PRACTICE PAPER – XII

MATHEMATHICS

Q 1.

The distance of the point (x, y) from y-axis is

(a) x
(b) y
(c) lxl
(d) lyl

Q 2.

The straight line 3x + y = 9 divides the segment joining the points (1, 3) and (2, 7) in the ratio.

(a) 4 : 2
(b) 3 : 4
(c) 4 : 5
(d) 5 : 6

Q 3.

If the angles of triangle ABC are in A.P., then

(a) $c^2 = a^2 + b^2 + ab$
(b) $a^2 + c^2 – ac = b^2$
(c) c2 = a2 + b2
(d) none of these

Q 4.

The area of triangle is 80 cm^2 and its perimeter is 8 cm. The radius of its inscribed circle is

(a) 10 cm
(b) 20 cm
(c) 5 cm
(d) none of these

Q 5.

The straight line 3x + 4y = 20 and the circle $x^2 + y^2 = 16$

(a) touch each other
(b) intersect in the two distinct points
(c) neither touch nor intersect in two points
(d) none of these

Q 6.

Slope of a line is not defined if the line is

(a) parallel to x-axis
(b) parallel to the line x – y = 0
(c) parallel to the line x + y = 0
(d) parallel to y-axis

Q 7.

The number of values of θ which lie between 0 and 2π and satisfy the equation $\sin^4 - 2\sin^2\theta - 1 = 0$ is

(a) 1
(b) 2
(c) 3
(d) none of these

Q 8.

If $\cos(2\sin^{-1}x) = 1/9$, then x =

(a) 2/3
(b) -2/3
(c) $\pm 2/3$
(d) none of these

Q 9.

The image of the point (α, β) is the line x + y = 0 is

(a) $(-\alpha, \beta)$
(b) (β, α)
(c) $(-\beta,-\alpha)$
(d) none of these

Q 10.

$\tan^{-1} 1/7 + 2\tan^{-1} 1/3 =$

(a) $3\pi/4$
(b) $\pi/4$
(c) $\pi/2$
(d) none of these

Q 11.

If a = 4, b = 3 and A = 60°, then c is a root of the equation

(a) $x^2 - 3x - 7 = 0$
(b) $x^2 + 3x + 7 = 0$
(c) $x^2 - 3x + 7 = 0$
(d) $x^2 + 3x - 7 = 0$

Q 12.

The vertex od the parabola $y^2 = 4a(x + a)$ is

(a) (0, 0)
(b) (-a, 0)
(c) (a, 0)
(d) (0, a)

Q 13.

Slope of any line parallel to x-axis is

(a) 1
(b) -1
(c) 0
(d) not defined

Q 14.

$bc\cos^2 A/2 + ca\cos^2 B/2 + ab\cos^2$, is equal to

(a) $(s - a)^2$
(b) $(s - b)^2$
(c) $(s - c)^2$
(d) s^2

Q 15.

If in a Δ ABC, a cosA = bhcos B, then the triangle is a/an

(a) equilibrium
(b) right angled
(c) isosceles
(d) either isosceles or right angle

Q 16.

The period of function f(x) $= \sin^2 + \tan x$ is

(a) π
(b) 2π
(c) 3π
(d) none of these

Q 17.

if x = {49 (n – 1) : n ϵ N} and y = {2^{3n} – 7n - : n ϵ N}, then

(a) x =y
(b) x⊂ y
(c) y⊂ x
(d) none of these

Q 18.

If P = {$n^3 + (n + 1)^3 + (n + 2)^3$: n ϵ N}, and Q = {9N : n ϵ N}, then

(a) P = Q
(b) P C Q
(c) Q C P
(d) none of these

Q 19.

If [$\log_4$ [$\log_2$ (x)}] = 1, then the value of x is

(a) 23
(b) 43
(c) 2 × 3 × 4
(d) none of these

Q 20.

Derivative of cos (sin x) with respect to sin x is

(a) – sin (sin x) cos x
(b) –sin (sin x)
(c) –sin(sin x)/cos x
(d) none of these

Q 21.

If x sin (a + y) = sin y, then dy/dx is equal to

(a) $\sin^2 (a + y) / \sin a$
(b) $\sin a / \sin^2 (a + y)$
(c) $\sin (a + y) / \sin a$
(d) $\sin a / \sin (a + y)$

Q 22.

The range of the function f(x) = cos [x], where $-\pi/2 < x < \pi/2$, is

(a) {-1, 1, 0}
(b) {cos 1, 1 ,cos 2)
(c) {cos 1, - cos 1, 1}
(d) none of these

Q 23.

The domain of the function f (x) = 1/[x] + √(2 – x) x is

(a) [0, 2]
(b) [0, 1]
(c) [1, 2]
(d) [1, 2]

Q 24.

Let $f(x) = x^3$, then f(x) has a

(e) local maxima at x = 0
(f) local minima at x = 0
(g) point of inflexion at x = 0
(h) none of these

Q 25.

$$\lim_{x \to \frac{\pi}{4}} \frac{\sec - \sqrt{2}}{x - \frac{\pi}{4}}$$

(a) √2
(b) - √2
(c) 0
(d) None of these

Q 26.

If I = $\int_1^2 \frac{dx}{\sqrt{1+x}}$ and J = $\int_1^2 \frac{dx}{x}$, then

(a) I > J
(b) I < J
(c) I = J
(d) None of these

Q 27.

$\int \frac{\sec x \, cosec \, x}{\log \tan x} \, dx$ =

(a) log (tan x)
(b) tan (log x)
(c) tan {log(log x) }
(d) logllog (tan x) I

Q 28.

If f(x) = 1/3x + 1 , then f' (0) is equal to

(a) Vanishes
(b) is positive
(c) is negative
(d) does not exist

Q 29.

If y = $\sin^{-1}$ x and z = $\cos^{-1}$ $\sqrt{1 - x^2}$, then dy/dx is equal to

(a) $\cos^{-1}$ x
(b) $1/\sqrt{1 - x^2}$
(c) $\sqrt{1 - x^2}$
(d) 1

Q 30.

$\int_{-\pi}^{\pi}$(cos px – sin q x)^2 dx is equal to

(a) 0
(b) $\frac{\pi}{2}$
(c) π
(d) 2π

Q 31.

$\int\left(e^{a\log x}+\ e^{x\log a}\right)$ dx is equal to

(a) $\frac{x}{a+1}^{a+1}+\frac{a^x}{\log a}$

(b) $\frac{1}{a}e^{alogx}+\frac{1}{\log a}e^{xloga}$

(c) $\frac{x^a}{\log a}+\frac{a^x}{\log X}$

(d) None of these

Q 32.

The number of vectors of unit length perpendicular to vectors $\vec{u} = \vec{\imath} + \vec{j}$ and $\vec{v} = \hat{\jmath} + \hat{k}$ is

(a) One

(b) Three

(c) Two

(d) Infinite

Q 33.

Let $\vec{r} = 2\hat{\imath} + 2\hat{\jmath} + 5\hat{k}$ and A, B be the points (1, 2, 5) and (- 1, -2, -3) respectively. If B$\vec{A}$ x $\vec{r} = 4\vec{\imath} + 6\ \vec{j}$ 2 $\lambda\hat{k}$, then $\lambda =$

(a) 0

(b) 1

(c) 2

(d) -2

Q 34.

$\int\frac{1}{a+x^{1/3}}\,dx =$

(a) $\left(\frac{X^{2/3}}{2}+\ x^{1/3}+\log(1+x^{1/3})\ \right)$

(b) $\left(\frac{X^{2/3}}{2}-\ x^{1/3}+\log(1+x^{1/3})\right)$

(c) $\left(\frac{X^{2/3}}{2}-\ x^{1/3}-\log(1+x^{1/3})\right)$

(d) *none of these*

Q 35.

The area $\{(x,y) : x^2 \leq y \leq \sqrt{x}\}$ is equal to

(a) 1/6
(b) 1/3
(c) 2/3
(d) none of these

Q 36.

If $\vec{A} = \hat{\imath} + 2\hat{\jmath}\ 3\hat{k}$, $\vec{B} = -\hat{\imath} + 2\hat{\jmath}\ +\hat{k}$ C $= 3\hat{\imath} + \hat{\jmath}$, then t s.t. $\vec{A} + t\vec{B}$ is at right angle to $\vec{C}$, will be equat to

(a) 5
(b) 4
(c) 6
(d) 2

Q 37.

Area of the parallelogram whose adjacent sides are $\vec{a}$ and $\vec{b}$ is

(a) $\vec{a}.\vec{b}$
(b) $\vec{a}$ x $\vec{b}$
(c) $|\vec{a}\ \vec{b}|$
(d) $\frac{1}{2}|\vec{a}$ x $\vec{b}|$

Q 38.

$\int(1-\cos x)$ cosec^2 x dx is equal to

(a) Tan $\frac{x}{2}$ + c
(b) Cot $\frac{x}{2}$ + c
(c) $\frac{1}{2}$ tan $\frac{x}{2}$ + c
(d) 2 tan $\frac{x}{2}$ + c

Q 39.

$(3\ \vec{a}$ x $2\vec{b}).\ \vec{c} + (3\vec{b}$ x $2\vec{c})\ .\ \vec{a} + (4\ \vec{c}$ x $3\vec{b}).\ \vec{a}$ is equal to

(a) 0
(b) 24 $[\vec{a}\ \vec{b}\ \vec{c}]$
(c) 24 $[\vec{b}\ \vec{a}\ \ \vec{c}]$
(d) None of these

Q 40.

$\vec{a}$ x ($\vec{b}$ x $\vec{c}$) is equal to

(a) $(\vec{a}.\vec{b})\ \vec{c} - (\vec{a}.\vec{c})\ \vec{b}$
(b) $(\vec{a}.\vec{b})\ \vec{b} - (\vec{a}.\vec{b})\ \vec{c}$
(c) $(\vec{b}.\vec{c})\vec{a} - (\vec{b}\ .\vec{a})$
(d) None of these

Q 41.

If x, y ϵR, xy rational, y irrational and x rational, then

(a) x> 0
(b) x< 0
(c) x = o
(d) $x \neq 0$

Q 42.

If α and β are two distinct complex numbers such that $|\alpha| = |\beta|$ and $Re(\alpha) > 0$, $lm(\beta) < 0$, then $\alpha + \beta/\alpha - \beta$ may be

(a) zero
(b) purely imaginary
(c) real and positive
(d) real and negative

Q 43.

If a > 0, then the equation $ax^2 + 1 = 0$ has

(a) real roots
(b) rational roots
(c) irrational roots
(d) non-real roots

Q 44.

The roots of the equation $x^2 - \cos\theta + 1 = 0$ are

(a) real for all θ
(b) real when $\theta = n\theta$, n ϵ
(c) none-real for all θ
(d) real when $\theta = (2n + 1)\pi/2$, n ϵ l

Q 45.

The number $(1 + i)^n/(1 – i)^n$ -2 is equal is

(a) 4 in-2
(b) $2\ i^{n-4}$
(c) $2\ i^{n-1}$
(d) none of these

PHYSICS

Q 46.

Magnetic field is measured in

(a) weber
(b) hennery
(c) weber$(metre)^2$
(d) weber/$(metre)^2$

Q 47.

the dimensions of Planck's constant are

(a) $[ML^2T^{-1}]$
(b) $[ML^3T^{-1}]$
(c) $[ML^{-2}T^{-1}]$
(d) $M°L^{-1}T^{-3}]$

Q 48.

The speed of boat is 5 km/hr in still water. It crosses a river of width 1 km along the shortest possible path in 15 minutes. Then velocity of river is

(a) 4 km/hr
(b) 3 km/hr
(c) 2 km/hr
(d) 1 km/hr

Q 49.

A bullet is dropped from the same height when another bullet is fired horizontally. They will hit the ground

(a) simultaneously
(b) one after the other
(c) depends on the observer
(d) depends upon mass of bullet

Q 50.

the displacement of a particle moving in a straight line depends on time (t) as: $x = \alpha t^3 + \beta t^2 + \gamma t + \delta$.

The ratio of its initial acceleration to its initial velocity depends

(a) Only on α
(b) Only on α and β
(c) Only on β and γ
(d) Only on a and γ

Q 51.

If a cyclist moving with a speed of 4.9 m/s on a level road can take a sharp circular turn of radius 4 m, then coefficient of friction between the cycle tyres and road is

(a) 0.41
(b) 0.51
(c) 0.61
(d) 0.71

Q 52.

a body of mass 5 kg is moving in a circle of radius 1 m with an angular velocity of 2 radian/sec. The centripetal force acting on the body is

(a) 10 N
(b) 20 N
(c) 30 N
(d) 40 N

Q 53.

A bullet of mass 25 g moving with a velocity of 200 m/s is stopped within 5 cm of the target. The average resistance offered by the target is

(a) 10 kN
(b) b) 20 kN
(c) c) 30 kN
(d) 40 kN

Q 54.

A machine delivering power movers a body along a straight line. The distance moved by the body in time is proportional to

a) t
b) $\sqrt{t}$
c) $t^{3/2}$
d) $t^{3/4}$

Q 55.

If the radius of earth is reduced by 1% without changing the mass, then change in the acceleration due to gravity will be

(a) 1% decrease
(b) 1% increase
(c) 2% increase
(d) 2% decrease

Q 56.

If the spinning speed of earth is increased, then weight of the body at the equator

(a) increases
(b) decreases
(c) doubles
(d) does not change

Q 57.

The ratio of energy required to raise a satellite to a height 'h' above the earth's surface to that required to put it into the orbit is

(a) h: R
(b) R : h
(c) 2h: R
(d) h: 2R

Q 58.

A circular disc is rotating with angular velocity ω. If a man standing at the edge of the disc walks towards its centre, then angular velocity of the disc will

(a) decrease
(b) increase
(c) be halved
(d) not change

Q 59.

For a gas, if the ratio of specific heats at constant pressure and volume is γ, then the value of degree of freedom is

(a) $2/\gamma - 1$
(b) $1/2(\gamma - 1)$
(c) $\gamma - 1/\gamma + 1$
(d) $\gamma + 1/\gamma - 1$

Q 60.

A lift is ascending with an acceleration equal to g/3. What will be the time-period of a simple pendulum suspended from its ceiling if its time-period in stationary lift is T?

(a) T/2
(b) $(\sqrt{3}/2)$ T
(c) $(\sqrt{3}/4)$ T
(d) T/4

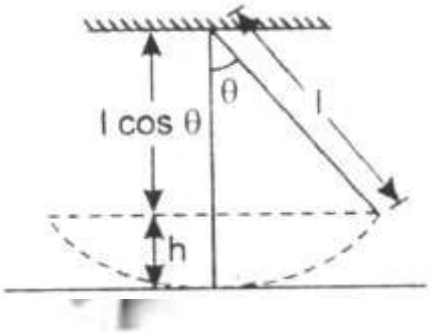
Q 61.

If the equation of a sound wave is given as: y = 0.0015 sin (62. × + 316 t), then wavelength of this wave is

(a) 0.4 unit
(b) 0.3 unit
(c) 0.2 unit
(d) 0.1 unit

Q 62.

A simple pendulum of length 'I' has a maximum angular displacement θ. The maximum kinetic energy of the bob of mass m is.



(a) mgl
(b) 0.5 mgl
(c) mgl sin θ
(d) mgl (1 – cos θ)

Q 63.

A standing wave is represented by: $y = a \sin(100\, t).\ \cos(0.01\, x)$; where t in seconds and x in metres. The velocity of wave is

(a) 10^4 m/s
(b) 1 m/s
(c) 10^{-4} m/s
(d) 10^{-2} m/s

Q 64.

The amplitude of the vibrating particle due to superposition of two simple harmonic motions of $y_1 = \sin(\omega t + \pi/3)$ and $y_2 = \sin(\omega t)$ is

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

Q 65.

In a sinusoidal wave, the time required for a particular point to move from maximum displacement is 0.17 sec. The frequency of the wave is

(a) 0.36 Hz
(b) 0.73 hz
(c) 1.47 Hz
(d) 2.94 Hz

Q 66.

When a current flows in a wire, there exists an electric field in the direction of

(a) flow of current
(b) opposite to the flow of current
(c) perpendicular to the flow of current
(d) at an angle of 45° to the flow of current

Q 67.

Two identical mercury drops, each of radius r are charged to the same potential V. if the mercury drops coalesce to form a big drop of radius R, then potential of the combined drop will be

(a) $(b)^{3/2}$
(b) $(b)^{2/3}$
(c) $(c)^{2/3}$
(d) $(c)^{1/2}$

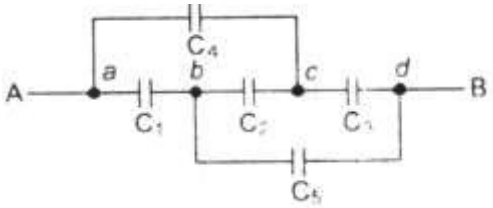
Q 68.

The energy stored in a capacitor is actually stored

(a) between the plates
(b) on the positive plate
(c) on the negative plate
(d) on the outer surfaces of the plates

Q 69.

In the given figure, the capacitors C_1, C_3, C_4, C_5 have a capacitance of 4 μF each. If the capacitor C_2 has a capacitance between A and B is



(a) 2 μF
(b) 4 μF
(c) 6 μF
(d) 8 μF

Q 70.

A 100 W, 200 V bulb is connected to a 160 volts supply. The actual power consumption would be

(a) 64 W
(b) 80 W
(c) 100 W
(d) 125 W

Q 71.

To convert a galvanometer in a voltmeter. We must connect a

(a) low resistance in series
(b) high resistance in series
(c) low resistance in parallel
(d) high resistance in parallel

Q 72.

A galvanometer of 100 Ω resistance gives full scale deflection with 0.01 A current. How much resistance should be connected to convert it into an ammeter of range 10 A ?

(a) 0.2 Ω in series
(b) 0.2 Ω in parallel
(c) 0.1 Ω in series
(d) 0.1 Ω in parallel

Q 73.

The potential difference between two electrodes of a galvanic cell, in an open circuit, is known as

(a) current
(b) impedence
(c) potential difference
(d) electromotive force

Q 74.

The magnetic field B_0 due to a current carrying circular loop of radius 12 cm at its centre is 0.50×10^{-4} T, The magnetic field due to this loop at a point on the axis at a distance of 5 cm from the centre is

(a) 3.5×10^{-9} T
(b) 5.3×10^{-9} T
(c) 9.3×10^{-5} T
(d) 3.9×10^{-5} T

Q 75.

An e.m.f. of 15 volt is applied in a circuit containing 5H inductance and 10Ω resistance. The ratio of currents at $t = \infty$ and at $t = 1$ sec is

(a) e^{-1}
(b) $1 - e$
(c) $e^{1/2}/e^{1/2} - 1$
(d) $e^2/e^2 - 1$

Q 76.

Two magnets of magnetic moments M and 2M are placed in a vibration magnetometer, with identical poles in the same direction. The time-period of vibration of the combination is T_1. If the same magnets are placed with opposite poles together and vibrate with timeperiod T_2, then

(a) $T_2 = T_1$
(b) $T_2 > T_1$
(c) $T_2 < T_1$
(d) T_2 is infinite

Q 77.

Which of the following waves have the maximum wavelength ?

(a) X-rays
(b) radio waves
(c) UV rays
(d) IR rays

Q 78.

At what angle, a ray of light will be incident on one face of an equilateral prism, so that the emergent ray may graze the second surface of the ($\mu = 1.5$).

(a) 18°
(b) 28°
(c) 32°
(d) 38°

Q 79.

A paper, with two marks having separation d, is held normal to the line of right of an observer at distance of 50 cm. The diameter of the, eyes-lens of the observer is 2 mm. Which of the following is the least value of d, so that the marks can be seen as separate? (mean wavelength of visible light may be taken 5000 A)

(a) 0.125 cm
(b) 1.225 cm
(c) 1.525 cm
(d) 2.125 cm

Q 80.

How many images will be formed if two mirrors are fitted on adjacent wall and one mirror on roof?

(a) 2
(b) 5
(c) 7
(d) 10

Q 81.

An optician prescribes spectacles to a patient with a combination of a convex lens of focal length 40 cm and concave lens 25 cm. The power of spectacles is

(a) – 1.5 D
(b) – 6.5 D
(c) 1.5 D
(d) 6.5 D

Q 82.

The velocity of an electron in the inner-most orbit of an atom is

(a) zero
(b) mean
(c) lowest
(d) highest

Q 83.

The hydrogen atom can give spectral lines in the Lyman, Balmer and Paschen series. Which of the following statement is correct ?

(a) Paschen series is in visible region
(b) balmer series is in visible region
(c) lyman series is in infra-red region
(d) Balmer series is in ultra violet-region

Q 84.

A sample of a radioactive substance contains 2828 atoms. If its half-life is 2 days, how many atoms will be left intact in the sample after one day ?

(a) 1414
(b) 707
(c) 2000
(d) 1000

Q 85.

In a nuclear reactor, the fast moving neutrons are slowered down by passing them through

(a) oil
(b) vacuum
(c) heavy water
(d) kerosene

CHEMISTRY

Q 86.

The unit of rate constant for the first order reaction is

(a) sec^{-1}
(b) $mol.\ Ltr^{-1}$
(c) $mol^{-1}.\ ltr.\ Sec^{-1}$
(d) all of these

Q 87.

the charge of an electron is -1.6×10^{-19} C. The value of free charge on Li^{+} ion will be

(a) 3.6×10^{-19} C
(b) 2.6×10^{-19} C
(c) 1.6×10^{-19} C
(d) 1×10^{-19} C

Q 88.

The maximum valency of an element with atomic number 7 is

(a) 2
(b) 3
(c) 4
(d) 5

Q 89.

How many grams of $CaCO_3$ will give 56 g of CaO ?

(a) 120 g
(b) 112 g
(c) 100 g
(d) 56 g

Q 90.

Which of the following has the same mass as that of an electron ?

(a) photon
(b) proton
(c) positron
(d) neutron

Q 91.

What is the value of carbonate hardness of water sample if 100 ml of it took 5 ml of 0.09 N HCI solution? (Molecular weight of Na_2CO_3 = 106)

(a) 4.50 mg-eq/ltr.
(b) 477.00 mg-eq/ltr.
(c) 0.042 mg-eq/ltr.
(d) 1.80 mg-eq/ltr.

Q 92.

The shape of IF_7 molecule is

(a) octahedral
(b) tetrahedral
(c) trigonalbipyramidal
(d) pentagonalbipyramidal

Q 93.

If the rate of diffusion of CH_4 is twice of that of a gas X, then what is the molecular mass of the gas X ?

(a) 32
(b) 64
(c) 80
(d) 96

Q 94.

The extraction of IA and IIA group metals is done by

(a) carbon reduction
(b) electrolytic reduction
(c) metal displacement
(d) alumino, thermic process

Q 95.

The element having atomic number 56 belongs to

(a) actinides
(b) lanthanides
(c) transition series
(d) alkaline earth metals

Q 96.

For l = 3, the corresponding values of magnetic quantum numbers would be

(a) – 1, -2, -3
(b) o, +1, + 2, + 3
(c) ± 1, ± 2, ± 3
(d) o, ± 1, ± 2, ± 3

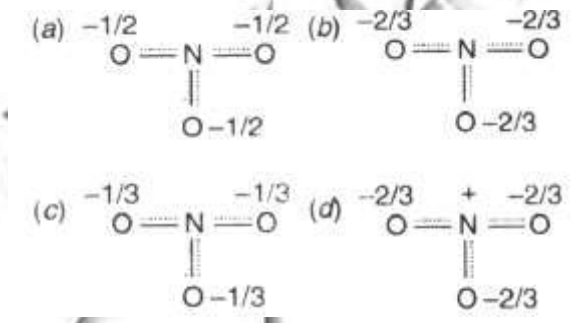
Q 97.

Which of the following is an alicyclic compound?

(a) benzene
(b) hexane
(c) cyclohexane
(d) furon

Q 98.

The resonance bybrid of nitrate ion is



Q 99.

The homologue of ethylene is

(a) C_2H_2
(b) C_3H_6
(c) C_3H_8
(d) C_3H_4

Q 100.

The maximum number of hydrogen bonds formed by a water molecule in ice is

(a) 4
(b) 3
(c) 2
(d) 1

Q 101. Which of the following shows electrical conduction?

(a) Sodium
(b) graphite
(c) diamond
(d) potassium

Q 102.

The rate of a chemical reaction depends upon

(a) time
(b) pressure
(c) concentration
(d) all of these

Q 103.

The interatomic distances in H_2 and Cl_2 molecules are 74 and 198 pm respectively The bond length of HCI is

(a) 124 pm
(b) 136 pm
(c) 272 pm
(d) 248 pm

Q 104.

The electronic configuration of Mn^{2+} ion in its ground state is

(a) $3d^5 4s^\circ$
(b) $3d^4 s^1$
(c) $3d^3 4s^2$
(d) $3d^2 4s^2 4p^2$

Q 105.

The shape of ethylene molecule is

(a) square planar
(b) tetrahedral
(c) pyramidal
(d) linear

Q 106.

An isomer of ethanol is

(a) ethanol
(b) methanol
(c) diethyl ether
(d) dim ethyl ether

Q 107.

The hybridization of carbons of C—C single bond of $HC{=}C{-}CH = CH_2$ is

(a) $sp^3 - sp^3$
(b) $sp^2 - sp^3$
(c) $sp^3 - sp$
(d) $sp - sp^2$

Q 108.

The positive charge of an atom is

(a) spread all over the atom
(b) distributed around the nucleus
(c) concentrated at the nucleus
(d) all of these

Q 109.

During the electrolysis of an electrolyte, the number of ions produced, is directly proportional to the

(a) time consumed
(b) mass of electrons
(c) quantity of electricity passed
(d) electro chemical equivalent of electrolyte

Q 110.

In graphite, carbon atoms are joined together due to

(a) ionic bonding
(b) covalent bonding
(c) metallic bonding
(d) Van der waal's forces

Q 111.

Carborundum is

(a) SiC
(b) $AICI_3$
(c) $AI_2 (SO_4)_3$
(d) $AI_2 O_3 . 2H_2O$

Q 112.

Which of the following is called laughing gas ?

(a) nitric oxide
(b) nitrous oxide
(c) dinitrogen trioxide
(d) dinitrogenpentoxide

Q 113.

ZnO when heated with BaO at 1100°C gives a compound. Identify the compound

(a) $BaZno_2$
(b) $Ba + ZnO_2$
(c) $BaCdO_2$
(d) $BaO_2 + Zn$

Q 114.

For a cell, the cell reaction is

$Mg_{(s)} + Cu^{2+}_{(aq)} \rightarrow Cu_{(s)} + Mg^{2+}_{(aq)}$.

If standard reduction potentials of Mg and Cu are – 2.37 V and + 0.34 V, then e.m.f. of the cell of

(a) 2.03 V
(b) – 2.03 V
(c) 2.71 V
(d) – 2.71 V

Q 115.

In the metallurgy of zinc, the zinc dust obtained from roasting contains some zinc oxide. How is this removed ?

(a) smelting is employed
(b) X-ray method is used
(c) absorbance of UV light
(d) shock coding with a shower of lead

Q 116.

Excess of ethanol when heated with concentrated H_2SO_4 at 140°C, the compound obtained is

(a) Ethane
(b) Diethyl sulphate
(c) Ethoxy ethane
(d) Ethyl hydrogrensulphate

Q 117.

when metallic copper comes in contact with moisture, a green powdery/pasty coating can be seen over it. This is chemically known as

(a) Copper sulphide – Copper carbonate
(b) Copper sulphate – Copper sulphide
(c) Copper carbonate – Copper sulphate
(d) Copper carbonate – Copper sulphate

Q 118.

Which of the following is the most stable carbonium ion among the following?

(a) $C_6H_5CH_2$
(b) CH_3CH_2
(c) C_6H_5-CH_2CH_2
(d) C_6H_5 CH –C_6H_5

Q 119.

If Na is heated in presence of air, it forms

(a) Na_2CO_3
(b) Na_2O_2
(c) Na_2O
(d) both (b) and (c)

Q 120.

The indicator used in the titration of iodine against sodium thiosulphate is

(a) starch
(b) potassium
(c) K_2CrO_4
(d) $K_3Fe(CN)_6$

Q 123.

The reaction of an aldehyde with hydroxylamine gives a product which is called

(a) aldoxime
(b) hydrazine
(c) semicarbzone
(d) aminohydroxide

Q 124.

According to the nuclear reaction:

$_4Be + _2He^4 \rightarrow _6 C^{12} + _0n^1$, mass no. of (Be) atom is

(a) 4
(b) 6
(c) 7
(d) 9

Q 125. The bad smelling substance, formed by the action of alcoholic caustic potash on chloroform and aniline, is

(a) nitrobenzene
(b) phenyl cyanide
(c) phenylisocyanide
(d) phenylisocyanate

LOGICAL REASONING

Direction (Q. 126 – 127). Choose the correct relation.

Q 126.

pigeon: peace ::

(a) crown: head
(b) war: liberty
(c) laurels: victory
(d) white flag: surrender

Q 127.

tall: dwarf :: genius:

(a) shot
(b) long
(c) idiot
(d) intelligence

Direction (Q. 128 – 129). Solve the following problems.

Q 128.

The number which will come next in the series 2,6,12,20,……., is

(a) 30
(b) 32
(c) 38
(d) 40

Q 129.

0,……., 8,27,64,125

(a) 1
(b) 2
(c) 3
(d) 4

Q 130.

Which one set of letters when sequentially placed in the gaps of the given letter series shall complete it?
bab_b_b_ _abb

(a) abba
(b) bbba
(c) abab
(d) babb

Q 131.

From the given alternatives, the word which cannot be formed from the letters used in the word SUPERIMPOSABLE is

(a) POSSIBLE
(b) REPOSURE
(c) SPIRE
(d) REPTILE

Q 132.

If the code of STEADY is 931785 and that of ENTRY is 12345, then what will be the code of SEDATE?

(a) 814195
(b) 954185
(c) 614781
(d) 918731

Q 133.

$\sqrt{4/3} - \sqrt{3/4} =$

(a) 0
(b) 1
(c) $1/2\sqrt{3}$
(d) $5\sqrt{3}/7$

Q 134.

If $5 + 2\sqrt{3}/7 + 4\sqrt{3} = a + b\sqrt{3}$, then the values of a and b are

(a) a = 11, b = 11
(b) a = 11, b = 6
(c) a = 11, b = - 6
(d) a = -11, b = - 6

Q 135.

If the sum of three consecutive odd numbers is 57, then the middle number is

(a) 17
(b) 19
(c) 21
(d) 23

ENGLISH

Directions (Q. 136 – 138). Choose the correct word to complete the sentences from the given choices.

Q 136.

There is no rose……..has a thorn.

(a) which
(b) but
(c) whom
(d) as

Q 137

. ……are your pencils.

(a) this
(b) their
(c) those
(d) that

Q 138

. ……is doubtful whether he will come.

(a) it
(b) that
(c) their
(d) its

Directions (Q. 139 – 141). In each of the following questions, out of the given alternatives, choose the synonym of the given word.

Q 139.

Economic

(a) save
(b) reduce
(c) minimize
(d) accumulate

Q 140.

Ascend

(a) leap
(b) grow
(c) deviate
(d) mount

Q 141.

Stupid

(a) silly
(b) insane
(c) disobedient
(d) incapable

Directions (Q. 142 – 144). In each of the following questions, out of the given alternatives, choose the antonym of the given word.

Q 142.

Accuracy

(a) faulty
(b) true
(c) correct
(d) right

Q 143.

Amnesty

(a) reward
(b) gift
(c) crowd
(d) punishment

Q 144.

Density

(a) thinness
(b) thickness
(c) toughness
(d) kindness

Directions (Q. 145 -147). In each of the following questions, fill in the blanks with the correct word from the given options.

Q 145.

He……..to office daily.

(a) go
(b) goes
(c) went
(d) going

Q 146.

Distribute these sweets……the poor students of this school.

(a) between
(b) among
(c) by
(d) from

Q 147.

Although he is lame……he can walk fast.

(a) but
(b) as
(c) yet
(d) still

Directions (Q. 148 – 150). Read the following passage carefully and answer the questions given below it.

Though the US prides itself on being a leader in the world community, a recent report shows that it lags far behind other industrialised countries in meeting the needs of its youngest and most vulnerable citizens. The US has a higher infant mortality rate, a higher proportion of low birth weight babies, a smaller proportion of babies immunised against childhood diseases and a much higher rate of adolescent pregnancies. These findings, described as a 'quiet crisis' requiring immediate and far-reaching action, appeared in a report prepared by a task force of educators, doctors, politicians and business people. According to the report, a fourth of the nation's 12 million infants and toddlers live in poverty. As many as half confront risk factors that could harm their ability to develop intellectually, physically and socially. Child imunisations are too low, more children are born into poverty, more are in substandard care while their parents work and more are being raised by single parents. When taken together, these and other risk factors can lead to educational and health problems that are much harder and more costly to reverse.

The crisis begins in the womb with unplanned parent-hood. Women with unplanned pregnancies 80% of teenage pregnancies and 56% of all pregnancies are unplanned. The problems continue after birth where unplanned pregnancies and unstable partnerships often go hand in hand. Since 1950, the number of single parent families has nearly tripled. More than 25 per cent of all births today are to unmarried mothers. As the number of single-parent families grows and more women enter the work force, infants and toddlers are increasingly in the care of people other than their parents. More disturbingly, recent statistics show that American parents are increasingly neglecting or abusing their children. In only four years from 1987-1991, the number of children in foster care increased by over 50 per cent. Babies under the age of one are the fastest growing category of children entering foster care. The crisis affects children under the age of three most severely, the report says. Yes, it is this period-from infancy through pre-school years – that sets the stage for a child's future.

Q 148.

The number of children born to married mothers in the US is approximately how many times the number of children born to unwed mothers.?

(a) 3.5 times
(b) 3 times
(c) 2 times
(d) 1.5 times

Q 149.

Children born out of unplanned pregnancies are highly vulnerable because

(a) their parents are mostly poor
(b) they are raised by single parents
(c) they are mostly mainourished
(d) they are less likely to receive pre-nantal care

Q 150.

Read the following factors A, B and C and decide which one or two of them is/are responsible for the physical, intellectual and social under-development of infants in the US?

A. Illiteracy of parents

B. lack of parental care

C. Poverty

(a) only A
(b) only B
(c) only C
(d) both B and C

PRACTICE PAPER – XII

ANSWERS KEY

MATHEMATICS

1. C
2. B
3. B
4. B
5. A
6. D
7. D
8. C
9. C
10. B
11. A
12. B
13. C
14. D
15. D
16. A
17. C
18. B
19. A
20. B
21. A
22. B
23. D
24. C
25. A
26. B
27. D
28. C
29. D
30. D
31. A
32. C
33. D
34. B
35. B
36. A
37. C
38. A

39. A
40. B
41. C
42. B
43. D
44. C
45. C

PHYSICS

46. D
47. A
48. B
49. A
50. C
51. C
52. B
53. A
54. C
55. C
56. B
57. C
58. B
59. A
60. B
61. D
62. D
63. A
64. C
65. C
66. A
67. B
68. A
69. B
70. A
71. B
72. D
73. D
74. D
75. D
76. B
77. B
78. B
79. C
80. C

81. A
82. D
83. B
84. C
85. C

CHEMISTRY

86. A
87. C
88. D
89. C
90. C
91. A
92. D
93. B
94. B
95. D
96. D
97. C
98. C
99. D
100. A
101. B
102. D
103. B
104. A
105. A
106. D
107. D
108. C
109. C
110. B
111. C
112. B
113. A
114. C
115. A
116. C
117. C
118. D
119. D
120. A
121. A

122. C
123. A
124. D
125. C

LOGICAL REASONING

126. D
127. C
128. A
129. A
130. D
131. D
132. D
133. C
134. C
135. B

ENGLISH

136. B
137. C
138. A
139. A
140. D
141. A
142. A
143. D
144. A
145. A
146. B
147. C
148. B
149. D
150. D

PRACTICE PAPER - XII

EXPLANATIONS

Sol 1.

Distance of (x, y) from y-axis (x = 0) is

$$is \ = \ \frac{|X|}{\sqrt{1^2 + 0^2}} = |X|$$

Sol 2.

If the required ratio is k : 1, then the dividing point i.e.

$\left(\frac{2k+1}{k+1}, \frac{7k+3}{k+1}\right)$ lies on the line $3x + y = 9$, i.e. $3\left(\frac{2k+1}{k+1} + \frac{7k+3}{k+1}\right)$

Sol 3.

Since, A, B, C are in A.P., therefore

$$2B = A + C$$

$\Rightarrow$ $2B = 180^\circ - B$

$(\because A + B + C = 180^\circ)$

$\Rightarrow$ $B = 60^\circ$

$\Rightarrow$ $\cos B = \frac{1}{2}$

$\Rightarrow \frac{c^2 + a^2 - b^2}{2ac} = \frac{1}{2}$

$\Rightarrow$ $c^2 + a^2 - ac = b^2$

Sol 4.

$r = \frac{\Delta}{s} = \frac{80cm^{\ 2}}{\frac{1}{2}(8)cm} = 20$ cm

Sol 5.

Distance of the given line from the centre (0, 0) of the circle is $\frac{|0+0-20|}{\sqrt{3^2+4^2}} = \frac{20}{5} = 4$ radius of the circle, therefore, he line is a tangent to the circle.

Sol 6.

Slope of a line parallel to y=axis is not defined as it makes an angle of 90° with +ve direction of x-axis and $\tan 90^\circ$ is not defined.

Sol 7.

$\text{Sin}^4\boldsymbol{\theta} - 2\sin^2\boldsymbol{\theta} - 1 = 0$

$\Rightarrow \quad \sin^2\boldsymbol{\theta} = \frac{2 \pm \sqrt{4}+4}{2}$

$\Rightarrow \quad \sin^2\boldsymbol{\theta} = 1 \pm \sqrt{2}$

Which is not possible as $1 + \sqrt{2} > 1$ and $1 - \sqrt{2} < 0$. So, no value of $\boldsymbol{\theta}$ can satisfy the given equation.

Sol 8.

$\text{Cos}\ (2\sin^{-1} x) = \frac{1}{9}$

$\Rightarrow \quad 1 - 2\sin^2(\sin^{-1} x) = \frac{1}{9}$

$\Rightarrow \quad 1 - 2x^2 = \frac{1}{9}$

$\Rightarrow \quad x = \pm\frac{2}{3}$

Sol 9.

If the image of a point P in a line is p', then mid-point of [PP'] lies on the line I and the line PP' is perpendicular to the line I.

Sol 10.

$\tan^{-1}\frac{1}{7} + 2\tan^{-1}\frac{1}{3} = \tan^{-1}\frac{1}{7} + \tan^{-1}\left(\frac{2/3}{1-\frac{1}{9}}\right)$

$= \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{3}{4}$

$= \tan^{-1}\left(\frac{\frac{1}{7}+\frac{3}{4}}{1-\frac{1}{7}-\frac{3}{4}}\right)$

Sol 11.

$\text{Cos A} = \frac{a^2 + c^2 - a^2}{2bc} \Rightarrow \quad \cos 60° = \frac{9+c^2-16}{2\times 3c}$

$\Rightarrow \quad \frac{1}{2} = \frac{c^2-7}{6c} \Rightarrow \quad c^2 - 3c - 7 = 0$

Sol 12.

The vertex of the given parabola is given by $y = 0$, $x + a = 0$, i.e. $(-a, 0)$.

Sol 13.

Slope of any line parallel to x-axis is, tan 0 =0.

Sol 14

bc $\cos^2\frac{A}{2}$ + ca $\cos^2\frac{B}{2}$ + ab $\cos^2\frac{C}{2}$

= s(s – a) + s(s – b) + s(s – c)

= s(3s – (a + b + c)}

= s {3s – 2s} = s^2

Sol 15.

a cos A = b cos B

⇒ k sin A cos A = k sin B cos B

⇒ sin 2A = sin 2B

⇒ 2A = 2B or 2A = 180° - 2B

⇒ A = B or A + b = 90°

⇒ A = B or C = 90°

Sol 16.

Here, f(π + x) = $\sin^2$ (π + x) + tan(π + x) = f(x). therefore, f is periodic with period 1.

Sol 18.

As, $n^3 + (n + 1)^3$ is always a multiple of 9 (can be proved by induction), therefore P ⊂ Q.

Sol 19.

Log_4 [$\log_3$ {$\log_2$ (x))}] = 1

⇒ $\log_3$ {$\log_2$ (x)} = 4^1 = 4

⇒ $\log_2$ (x) = 3^4

⇒ x = 2^{3^4}

Sol. 20.

Let $y = \cos(\sin x)$, $x = \sin x$,

$\therefore \frac{dy}{dx} = \frac{dy}{dx} / \frac{dz}{dx}$

$= \frac{-\sin(\sin x)\cos x}{\cos x}$

$= -\sin(\sin x)$

Sol 21.

Given, $x \sin(a + y) = \sin y$

$\Rightarrow \quad x = \frac{\sin y}{\sin(a+y)}$,

Differentiate both sides with respect to y.

Sol 22.

When $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, [c] = -2, -1, 0, or 1

$\therefore$ cos [x] with take values cos (-2), cos (1),

Cos (0) and cos 1

And here $R_f = \{1, \cos 1, \cos 2\}$

Sol 23.For D_f, $x \neq 0$, $(2 - x)\, x \geq 0$

$\Rightarrow \quad x \notin [0, 1]$ and $0 \leq x \leq 2$

$\Rightarrow \quad x \in [1, 2]$

Sol 24.

$F(x) = x^3$

$f'(x) = 3x_2 = 0$ when $x = 0$

Note that $f'(x)$ does not change sign as we move from left and right through 0. So f has a point of inflection at 0.

Sol 25.

$$\lim_{x \to \frac{\pi}{4}} \frac{\sec x - \sqrt{2}}{x - \frac{\pi}{4}} = \lim_{x \to \frac{\pi}{4}} \frac{\sec x \tan x}{1} = \sec\frac{\pi}{4}\tan\frac{\pi}{4} = \sqrt{2}.$$

Sol 26.

In [1, 2], $x_2 < x^2 + 1$

$\Rightarrow \quad \sqrt{x^2} < \sqrt{x^2 + 1}$

$\Rightarrow \quad \frac{1}{\sqrt{x^2}} > \frac{1}{\sqrt{x^2+1}}$

$\Rightarrow \quad \frac{1}{x} > \frac{1}{\sqrt{x^2+1}}$

$\Rightarrow \quad 1 < J.$

Sol 27.

$\frac{d}{dx}(\log(\tan x)) = \frac{1}{tan\, x} \sec^2 x$

i.e. numberator is each differential of denominator.

Sol 28.

$f'(x) = \frac{-3}{(3x+1)^2}$

$\Rightarrow f'(0) = \frac{-3}{1} = 3.$

Sol 29.

$y = \sin^{-1} x, z = \cos^{-1} \sqrt{1 - x^2} = \cos^{-1} (\sqrt{1 - \sin^2 y})$

$(\because y = \sin^{-1} x \Rightarrow x = \sin y)$

$\Rightarrow \quad y = z$

$\Rightarrow \quad \frac{dy}{dx} = 1.$

Sol 31. $\int \left(e^{a \log^x} + e^x \log^x\right) dx = \int (e^{\log^{x^a}} + e^{x log\, ax})\, dx$

$(x^a + a^x)\, dx$

$= \frac{x^{a+1}}{a+1} + \frac{a^x}{\log a}$

Sol 32.

Both $\frac{\vec{u}\, x\, \vec{v}}{|\vec{u}\, x\, \vec{v}|}$ and - $\frac{\vec{u}\, x\, \vec{v}}{|\vec{u}\, x\, \vec{v}|}$ are at right angle to $\vec{u}$ and $\vec{v}$.

Sol 33. $\overline{BA} \times \vec{r} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 1+2 & 2+2 & 5+3 \\ 2 & 2 & 5 \end{vmatrix}$

$= 4\,\hat{\jmath} + 6\hat{\jmath} + 2\lambda\hat{k}$

$\Rightarrow 4 - 8 = 2\,\lambda$

$\Rightarrow \lambda = -2$ (equating components along z - axis).

Sol 34.

Put $x^{1/3} = t$, i.e. $x = t^3$

Sol 35.

Required area is above the curve $= x^2$ and below the curve $y = \sqrt{x}$.

The two curves meet in points (0, 0) and (1, 1).

$\therefore$ Required area $= \int_0^1 (\sqrt{x} - x^2)dx$.

Sol 36.

$(\vec{A} + \vec{B}) \cdot \vec{c} = 0$

$\Rightarrow (1 - t)\,\hat{\imath} + (2 + 2t)\,\hat{\jmath} + (3 + t)\,\hat{k}.\,(3\,\hat{\imath} + \hat{\jmath}) = 0$

$\Rightarrow (1 - t).\,3 + (2\,2t).\,1 + (3 + t)\,0 = 0$

$\Rightarrow t = 5$

Sol 37.

Required area $= |\vec{a} \times \vec{b}|$

Sol 38.

$\int (1 - cos\ x)\ \text{cosec}^2\ dx = \int (cosec^2 x - cot\ \times)\ dx$

$= (-\cot x + \text{cosec}\ x + c)$

$= \frac{1 - cot\ x}{sin\ x} + c = \tan\frac{x}{2} + c$

Sol 39.

Given expression $= 6\,[\vec{a}\vec{b}\vec{c}] + 6\,[\vec{b}\vec{c}\vec{a}]$

$+ 12\,[\vec{c}\vec{b}\vec{a}] \qquad = 12\,[\vec{a}\vec{b}\vec{c}] - 12\,[\vec{a}\vec{b}\vec{c}] = 0$

Sol 41.

Since, the product of a non zero rational and an irrational,

$\therefore$ x, y $\in$ Q

$\Rightarrow$ x = 0

Sol 43.

$\Delta = 0^2 - 4.a.1 = -4a < 0$,

Hence the roots of the given equation or non-real.

Sol 44.

$x^2 = (-\cos\theta)^2 - 4$

$= \cos 2\theta - 4 \leq -3$

$(\because \cos^2\theta \leq \forall\, \theta)$

Hence, the roots of the given equation are non-real

Sol 45.

$\frac{(1+i)^n}{(1-i)^{n-2}} = \frac{(1+i)^n}{(1-i)} \frac{1}{(1-i)^{-2}}$

$= i^n(-2i) = -2i^{n+1}$

$= (-2)\, i^{n-1}\, i^2$

$= 2i^{n-1}$

Sol 46.

The unit of magnetic field is weber/(metre)^2. In S.I. system, the unit for magnetic field is called tesla.

Mathematically, 1 tesla = weber / (metre)^2

Sol 47.

Planck's constant, $H = \frac{\text{Energy in each photon}}{\text{Frequency of radiation}}$

$\therefore$ Dimensions of Planck's constant

$= \frac{\text{Dimensions of energy}}{\text{Dimensions of frequency}} = \frac{[ML^2T^{-2}]}{[M^\circ L^\circ T^{-1}]} = [ML^2T^{-1}]$

Sol 48.

Given, speed of boat in still water, $v_b = 5$ km/hr; width of the river $= 1$ km

Time taken to cross the river along the shortest possible path $= 15$ min $= \frac{1}{4}$ hour.

∴ Resultant velocity of the boat $= 4$ km/hr.

∴Velocity of river $= \sqrt{(5)^2 - (4)^2}$

$= \sqrt{25 - 16} = 3$ km/hr.

Sol 49.

In both the cases, the initial velocity in the vertical downward direction is zero. Therefore they will hit the ground simultaneously.

Sol 50.

Given, Equation of displacement,

$$X = \boldsymbol{\alpha} t^3 + \boldsymbol{\beta} t^2 + \boldsymbol{\gamma} t + \boldsymbol{\delta}.$$

Velocity, $v = \frac{dx}{dt} = \frac{d}{dt}(\boldsymbol{\alpha} t3 + \boldsymbol{\beta} t^2 + \boldsymbol{\gamma} t + \boldsymbol{\delta})$

$$= 3\boldsymbol{\alpha} t^2 + 2\boldsymbol{\beta} t + \boldsymbol{\gamma}.$$

When $t = 0$, initial velocity

$$v_\circ = 3(0) + 2(0) + \boldsymbol{\gamma} = \boldsymbol{\gamma}.$$

Similarly, acceleration, $= \frac{dv}{dt} = \frac{d}{dt}$

$$(3\boldsymbol{\alpha} t^2 + 2\boldsymbol{\beta} t + \boldsymbol{\gamma}) = 6\boldsymbol{\alpha} t + 2\boldsymbol{\beta}.$$

When $t = 0$, then $\boldsymbol{\alpha}_\circ = 6\boldsymbol{\alpha}(0) + 2\boldsymbol{\beta} = 2\boldsymbol{\beta}$.

Thus ratio of initial acceleration to initial velocity

$$\left(\frac{a_\circ}{v_\circ}\right) = \frac{2\beta}{\gamma} \propto \frac{\beta}{\gamma}.$$

Sol 51.

Given, Speed of cyclist, $v = 4.9$ m/s, and radius of circular path, $r = 4$ m.

Coefficient of friction between the cycle tyres and road

$$\boldsymbol{\mu} = \frac{v^2}{rg} = \frac{(4.9)^2}{4 \times 9.8} = 0.61.$$

Sol 52.

Given, mass of body, m = 5 kg;

Radius of circle, r = 1 m and angular velocity

ω = 2 rad/sec.

Centripetal force = $\frac{mv^2}{r}$ = mω²r . . . . . where v = ω r

= 5 x (b)² x 1 = 20 N

Sol 53.

Given, mass of bullet, m = 25 g = 0.025 kg; Initial velocity of bullet, u = 200 m/s;

Final velocity, v = 0

And distance, s = 5 cm = 0.05m.

We know, $v^2 = u^2 - 2as$

Or $0 = (200)^2 - 2a \times 0.05$

Or acceleration, a = $\frac{(200)^2}{2 \times 0.05}$ = 400000 m/sec².

∴ Average resistance offered by the target,

F = m.a

= 0.025 × 400000

= 10000 N

= 10 kN.

Sol 54.

Power, P = $\frac{Work\ done}{Time\ taken}$

= $\frac{F.s}{t} = \frac{mas}{1}$

= $\frac{m}{t} \times \frac{v}{t} \times s = \frac{m}{t^2} \times v \times s$

= $\frac{m}{t^2} \times \frac{s}{t} \times s = \frac{ms^2}{t^3}$

Since P and m are constant, therefore $s^2 \propto t^3$ or $s \propto t^{3/2}$. .....(Where s = Distance moved by the body in time t)

Sol 55.

Given, Initial radius of earth, $R_1 = R$ and final radius of earth,

$$R_2 = R\ (1 - 0.01)$$

$$= 0.99\ R.$$

Acceleration due to gravity. $g = \frac{GM}{R^2} \propto \frac{1}{R^2}$.

$$\therefore \frac{g_1}{g_2} = \left(\frac{R_2}{R_1}\right)^2 = \left(\frac{0.99R}{R}\right)^2 = 0.098$$

Or $g_2 = \frac{g_1}{0.98} = 1.02\, g_1 = 2\%$.

Positive sig indicates increase.

Sol 56.

Acceleration due to gravity at the equator,

$$G' = g - R\omega^2.$$

Thus if the spinning speed or angular velocity (ω) of earth increases, then value of g′ will decrease. Therefore weight of the body will decrease.

Sol 57.

Energy required to raise the satellite to a height 'h'

$$E_1 = GMm\left[\frac{1}{R+h} - \frac{1}{R}\right]$$

$$= \frac{GMmh}{R\,(R+h)} = \frac{gR^2mh}{R(R+h)}$$

$$= \frac{gmRh}{R+h} \quad \text{.... (i)}$$

Where $GM = gR^2$ also velocity required to put the satellite into the orbit.

$$v = \sqrt{\frac{gR^2}{R+h}}.$$

Thus kinetic energy required to put the satellite into the orbit

$$E_2 = \frac{1}{2}mv^2 = \frac{1}{2}m \times \frac{gR^2}{R+h} \quad \text{...(ii)}$$

$$\frac{E_1}{E_2} = \frac{\frac{gmRh}{R+h}}{\frac{1}{2}mx\frac{gR^2}{R+h}} = \frac{2h}{R} \text{ or } E_1 : E_2 = 2h : R.$$

Sol 58.

Given, Angular velocity of circular disc = **ω**. As the man walks towards the centre of the disc, then its moment of inertia decreases. As a result of this, angular velocity of the disc will increase.

Sol 59.

Ratio of specific heats at constant pressure and constant volume

$\boldsymbol{\gamma} = 1 + \frac{2}{n}$

Or $\boldsymbol{\gamma} - 1 = \frac{2}{n}$

Or Degree of freedom, $n = \frac{2}{\gamma - 1}$

Sol 60.

Given: Acceleration of lift, $a = \frac{g}{3}$

And, initial time-period of pendulum, $T_1 = T$.

Effective acceleration when it is ascending,

$G_2 = g - a = -\frac{g}{3} = \frac{2}{3}$

Time-period of simple pendulum.

$$T = 2\pi\sqrt{\frac{1}{g}} \propto \sqrt{\frac{1}{g}}.$$

$\therefore \quad \frac{T_1}{T_2} = \sqrt{\frac{g_2}{g_1}} = \sqrt{\frac{\frac{2}{3}g}{g}} = \sqrt{\frac{2}{3}}$

Or $T_2 = \left(\sqrt{\frac{3}{2}}\right) T_1 = \left(\sqrt{\frac{3}{2}}\right) T$

Sol 61.

Given, equation of sound wave

$$Y = 0.00515 \sin(62.4 \times + 316\ t).$$

The standard equation of the wave is

$$Y = a \sin 2\pi\left[\frac{x}{\lambda} + \frac{t}{T}\right]$$

Comparing the given equation with the standard equation, we get

$$\frac{2\pi}{\lambda} = 62.4$$

∴ Wavelength of the wave,

$$\boldsymbol{\lambda} = \frac{2\pi}{62.4}\ 0.1 \text{ unit.}$$

Sol 62.

Given, length of pendulum = 1 Maximum angular displacement = $\boldsymbol{\theta}$

and mass of bob = m

Height of the bob at maximum angular displacement, h = l –l cos $\boldsymbol{\theta}$ = (1 – cos $\boldsymbol{\theta}$). Also at the end of displacement, Kinetic energy of the bob = potential energy of the bob = mgh = mgl (1 – cos $\boldsymbol{\theta}$).

Sol 63.

Given, equation of standing wave is

$$Y = a \sin(100\ t).\cos(0.01\ x)$$

We know that the standard equation of standing wave is

$$Y = a \sin(\boldsymbol{\omega} t).\ \text{Cos}(kx)$$

Comparing the given equation with standard equation, we get

$$\boldsymbol{\omega} = 100 \text{ and } k = 0.01$$

Velocity of standing wave,

$$V = \boldsymbol{\lambda} v = \frac{2\pi}{k} \times \frac{\omega}{2\pi}$$

.....(where $\boldsymbol{\lambda} = \frac{2\pi}{k}$ and $v = \frac{\omega}{2\pi}$

$$= \frac{\omega}{k} = \frac{100}{0.01}\ 10^4 \text{ m/s.}$$

Sol 64.

Given, equations of simple harmonic motions are

$Y1 = \sin\left(\omega t + \frac{\pi}{3}\right)$ and $y2 = \sin(\boldsymbol{\omega} t)$

The standard equation of a simple harmonic

Motion is

$Y = a \sin(\boldsymbol{\omega} t + \boldsymbol{\phi})$

Comparing the given equations with the standard equation, we get

A1 = 1; a2 = 1 and $\phi = \frac{\pi}{3} = 60°$

Now, amplitude due to superposition of simple harmonic motions,

$$A = \sqrt{a_1^2 + a_2^2 + 2a_1a_2\ cos\phi}$$

$$= \sqrt{(1)^2 + (1)^2 + 2 \times 1 \times 1 \times cos60°}$$

$$= \sqrt{1 + 1(2 \times 0.5)}$$

$$= \sqrt{3}$$

Sol 65.

Given, time required for maximum displacement, t = 0.17 sec.

Time period of sinusoidal wave,

T = 4t = 4 × 0.17 = 0.68 sec

∴ Frequency, $f = \frac{1}{T} = \frac{1}{0.68} = 1.47$ Hz.

Sol 66.

Current flows in the direction of flow of positive charge. Similarly electric field exists in the direction of flow of positive charge. Therefore electric field exists in the direction of the flow of current.

Sol 67.

Given, radius of each small drop = r;

Potential on each small drop = V

And, radius of big drop = R.

Since volume of two small drops remains same after coalesce to form one big drop,

Therefore: $2 \times \frac{4}{3}\pi r^3 = \frac{4}{3}$

Or $R = (2)^{1/3}\ r$

Potential on each small drop,

$V = \frac{1}{4\pi\varepsilon_\circ}\frac{q}{r}$

Where, q = Charge on each small drop

Also, since charge on big drop is double the charge on each small drop, therefore potential on big drop

$= \frac{1}{4\pi\varepsilon_\circ}\frac{2q}{R} = \frac{1}{4\pi\varepsilon_\circ}\frac{2q}{(2)^{1/3}r}$

$= (b)^{2/3}\frac{1}{4\pi\varepsilon_\circ}\frac{q}{r} = (b)^{2/3}$

Sol 68.

The energy stored in a capacitor is in the form of electrostatic energy. It is actually stored between the plates of the capacitor.

Sol 69.

Given, capacitances $C_1, C_3, C_4, C_5 = 4\ \mu f$

Each and capacitances $C_2 = 10\ \mu F$.

We know if a battery is connected across A and B, the points b and d are at the same potential (since $C_1 = C_4 = C_3 = C_5 = 4\ \mu f$).

Therefore no charge flow through C_2. Thus it has no role in the circuit.

Also, since C_1 and C_5 are in series, therefore relation for their equivalent capacitance is

$C' = \frac{C_1 \times C_2}{C_1 + C_5} = \frac{4\times4}{4+4}$

Similarly, C_4 and C_3 are in series, hence their equivalent capacitance,

$C'' = \frac{C_3 \times C_4}{C_3 + C_4} = \frac{4\times4}{4+4} = 2\mu f$

Now C' and C'' are in parallel, therefore effective capacitance between A and B

$= C' + C'' = 2 + 2 = 4\ \mu F.$

Sol 70.

Given, power of bulb, P = 100 W Voltage of bulb, V = 200 V and supply

Voltage, Vs = 160 V.

Resistance of bulb, $R = \frac{V^2}{P} = \frac{(200)^2}{100} = 400\ \Omega.$

Therefore actual power consumption, $P = \frac{(V_s)^2}{R} = \frac{(160)^2}{400} = 64$ W

Sol 71.

Voltmeter is a device used to measure potential difference and is connected in parallel in the circuit. Since minimum current passes through is, therefore we must connect a high resistance in series with the galvanometer.

Sol 72.

Given, resistance of galvanometer, G = 100 Ω;

Maximum current across the galvanometer,

Ig = 0.01 A

And current range in ammeter, I = 10 A

Shunt resistance that should be connected in parallel to convert the galvanometer into an ammeter

$S = \left(\frac{I_g}{I - I_g}\right) \times G = \left(\frac{0.01}{10 - 0.01}\right) \times 100 = 0.1\Omega.$

Sol 73.

In an open circuit no current is drawn from the cell. And the potential difference between two electrodes of a galvanic cell, in as open circuit, is called electromotive force of the cell.

Sol 74.

Given, magnetic field at centre of circular loop,

$B_\circ = 0.50 \times 10^{-4}$ T;

Radius of circular loop, r = 12 cm = 0.12 m

And distance of the point from centre, x = 5

Cm = 0.05 m.

Magnetic field at the centre of a current-carrying circular loop,

$B_\circ = \frac{\mu_\circ i}{2r}$ ..(i)

Also, magnetic field at an axial point of a circular loop

$B = \frac{\mu_\circ i r^2}{2(r^2 + x^2)^{3/2}}$ ...(ii)

Dividing equation (ii) by equation (i), we get

$\frac{B}{B_\circ} = \frac{r^3}{(r^2 + x^2)^{3/2}}$

Or $B = B_{\circ} \times \frac{r^3}{(r^2+x^2)^{3/2}}$

$= 0.50 \times 10^{-4} \times \frac{(0.12)^3}{[(0.12)^2+(0.05)^2]^{3/2}}$

$= \frac{0.50 \times 10^{-4} \times (0.12)^3}{[0.0169]^{3/2}}$

$= 0.50 \times 10^{-4} \times \left(\frac{0.12}{0.13}\right)^3$

$= 3.9 \times 10^{-5}$ T

Sol 75.

Given, e.m.f. = 15 volt; Inductance, L = 5 H

And resistance, R = 10 Ω.

Time constant of LR-circuit,

$\lambda = \frac{L}{R} = \frac{5}{10} = \frac{1}{2}$ sec.

Current in LR-circuit,

$I = I_{\circ}(1 - e^{-t/\lambda}) = 10(1 - e^{-2t})$.

∴ current at $t = \infty$, $I\infty = I_{\circ}$

Similarly current at t = 1 sec, $I1 = I_{\circ}(1 - e^{-2})$.

Thus ratio of currents $= \left(\frac{I_\infty}{I_1}\right) = \frac{I_{\circ}}{I_{\circ}(1-e^{-2})}$

$= \frac{1}{1-e^2} = \frac{e^2}{e^2-1}$.

Sol 76.

Given, magnetic moment of first magent,

$M_1 = M$;

Magnetic moment of second magent,

$M_2 = 2M$;

Time-period when the magnets are placed with identical poles in same direction = T_1

And time-period when the magnets are placed with opposite poles are together = T_2.

In a vibration magnetometer, time-period of vibration when identical poles are in the same direction,

$$T_1 = 2\pi\sqrt{\frac{K}{(M_1+M_2)H}}$$

$$= 2\pi\sqrt{\frac{K}{(M+2M)H}}$$

$$= 2\pi\sqrt{\frac{K}{3MH}}.$$

Similarly, time-period of vibration when opposite poles are together

$$T_2 = 2\pi\sqrt{\frac{K}{(M_2-M_1)H}}$$

$$= 2\pi\sqrt{\frac{K}{(2M-M)H}}$$

$$= 2\pi\sqrt{\frac{K}{MH}}.$$

Thus $T_2 > T_1$ ...(where K is a constant)

Sol 77.

The range of wavelengths of X-rays in 10^{-10} to 10^{-8} m, ratio waves greater than 10^{-1}, UV rays 10^{-8} to 4×10^{-7} m and IR rays 7.8×10^{-7} to 10^{-3} m.

Therefore radio waves have the maximum wavelength.

Sol 78.

Given, angle of refration, A = 60 , and refractive index, $\mu = 1.5$.

When a ray of light is to emerge grazingly at the second surface of the prism, the angle of incidence at first surface should be limiting angle of incidence.

Also relation for the limiting angle of incidence

(i)lim is

$\text{Sin } (i)_{lim} = \sin A.\sqrt{\mu^2 - 1}$-cos A

$= \sin 60° \sqrt{(1.5)^2 - 1}$- cos 60°

$= \frac{\sqrt{3}}{2} \times 1.118 - \frac{1}{2} = 0.4682$ or $(i)_{lim} = 28°$

Sol 79.

Given, separation between marks = d'

Distance between paper and observer,

D = 50 m;

Aperture of eye-lens, a = 2 mm = 2×10^{-3} m

And mean wavelength of light,

$\lambda = 5000$ Å $= 5000 \times 10^{-10}$ m

The least distance between the marks to be seen separate,

$D = \frac{1.22\lambda}{a} \times D$

$= \frac{1.22 \times (5000 \times 10^{-10})}{2 \times 10^{-3}} \times 50$

$= 15.25 \times 10^{-3}$ m = 1.525 cm.

Sol 80.

Two mirrors on adjacent walls will give three images. And one mirror on the roof will give one image of objective and three images of the earlier formed images. Therefore total images will be 7.

Sol 81.

Given, focal length of the convex lens,

F1 = + 40 cm

And focal length of the concave lens,

F2 = - 25 cm

(minus sign due to concave).

Relation for the focal length of the combination (f) is

$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$

$= \frac{1}{40} - \frac{1}{25} = -\frac{3}{200}$

Or f $= -\frac{200}{3} =$ - 66.7 cm.

∴ Power of the spectacles, $P = \frac{100}{f} = \frac{100}{-66.7} =$ - 1.5 D.

Sol 82.

The velocity of an electron in an orbit of an atom is inversely proportional to the radius of orbit. Therefore velocity of electron in the innermost orbit of an atom is the highest.

Sol 83.

In Balmer series, all the lines correspond to tranition of electrons from higher excited state to the orbit having $n = 2$ i.e. $n_1 = 2$, $n_2 = 3$,

4, 5 …

And maximum wavelength of Balmer series

$(n_2 = 3)\ \boldsymbol{\lambda}_{max} = 6564\ Å.$

And minimum wavelength of Balmer series

$(n_2 = \infty)\boldsymbol{\lambda}_{min} = 3646\ Å.$

The value of maximum and minimum wavelengths indicate that the series lie in the visible region.

Sol 84.

Given, original number of atoms, $N = 2828$

Half-life, $(t)_{1/2} = 2$ days and time of decay,

$T = 1$ day.

Number of half-lives, $n = \frac{t}{(t)_{1/2}} = \frac{1}{2}$

Number of nuclei left after one day

$= \left(\frac{1}{2}\right)^{n} \times$ Original number of atoms

$= \left(\frac{1}{2}\right)^{1/2} \times 2828 = 2000$

Sol 85.

Heavy water is rich in protons. When fast moving neutrons have head on collosion with the protons of heavy water, they lose their energy and get slow down.

Sol 86.

For a first ordr reaction,

$$\text{Rate constant, } k \propto -\frac{1}{Time\ taken}$$

Since the unit of time is sec, therefore the unit of rate constant is sec^{-1}.

Sol 87.

Given, Charge of an electron,

$e = -1.6 \times 10^{-10}$ C

Magnitude of charge of an electron is equal to that of a proton.

Since Li^+ has one proton, therefore the value of free charge on Li^+ ion is 1.6×10^{-10} C.

Sol 88.

Given, element with atomic number = 7

The electrons of element with of atomic no.

7 are arranged in shell K, L as 2, 5.

Also, the electrons present in the outermost shell of an atom are known as valence electrons and it decides valency of the atom.

Since the outer shell (L) contains 5 electrons, therefore its valency is 5.

Sol 89.

$$CaCO_3 \rightarrow CaO + CO_2$$

(Calciumacarbonate) (Calcumoxide) (Carbondioxide)

Also, molecular weight of $CaCO_3$

$= 40 + 12 + (3 \times 16) = 100$.

Therefore 100 g of $CaCO_3$ will give 56 g of CaO.

Sol 90.

A positron is the positive counterpart of an electron.

And its mas is 9.1×10^{-31} kg. i.e.,

Equivalent to mass of an electron.

Sol 91.

Given, volume of water sample, V1 = 100 ml;

Volume of HCI solution, $V_2 = 5$ ml;

Normality of HCI solution, $N_2 = 0.09$ N

And molecular weight of $NaCO_3 = 106$.

Normality or hardness of the water sample,

$N1 = \frac{N_2 \times V_2}{V_1} = \frac{0.09 \times 5}{100}$

$= 4.5 \times 10^{-3} = 4.5 \times 10^{-3} \times 1000$

= 4.50 mg-eq/ltr.

Sol 92.

The shape of iodine heptafluoride (IF_7) molecules is pentagonal bipyrmidal and it has sp^3d^3-hybridisation with bond angle 72° 90'.

Sol 93.

Given, rate of diffusion of CH_4 (RCH_4) = 2 ×

Rate of diffusion of the gas X (R_X)

From Graham's law of diffusion that the rate of diffusion of a gas ® is inversely proportional to square root of its molecular mass (M).

Also, molecular mass of CH_4 (MCH_4)

= 12 + (1× 4) = 1c.

∴ $\frac{R_{CH_4}}{R_X} = \sqrt{\frac{M_X}{M_{CH_4}}}$

Or $\frac{2}{1} = \sqrt{\frac{M_X}{16}} = \sqrt{\frac{M_X}{4}}$

Or $\sqrt{M_X} = 4 \times 2 = 8$

Or $M_X = 64$.

Sol 94.

IA and IIA group metals have high oxidationpotential due to which their chemical reduction is not possible. Therefore they ae extracted by electrolytic reduction.

Sol 95.

Element having atomic number 56 has the electronic configuration [Xe] $6S^2$. Thus it is placed in the 6^{th} period of II A group. And the element is Barium (Ba) .

Also, the II A group elements are known as alkaline earth metals. Therefore barium (Ba) belongs to alkaline earth metal.

Sol 96.

Given, azimuthal quantum number (i) $= 3$.

For a give value of I, the values of magnetic quantum number (m) are – I, 0, + I.

Since the value of I is equal to 3, therefore the values of m will be $0, \pm 1, \pm 2, \pm 3$.

Sol 97.

The alicyclic compounds are those cyclic carbon compounds which do not possess a benzene ring with its system of conjugate double bonds and have aliphatic characteristic. Since cyclohexane has these characteristic, therefore it is an alicyclic compound.

Sol 98.

Nitrate ion NO_3^- has resonating structure as all the three nitrogen-oxygen bonds are indentical.

And charge on each oxygen atoms $= -\frac{1}{3}$.

Therefore resonance hybrid of nitrate ion

(NO_3^-) is as shown in option '3;.

Sol 99.

The homologue of a compound is differs by

CH_2 with its molecular formula.

Since the given compound is ethylene

(C_2H_2), therefore its homologue is

$$C_2H_2 + CH_2 = C_3H_4.$$

Sol 100.

In liquid state, water molecules contain two hydrogen bonds, while in solid state water is ice an it contains 4 hydrogen bonds in its one molecule. This happens due to spatial arrangement of atoms of liquid water and solid water viz ice.

Sol 101.

Graphite is the only substance among the given molecules, which has free electrons. That is why, it shows electrical conduction.

Sol 102.

The rate of a chemical reaction is a function of time (t). Also when the concentration or pressure during a chemical reaction changes, the rate of chemical reaction also changes.

Sol 103.

Given, interatomic distance in hydrogen (H_2)

Molecule, $I_{H_2} = 74$ Pm

And interatomic distance in chlorine (Cl_2)

Molecule, $I_{C_2} = 198$ Pm

For atoms linked by one **π**-bond, covalent radius

$r = \frac{Interatomic\ distance}{2}$

∴ Covalent radius of hydrogen,

$r_H = \frac{I_{H_2}}{2} = \frac{74}{2} = 37$ Pm

and covalent radius of chlorine,

$r_{CI} = \frac{I_{Cl_2}}{2} = \frac{198}{2} = 99$ Pm.

Also, $H_2(g) + CI(g) \rightarrow 2HCI(g)$.

Therefore bond length of HCI molecule,

$$L_{HCI} = r_H + r_{CI} = 37 + 99 = 136 \text{ Pm}$$

Sol 104.

Manganese (Mn^{2+}) ion contains 23 electrons. Therefore its electronic configuration will be $[Ar]^{18}3d^{5}4s^{0}$.

Thus the electronic configuration of manganese (Mn2+) ion in its ground state is $3d^{5}\ 4s^{0}$.

Sol 105.

In ethylene ($C_2\ H_2$), carbon atom is ap^{0} hybridised. And bond angle between two carbon atoms is 120°. Therefore its molecular shape is square planar.

The functional isomers have the same molecular formula but different functional group. The functional isomer of ethanol is dimethyl ether.

Sol 107.

First carbon atom has two **π**-bonds and it is sp-hybridised. And second carbon atom has one **π**-bond and it is sp2-hybridised. Therefore bybridisation of carbons of C – C single bond of $HC = C - CH = CH_2$ is $sp - sp_2$.

Sol 108.

In an atom, the protons are positively charged particles. Since the protons are concetratd at the nucleus, therefore the positive charge of an atom is concentrated at the nucleus.

Sol. 109

From the Faraday's first law of electrolysis the ions produced during electrolysis of an electrolyte is directly proportional to the quantity of electricity passed.

Sol 110.

In graphite, the carbon atoms is sp^{2}-hybridized and each carbon atom is joined to three other carbon atoms by covalent bond and forms flat hexagonal ring.

Sol 111.

Carborundum is silicon carbide (SiC). It is used as abrasive for polishing metallic surface.

Sol 112.

Nitrous oxide is poisonous in nature. When it is inhaled in small quantities, it produces hystericallaugher. That is why, nitrous oxide is known as a laughing gas.

Sol 113.

$$ZnO + BaO \xrightarrow{1100C} BaZnO_2$$

(zinc oxide) (Barium oxide) (Barium Zincate)

Thus in this reaction, the compound produced is barium zincate ($BaZnO_2$).

Sol 114.

Given, Standard potential of Mg,

$$E^{\circ}_{Mg} = -2.37\ V$$

And standard potential of Cu, $E^{\circ}_{Cu} = +0.34\ V$.

e.m.f. of the cell $= E_{Cu} - E_{Mg}$

$= 0.34 - (-2.37) = 2.71\ V$.

Sol 115.

$$2ZnS + 3O2 \rightarrow 2ZnO + 2SO2 \quad ...(i)$$

(Zinc (Oxygen) (Zinc (Sulphur

Blende) oxide) dioxide)

$$ZnO + C \rightarrow Zn + CO \quad ...(ii)$$

And(Zinc (Carbon) (Zinc) (Carbon

Oxide) monoxide)

Thus in the metallurgy of zinc, the zinc oxide

(ZnO) obtained from roasting, when smelted with carbon C, it gives zinc (Zn) and evolved carbon monoxide (CO).

Therefore zinc oxide is removed by the process of smelting

Sol 116.

$$C_2H_5OH \xrightarrow[100-110^{\circ}C]{Conc.H_2SO_4} C_2H_5HSO_4$$

(Ethanol Excess) (Ethyl hydrogen sulphate)

$$\underset{\xrightarrow[140°C]{}}{C_2H_5OH} \quad (C_2H_5)_2O \quad + \quad H_2SO_4$$

(Ethoxy ethane) (Sulphuric acid)

Thus in this reaction, ethoxy ethane

$[(C_2H_5)_2O]$ is obtained.

Sol 117.

$2Cu + h2O + CO2 \rightarrow CuCO3.Cu(OH)2$

(Copper) (water) (Carbon Dioxide) (Copper carbonateCopper hydroxide)

Thus in this reaction copper carbonate (CuCO3) and copper hybroxide [Cu(OH)2] are formed which provide green powdery/pasty coating.

Sol 118.

Diphenyl carbonium (C_6H_5 CH-C_6H_5)

Ion has maximum number of resonating structures. Therefore it is the most stable carbonium ion.

Sol 119.

$4Na + O2 \overset{\Delta H}{\rightarrow} 2Na2O.$

(Sodium) (oxygen) (Sodium monoxide)

And

$2Na + O_2 \overset{\Delta H}{\rightarrow} Na_2O_2$

(Sodium) (Oxygen) (Sodium peroxide)

Thus in these reaction 4 moles of sodium forms sodium monoxide (Na_2O) while 2 mole of sodium forms sodium peroxide (Na_2O_2).

Sol 120.

Starch gives a blue coloured complex with iodine and this colour serves as the analytical test for iodine. This reaction involves the insertion of iodine molecules in the channel provided by the water soluble portion of starch where they are held by Van der Waal's forces. Therefore starch is used as a indicator in the titration of iodine against sodium thiosulphate.

Sol 121.

Bronsted base strength can be estimated from effective charge on oxygen. The effective charge of oxygen on ClO^- , ClO_2^-,

ClO_3^- and ClO_4^- are – 1, $-\frac{1}{2}, -\frac{1}{3}$ and $-\frac{1}{4}$

Respectively, Also, greater the effective charge, lower will be the stability and greater will the base strength. Since ClO^- has greater effective charge, therefore it is the strongest Bronsted base.

Sol 122.

Given: Complex ion $[Co^{III}(NH_3)_5Cl]^X$.

Let x be the oxidation number of the given complex ion.

Oxidation numbers of Co, N, H and Cl are +3, -3, + 1, respectively.

$\therefore$ Charge (x) $= 3 + [5(-3 + 3(+1)$

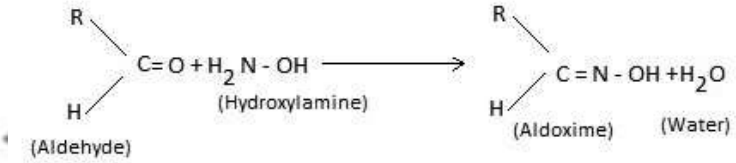
$+ (-1)\}] + 1 = 2.$

Thus complex salt would be $[Co^{III}(NH_3)_5]Cl_2$

And it can be prepared by the combination of

$[Co^{III}(NH_3)_5\ Cl]^X$ with $2Cl^-$.

Sol 123.



Thus in this reaction aldoxime is given out.

Sol 124.

Given, $_4Be + {}_2H^4 \rightarrow {}_6C1^2 + {}_0n^1$.

Let mass no. of Be be X.

$X + 4 = 12 + 1.$

$\therefore$ $X + 4 - 12 - 1 = 0$

Or $X - 9 = 0$

Or X = 9

Thus mass number of beryllium (Be) be 9.

Sol 125.

When aniline is warmed with chloroform and an alcoholic solution of potassium bydroxide (KOH) it forms phenyl isocyanide, which gives very unpleaseant' smell. This reaction is calld carbylamines reaction.

Sol 128.

Given, series 2, 6, 12, 20 …….

Difference of the given numbers are in increasing order as :

6 – 2 = 4, 12 – 6 = 6, 20 – 12 = 8.

Therefore 30 will come next to complete the series (i.e, 30 – 20 = 10).

Sol 129.

Given, series 0, ……., 8, 27, 64, 125m

The given numbers are the cubes of the number in increasing order as:

(0)3 = 0, (a)3 = 1, (b)3 = 8, (c)3 = 27, (d)3 = 64

And (5)3 = 125.

Therefore 1 will com to complete the series.

Sol 130.

Given, alphabetic series bab_b_b_ _ abb.

The set of four given alphabets, the alphabets b, a, b, b are sequentially placed to complete the series.

Therefore the series will be babbbabbbabb.

Sol 131.

Given, Word 'SUPERIMPOSABLE'.

The words 'POSSIBLE, REPOSURE and SPIRE can b e formed from the given word 'SUPERIMPOSABLE'. But the alphabet 'T' of the word REPTILE is not present in SUPEIMPOSABLE'. Therefore it cannot be formed from the letters in given word.

Sol 132.

Given, code of 'STEADY' = 931785 and code of 'ENTRY' = 12345.

From the given codes, that the value of

S = 9, T = 3, 'E = 1, D = 8, Y = 5, N = 2 and R = 4.

Therefore code of the word SEDATE = 918731.

Sol 133.

Given, $\sqrt{\frac{4}{3}-\sqrt{\frac{3}{4}}} = \frac{2}{\sqrt{3}}-\frac{\sqrt{3}}{2}$

$= \frac{(2\times2)-(\sqrt{3}\times\sqrt{3})}{2\sqrt{3}}$

$= \frac{4-3}{2\sqrt{3}}$

$= \frac{1}{2\sqrt{3}}$

Sol 134.

Given, $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a + b\sqrt{3}$.

Now, $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = \frac{5+2\sqrt{2}}{7+4\sqrt{3}} \times \frac{7-4\sqrt{3}}{7-4\sqrt{3}}$

$= \frac{35-20\sqrt{3}+14\sqrt{3}-24}{(7)^2-(4\sqrt{3})^2}$

$= \frac{11-6\sqrt{3}}{49-48}$

Or $a + b\sqrt{3} = 11 - 6\sqrt{3}$

Comparing both sides, we get

A = 11 and b = -6

Sol 135.

Given, Sum of three consecutive odd numbers = 57.

Let the numbers be x, (x + 2) and (x + 4).

Sum of numbers = x + (x + 2) + (x + 4) = 57

Or $3x + 6 = 57$

Or $3x = 51$ or $x = 17$

Thus the numbers are 17, 19,21. And the middle number = 19.