_3)_2$, $Na_2CO_3$, $CaCO_3$, $Na_2SO_4$

a) 7
b) 6
c) 5
d) 4

19) What is the correct IUPAC name of the compound?

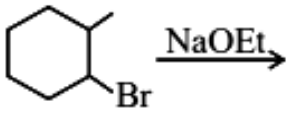


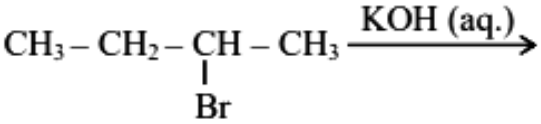

The frequency of the wave is $x \times 10^{19}$Hz. $x$ = _____ (nearest integer).

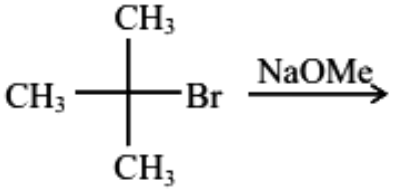
a) 5 b) 9

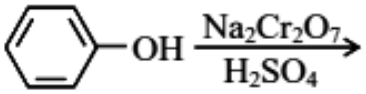
c) 6 d) 3

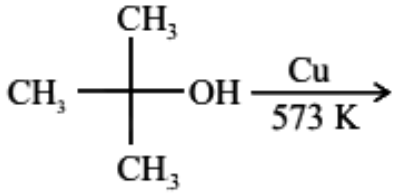
20) The reactions which cannot be applied to prepare an alkene by elimination, are

i) 


ii) 


iii) 


iv) 


v) 


a) i) and iii) b) ii) and iv)

c) i) and ii) d) iii) and iv)

21) Pure ammonia is placed in a vessel at a temperature where its dissociation constant (a) is appreciable. At equilibrium:

a) $K_p$ does not change significantly with pressure.

b) does not change with pressure

c) concentration of $NH_3$ does not change with pressure.

d) concentration of hydrogen is less than that of nitrogen.

22) An example of reversible reaction is :

a) $Pb(NO_3)_2$ aq + 2NaI(aq) ➔ $PbI_2$(s) + 2$NaNO_3$(aq)

b) $AgNO_3$(aq) + HCl(aq) ➔ AgCl(s) + $NaNO_3$(aq)

c) 2Na(s) + $H_2O$(l) ➔ 2NaOH(aq) + $H_2$(g)

d) $KNO_3$(aq) + NaCl(aq) ➔ KCl(aq) + $NaNO_3$(aq)

23) At 298 K, the value of ΔG° for a reaction is zero. Which statement is correct?

a) Reaction is at equilibrium only at 298 K

b) K = 1 at 298 K

c) ΔH° = 0 at 298 K

d) Reaction proceeds spontaneously in forward direction at 298 K

24) Which orbital interaction leads to π-bond formation between two p orbitals that are not collinear but have appropriate phase overlap?

a) End-to-end overlap b) Side-to-side overlap

c) Head-on overlap d) No overlap possible

25) Which species has the highest lattice energy (assuming similar ionic radii trend) among: LiF, LiI, NaF, KF?

a) LiF b) LiI

c) NaF d) KF

26) Consider the Born–Haber cycle for formation of MX where M is metal and X is halogen. Which step contributes most to making $\Delta H_f^\circ$ more negative?

a) Sublimation of M b) Atomization of $X_2$

c) Lattice enthalpy d) Ionization enthalpy of M

27) For the equilibrium: $N_2O_4(g) \rightleftharpoons 2\ NO_2(g)$ ($\Delta H^\circ > 0$), on increasing temperature the equilibrium constant $K_p$

a) increases b) decreases

c) remains unchanged d) becomes zero

28) Which statement about resonance in benzene is correct?

a) Resonance implies rapid flipping of double bonds

b) Resonance energy equals enthalpy of hydrogenation difference

c) Resonance structures are real, isolable forms

d) Resonance increases the bond length alternation

29) The standard electrode potential $E^\circ$ for $A^{2+} + 2e^- \rightarrow A$ is more positive than for $B^{2+} + 2e^- \rightarrow B$. Which is true about A and B metals?

a) A is a stronger reducing agent than B b) $A^{2+}$ is harder to reduce than $B^{2+}$

c) A metal is less reducing than B d) $A^{2+}$ will spontaneously oxidize B

30) In an $sp^2$ hybridized carbon, the bond angle is expected to be close to:

a) 180° b) 120°

c) 109.5° d) 90°

## SECTION – B
## MATHS

31) If A = $x \in R : x^2 - 3x + 2 \leq 0$ and B = $x \in R : x^2 - 5x + 6 \geq 0$, then A ∪ $B$ equals

a) $(-\infty, 2] \cup [3, \infty)$ b) [1,3]

c) $(-\infty, 1] \cup [2, \infty)$ d) $(-\infty, \infty)$

32) A line passes through the intersection of $x + y = 1$ and $2x - y = 3$ meets coordinate axes at A and B. The locus of midpoint of AB is

a) $x + y = 1$ b) $2x + y = 3xy$

c) $x - 4y + 6xy = 0$ d) $x^2 + 2y^2 = 9$

33) Out of 8 men and 5 women, a committee of 5 members is to be formed with at least 2 women. Then, number of ways are

a) 200 b) 400

c) 560 d) 600

34) If $f(x) = a\cos(bx + c) + d$, then what is the range of f (x)?

a) [d – a, a + d] b) [d – b, b + d]

c) [b – a, a + b] d) [d – c, b + d]

35) The system of linear equations
$\lambda x + 2y + 2z = 5$
$2\lambda x + 3y + 5z = 8$
$4x + \lambda y + 6z = 10$ has:
a) no solution when $\lambda = 2$ b) infinitely many solutions when $\lambda = 2$
c) no solution when $\lambda = 8$ d) a unique solution when $\lambda = -8$

36) Let $\alpha$ and $\beta$ are the roots of the equation $px^2 + qx - r = 0$, where $p \neq 0$. If p, q and r are the consecutive terms of the non-constant G.P. and $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{3}{4}$, then the value of $(\alpha - \beta)^2$ is
a) $\frac{80}{9}$ b) 9
c) $\frac{20}{3}$ d) 8

37) If $\alpha, \beta$ are the roots of the equation, $x^2 - x - 1 = 0$ and $S_n = 2023\alpha^n + 2024\beta^n$, then
a) $2S_{12} = S_{11} + S_{10}$ b) $S_{12} = S_{11} + S_{10}$
c) $2S_{11} = S_{12} + S_{10}$ d) $S_{11} = S_{12} + S_{10}$

38) The square of three positive integers are in arithmetic progression and the third integer is 12 more than the first. Find the least among these integers.
a) 2 b) 3
c) 4 d) 5

39) If $\alpha, \beta$ are the sum and product of all the non zeroes solutions of the equation $\bar{z}^2 + |z| = 0, z \in C$, then $4(\alpha^2 + \beta^2)$ is equal to
a) 6 b) 8
c) 2 d) 4

40) Find the domain of the function $f(x) = \sqrt{(9x - x^2)}$
a) [9,∞] b) [0,9]
c) $[-\infty, 0]$ d) [0,∞)

41) In a class of 175 students, the following data shows the number of students obtaining one or more subjects. Mathematics 100, Physics 70, Chemistry 40. Mathematics and Physics 30, Mathematics and Chemistry 28, Physics and Chemistry 23, Mathematics, Physics and Chemistry 18. How many students have offered Mathematics alone?
a) 35 b) 48
c) 60 d) 22

42) The number of values of x in the interval $[0,3\pi]$ satisfying the equation $2sin^2x + 5\sin x - 3 = 0$ is
a) 6 b) 1
c) 2 d) 4

43) The number of complex numbers z such that $|z - 1| = |z + 1| = |z - i|$ equals:
a) 0 b) 1
c) 2 d) ∞

44) A man saves Rs. 200 in each of the first three months of his service. In each of the subsequent months his saving increases by Rs. 40 more than the saving of immediately previous month. His total saving from the start of service will be Rs. 11040 after
a) 19 months b) 20 months
c) 21 months d) 18 months

45) The first two terms of a geometric progression add upto 12. The sum of the third and the fourth term is 48. If the terms of the geometric progression are alternately positive and negative, then the first term is:

a) $4$ b) $-4$

c) $-12$ d) $12$

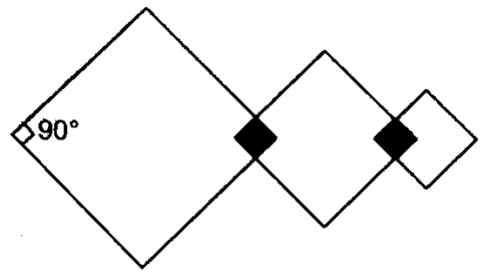
46) Starting with a unit square, a sequence of square is generated. Each square in the sequence has half the side length of its predecessor and two of its sides bisected by its predecessor's sides as shown. This process is repeated indefinitely. The total area enclosed by all the squares in limiting situation, is:

a) $\frac{5}{4} sq.unit$

b) $\frac{79}{64} sq.unit$

c) $\frac{75}{64} sq.unit$

d) $\frac{1}{12} sq.unit$




47) The tangent PT and the normal PN to the parabola $y^2 = 4ax$ at a point P on it meet its axis at points T and N, respectively. The locus of the centroid of the triangle PTN is a parabola whose:

a) Vertex is $(\frac{2a}{3}, 0)$ b) Directrix is $x = 0$

c) Latus rectum is $\frac{2a}{3}$ d) Focus is $(0, a)$

48) an ellipse has OB as semi minor axis, F and F' its foci and the angle FBF is a right angle. Then thew eccentricity of the ellipse is

a) $\frac{1}{\sqrt{3}}$ b) $\frac{1}{4}$

c) $\frac{1}{2}$ d) $\frac{1}{\sqrt{2}}$

49) $\lim_{x\to 1} \frac{|x-1|}{(x-1)}$ is equal to

a) $0$ b) $1$

c) $-1$ d) Does not exist

50) If $y = 1 + sinx + sin^2x$, then find $\frac{dy}{dx}$ at $x = 0$.

a) $1$ b) $-1$

c) $0$ d) $2$

51) Statement -I The variance of first n even natural number is $\frac{(n^2-1)}{4}$

Statement II : The sum of first n natural numbers is $\frac{n(n+1)}{2}$ and the sum of squares of first n natural numbers is $\frac{n(n+1)(2n+1)}{6}$.

a) Statement-I is true, statement-II is true; statement-II is correct explanation for statement-I

b) Statement-I is true, statement-II is true; statement-II is not a correct explanation for statement-I.

c) Statement-I is true, statement-II is false.

d) Statement-I is false, statement-II is true.

52) The plane through the intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$ and parallel to $y$-axis also passes through the point:

a) $(-3, 0, -1)$ b) $(-3, 1, 1)$

c) $(3, 3, -1)$ d) $(3, 2, 1)$

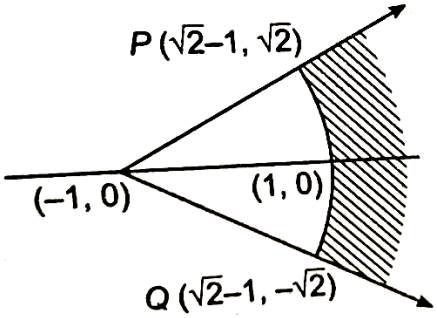
53) The locus of z which lies in shaded region is best represented by :

a) $Z : |z + 1| > 2, |\arg(z + 1)| < \frac{\pi}{4}$

b) $Z : |z - 1| > 2, |\arg(z - 1)| < \frac{\pi}{4}$

c) $Z : |z + 1| < 2, |\arg(z + 1)| < \frac{\pi}{2}$

d) $Z : |z - 1| < 2, |\arg(z - 1)| < \frac{\pi}{2}$




54) If the roots of the quadratic equation $x^2 + 6x + b = 0$ are real and distinct and they differ by at most 4, then the range of value of b is:

a) $[-3, 5]$ b) $[5, 9)$

c) $[6, 10]$ d) $[5, \infty)$

55) The range of the function $f(x) = 7 - x_{P_{x-3}}$ is:

a) $\{1, 2, 3\}$ b) $\{1, 2, 3, 4, 5, 6\}$

c) $\{1, 2, 3, 4\}$ d) $\{1, 2, 3, 4, 5\}$

56) The sum of coefficient of integral powers of x in the binomial expansion of $\left(1 - 2\sqrt{x}\right)^{20}$ is:

a) $\frac{1}{2}3^{50}$ b) $\frac{1}{2}(3^{50} - 1)$

c) $\frac{1}{2}(2^{50} + 1)$ d) $\frac{1}{2}(3^{20} + 1)$

57) Let two numbers have arithmetic mean 9 and geometric mean 4. Then these numbers are the roots of quadratic equation:

a) $x^2 + 18x + 16 = 0$ b) $x^2 - 18x + 16 = 0$

c) $x^2 + 18x - 16 = 0$ d) $x^2 - 18x - 16 = 0$

58) The mean and standard deviation of 100 observations are 40 and 5.1 , respectively. By mistake one observation is taken as 50 instead of 40 . If the correct mean and the correct standard deviation are $\mu$ and $\sigma$ respectively, then $10(\mu + \sigma)$ is equal to

a) 447 b) 445

c) 449 d) 451

59) If the mean and the variance of 6, 4, a, 8, b, 12, 10, 13 are 9 and 9.25 respectively, then $a + b + ab$ is equal to :

a) 103 b) 106

c) 100 d) 105

60) The number of sequences of ten terms, whose terms are either 0 or 1 or 2 , that contain exactly five 1 s and exactly three 2 s , is equal to :

a) 360 b) 2520

c) 1820 d) 45

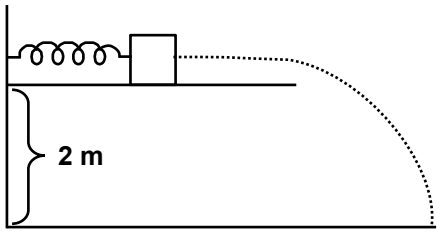
## SECTION – C
## PHYSICS

61) To one end of a string of length L, a particle of mass m is attached, whereas the other end is fixed. A nail is located at a distance d below the point of suspension. For the ball to completely swing around in a circle centered on the nail, what is the value of d in terms of length L?

a) 0.4 L
b) 0.5 L
c) 0.6 L
d) 0.7 L

62) A small block of mass 100 g is pressed against a horizontal spring fixed at one end and compression is 5 cm. The spring constant is 100 N/m. When the block moves horizontally it leaves the spring. Where will it hit the ground 2 m below the spring?

a) Horizontal distance of 1 m from end of spring.
b) Horizontal distance of 2 m from end of spring.
c) 0.5 m from free end of spring.
d) 1.5 m from free end of spring.




63) A particle moves along the $x$ - axis from $x = 0$ to $x = 5$ m under the influence of a force given by $F = (7 - 2x + 3x^2)$ N. The work done in the process is

a) 70 J
b) 270 J
c) 35 J
d) 135 J

64) A 500 kg car takes a sharp turn of radius 50 m with a velocity of 36 km/hr. The centrifugal force acting on it is

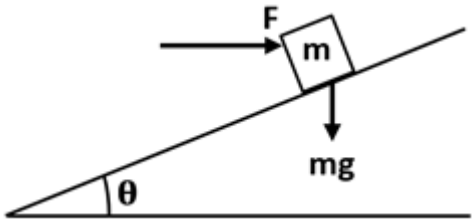
a) 1296 N
b) 1000 N
c) 6000 N
d) 500 N

65) The sum of the magnitudes of two forces acting at point is 18N and the magnitude of their resultant is 12N. If the resultant is at 90° with the force of smaller magnitude, what are the magnitudes of forces.

a) 12N, 5N
b) 14N, 4N
c) 5N, 13N
d) 10N, 8N

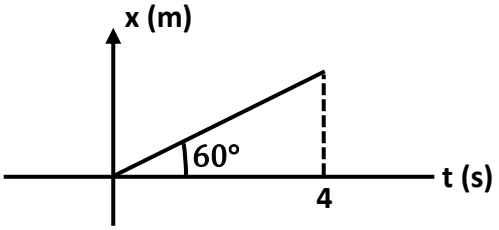
66) The forces acting on a block placed on a smooth inclined plane of angle θ is as shown. Net force acting on the block down the incline is

a) mg sinθ + F cosθ
b) mg sinθ – F cosθ
c) mg cosθ – F sinθ
d) mg cosθ + F sinθ




67) Position- time curve of a particle moving along x-axis is as shown in x-t curve. The position of particle at t = 4s will be,

a) $4\sqrt{3}$ m
b) $2\sqrt{3}$ m
c) 2 m
d) 1 m



68) A simple pendulum hangs from the roof of train. The string is inclined towards the rear of the train. What is the nature of motion of the train?

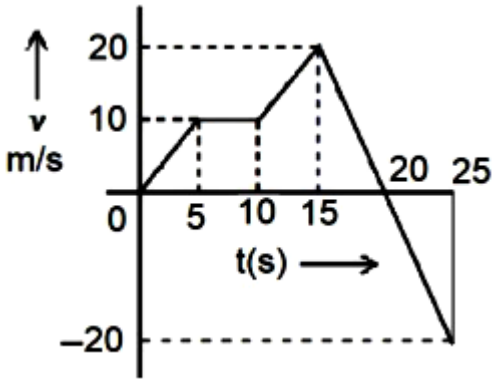
a) Uniform
b) Accelerated
c) Retarded
d) At rest

69) Two cars are travelling towards each other at speed of 20 m/s each. When the cars are 300m apart, both the drivers apply brakes and the cars retard at the rate of $2m/s^2$. The distance between them when they come to rest is

a) 25 m
b) 100 m
c) 50 m
d) 200 m

70) From the v-t graph shown, the ratio of distance to displacement in 25s of motion is:

a) 1
b) $\frac{3}{5}$
c) $\frac{1}{2}$
d) $\frac{5}{3}$




71) An object with mass 500 g moves along x-axis with speed $v= 4\sqrt{x}$ m/s. The force acting on the object is:

a) 8 N
b) 4 N
c) 5 N
d) 6 N

72) A player caught a cricket ball of mass 150g moving at a speed of 20m/s. If the catching process is completed in 0.1s, the magnitude of force exerted by the ball on the hand of the player is:

a) 150 N
b) 3 N
c) 30 N
d) 300 N

73) A body of mass 2kg is thrown up vertically with kinetic energy of 490J. If $g=9.8ms^{-2}$, the height at which the kinetic energy of the body becomes half of the original value, is

a) 50 m
b) 12.5 m
c) 25 m
d) 10 m

74) An engine develops 10 kW of power. How much time will it take to lift a mass of 200 kg to a height of 40 m. (Take g = 10 $ms^{-2}$).

a) 4 s
b) 5 s
c) 8 s
d) 10 s

75) Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will:

a) move towards each other
b) become stationary
c) keep floating at the same distance between them
d) move away from each other

76) Viscous force exerted by the liquid flowing between two plates in a streamline flow depends upon the
a) area of the plates
b) temperature of the liquid
c) pressure of the liquid
d) level of liquid surface

77) The wettability of a surface by a liquid depends primarily on:
a) Viscosity
b) Density
c) Surface tension of liquid and air
d) Angle of contact between the surface and the liquid

78) A spherical black body with a radius of 12 cm radiates 450-watt power at 500 K. If the radius were halved and the temperature is doubled, the power radiated in watt would be
a) 225
b) 450
c) 1000
d) 1800

79) A copper ball 2 cm in radius is heated in a furnace at 327°C. If its emissivity is 0.3, at what rate does it radiate energy?
a) 1.72 W
b) 2.76 W
c) 11 W
d) 2.15 W

80) The latent heat of vaporization of a substance is always
a) greater than its latent heat of fusion
b) greater than its latent heat of sublimation
c) equal to its latent heat of sublimation
d) less than its latent heat of fusion

81) A mass of diatomic gas ($\gamma = 1.4$) at a pressure of 2 atmosphere is compressed adiabatically so that its temperature rises from 27°C to 927°C. The pressure of the gas in the final state is
a) 8 atm
b) 256 atm
c) 28 atm
d) 68.7 atm

82) If there were no atmosphere, the average temperature on the surface of earth would be:
a) lower
b) higher
c) same
d) zero

83) A 3 m long wire of radius 3 mm shows an extension of 0.1 mm when loaded vertically by a mass of 50 kg in an experiment to determine Young's modulus. The value of Young's modulus of the wire as per this experiment is P x $10^{11}$ Nm, where the value of P is: (Take $g=3\pi$ m/$s^2$)
a) 2.5
b) 25
c) 10
d) 5

84) In the experiment for measurement of viscosity ' $\eta$ ' of given liquid with a ball having radius R, consider following statements.
i) Graph between terminal velocity V and R will be a parabola.
ii) The terminal velocities of different diameter balls are constant for a given liquid.
iii) Measurement of terminal velocity is dependent on the temperature.
iv) This experiment can be utilized to assess the density of a given liquid.
v) If balls are dropped with some initial speed, the value of ' $\eta$ ' will change.

Choose the correct answer from the options given below:
a) iii), iv) and v)
b) i), ii) and v)
c) i), iii) and iv)
d) ii), iv) and v)

85) **Assertion (A) :** Time period of a simple pendulum is longer at the top of a mountain than that at the base of the mountain.

**Reason (R) :** Time period of a simple pendulum decreases with increasing value of acceleration due to gravity and vice-versa.

a) Both (A) and (R)are true and (R) is the correct explanation of (A)
b) Both (A) and (R) are true and (R) is the not correct explanation of (A).
c) (A) is true but (R) is false
d) (A) is false but (R) is true.

86) A ball of mass 100 g is projected with velocity 20 m/s at 60° with horizontal. The decrease in kinetic energy of the ball during the motion from point of projection to highest point is

a) 20 J
b) 5 J
c) 15 J
d) 0

87) The angle of projection for a projectile to have same horizontal range and maximum height is:

a) $\tan^{-1}\left(\frac{1}{2}\right)$
b) $\tan^{-1}(2)$
c) $\tan^{-1}\left(\frac{1}{4}\right)$
d) $\tan^{-1}(4)$

88) The co-ordinates of a particle moving in x-y plane are given by: x=2+4t, y= $3t+8t^2$. The motion of the particle is:

a) uniform motion along a straight line.
b) non-uniformly accelerated.
c) uniformly accelerated having motion along a straight line.
d) uniformly accelerated having motion along a parabolic path.

89) Two forces having magnitude A and $\frac{A}{2}$ are perpendicular to each other. The magnitude of their resultant is:

a) $\frac{5A}{2}$
b) $\frac{\sqrt{5}A}{4}$
c) $\frac{\sqrt{5}A}{2}$
d) $\frac{\sqrt{5}A^2}{2}$

90) A vector in x-y plane makes an angle of 30° with y-axis. The magnitude of y-component of vector is $2\sqrt{3}$. The magnitude of x-component of the vector will be:

a) $\sqrt{3}$
b) 2
c) 6
d) $\frac{1}{\sqrt{3}}$