CAREERS 360

PRACTICE Series

SRMJEE 2025

Sample Paper

Contents

A Note to Students

Dear Students,

We are excited to present you with the SRMJEE Sample Paper eBook to aid you in your preparation for the SRM Joint Engineering Entrance Examination (SRMJEE). This eBook is designed to help you familiarize yourself with the exam pattern, improve your time management, and assess your readiness for the test.

Here's how you can make the most of this sample paper:

1. **Understand the Exam Structure:** The sample paper closely follows the SRMJEE format, so taking it will give you a clear idea of the types of questions you'll encounter.
2. **Practice Time Management:** Completing the sample paper under timed conditions will help you practice managing your time effectively, which is essential during the actual exam.
3. **Identify Strengths and Weaknesses:** By reviewing your answers, you can identify areas where you're strong and where you need to improve. Focus more on your weaker topics in the coming days.
4. **Stay Calm and Confident:** Practice will increase your familiarity with the exam and reduce anxiety. Use this sample paper to boost your confidence and sharpen your skills.
5. **Review and Analyze:** After completing the paper, thoroughly review the solutions to understand any mistakes and learn the correct approaches to solving problems.

Remember, consistent practice and understanding of concepts are key to excelling in SRMJEE. We wish you all the best in your preparation!

Good Luck!

Team Careers360

SRMJEE Exam Pattern

The SRM Joint Engineering Entrance Examination (SRMJEEE) follows a structured pattern to assess candidates across various subjects. Below is the detailed exam pattern presented in a table format:

Subject	Number of Questions	Marks per Question	Total Marks
Physics	35	1	35
Chemistry	35	1	35
Mathematics/Biology	40	1	40
English	5	1	5
Aptitude	10	1	10
Total	**125**		**125**

Key Details:

1. **Mode of Examination:** Remote Proctored Online Mode (RPOM)
2. **Duration:** 2 hours and 30 minutes
3. **Question Type:** Multiple Choice Questions (MCQs) with four options each
4. **Question Type:** Multiple Choice Questions (MCQs) with four options each
5. **Marking Scheme**: Each correct answer awards 1 mark; there is no negative marking for incorrect answer.

SRMJEE Syllabus 2025

The SRMJEEE 2025 syllabus for engineering aspirants encompasses topics from Physics, Chemistry, Mathematics, English, and Aptitude. Below is a structured overview of the syllabus:

PHYSICS

Unit	Topics Covered
Units and Measurement	Units for measurement, the system of units (S.I., fundamental, and derived units), measurements (errors in measurement, significant figures), dimensions, dimensional analysis, and applications.
Mechanics	Laws of motion, force and inertia, impulse and momentum, conservation of linear momentum, applications, projectile motion, uniform circular motion, friction (laws and applications), and centripetal force.
Gravitation	Universal law of gravitation, acceleration due to gravity, variation of 'g' with altitude, latitude, and depth, gravitational potential, escape velocity, orbital velocity, geostationary satellites, Kepler's laws.
Mechanics of Solids and Fluids	Elasticity, stress-strain relationship, Hooke's law, fluid mechanics, viscosity, surface tension, applications.
Oscillations and Wave Motion	Simple harmonic motion, damped and forced oscillations, resonance, wave motion, speed of waves, superposition principle, standing waves, Doppler effect.
Heat and Thermodynamics	Kinetic theory of gases, thermal properties, thermodynamics (first law, second law, entropy), heat engines, refrigerators.
Ray and Wave Optics	Reflection, refraction, total internal reflection, lenses, mirrors, wave optics, interference, diffraction, polarization.
Electricity and Magnetism	Electrostatics, current electricity, magnetic effects of current, electromagnetic induction, alternating current, electromagnetic waves.
Atomic Physics and Relativity	Atomic models, X-rays, photoelectric effect, de Broglie waves, Heisenberg uncertainty principle, special theory of relativity.
Dual Nature of Matter and Nuclear Physics	Dual nature of radiation and matter, nuclear structure, radioactivity, nuclear reactions, applications.
Electronics and Communication	Semiconductors, diodes, transistors, logic gates, communication systems.

CHEMISTRY

Unit	Topics Covered
Atomic Structure	Atomic models, quantum numbers, electronic configuration, periodic properties.
Chemical Bonding and Molecular Structure	Ionic and covalent bonding, VSEPR theory, hybridization, molecular orbital theory.
States of Matter	Gaseous, liquid, and solid states, ideal and real gases, intermolecular forces, and phase equilibria.
Chemical Thermodynamics and Energetics	First law, enthalpy, entropy, Gibbs free energy, spontaneity, Hess's law, bond enthalpy.
Chemical Equilibrium	Law of mass action, Le Chatelier's principle, equilibrium constants, applications.
Solutions	Types, concentration terms, Raoult's law, colligative properties, abnormal molar masses.
Electrochemistry	Electrolytic and galvanic cells, Nernst equation, electrochemical series, corrosion.
Chemical Kinetics	Rate laws, order and molecularity, activation energy, Arrhenius equation, catalysis.
Surface Chemistry	Adsorption, colloids, emulsions, applications.
Hydrocarbons	Alkanes, alkenes, alkynes, aromatic hydrocarbons, reactions, mechanisms.
Organic Compounds Containing Oxygen	Alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, esters, reactions, mechanisms.
Organic Compounds Containing Nitrogen	Amines, nitro compounds, cyanides, isocyanides, diazonium salts, reactions, mechanisms.
Biomolecules	Carbohydrates, proteins, nucleic acids, enzymes, vitamins, hormones.
Polymers	Classification, types, polymerization methods, properties, uses.
Chemistry in Everyday Life	Drugs, detergents, food additives, pesticides, fertilizers.

MATHEMATICS

Unit	Topics Covered
Sets, Relations, and Functions	Sets and their representations, relations, functions, types of functions, composition of functions, inverse of a function.
Complex Numbers and Quadratic Equations	Complex numbers in Cartesian form, polar form, De Moivre's theorem, quadratic equations, roots, nature of roots.
Matrices and Determinants	Types of matrices, operations, determinants, properties, applications in solving linear equations.
Permutations and Combinations	Fundamental principle of counting, permutations, combinations, applications.
Binomial Theorem and Its Applications	Binomial theorem for positive integral indices, general term, middle term, applications.
Sequences and Series	Arithmetic progression, geometric progression, harmonic progression, sum of finite series, arithmetic-geometric series.
Differential Calculus	Limits, continuity, differentiability, differentiation, applications in rate of change, tangents and normals, maxima and minima.
Integral Calculus	Indefinite integrals, definite integrals, applications in areas under curves, differential equations.
Analytical Geometry	Straight lines, circles, conic sections (parabola, ellipse, hyperbola), equations, properties.
Vector Algebra	Vectors, operations, scalar and vector products, applications in geometry.
Statistics and Probability	Measures of central tendency, dispersion, probability theory, Bayes' theorem, random variables, probability distributions.

ENGLISH

Unit	Topics Covered
Comprehension	Reading passages, understanding content, answering questions based on passages.
Grammar and Vocabulary	Synonyms, antonyms, sentence completion, error detection, idioms, and phrases.

APTITUDE

Unit	Topics Covered
Number System	Integers, fractions, decimals, divisibility, factors, multiples.
Percentage and Ratio	Calculations involving percentages, ratios, proportions, profit and loss.
Time and Work	Problems with work efficiency, time taken, and combined work.
Geometry	Basic geometrical

Sample Paper

Physics

Q. 1 Position of particle in a rectaangular co-ordinate system is (4,6,-2). Then its position vector is :

Option 1:
$4\hat{i}+6\hat{j}-2\hat{k}$

Option 2:
$4\hat{i}-6\hat{j}-2\hat{k}$

Option 3:
$-4\hat{i}+6\hat{j}+2\hat{k}$

Option 4:
$4\hat{i}+6\hat{j}+2\hat{k}$

Correct Answer:
$4\hat{i}+6\hat{j}-2\hat{k}$

Solution:
As we learn

Position vector -

Location of a point, in space, is an important physical quantity which is known as position vectors.

- wherein

Representation of position vector

$\vec{r}=x\hat{i}+y\hat{j}+z\hat{k}$

Representation of position vector

$\vec{r}=x\hat{i}+y\hat{j}+z\hat{k}$

$\vec{r}=4\hat{i}+6+\hat{j}-2\hat{k}$

Q. 2 $\widehat{p}=0.5\widehat{i}+0.8\widehat{j}-c\widehat{k}$, $\widehat{p}$ is the unit vector. then the value of 'c' is -

Option 1:
1

Option 2:
$\sqrt{0.11}$

Option 3:
$\sqrt{0.01}$

Option 4:
$\sqrt{0.39}$

Correct Answer:
$\sqrt{0.11}$

Solution:
As we learn

Magnitude of position of vectors -

Magnitude: Its magnitude is the distance between the given point and its direction from the origin to that point.

$\vec{r}=x\hat{i}+y\hat{j}+z\hat{k}$

Magnitude : $r=\sqrt{x^2+y^2+z^2}$

- wherein

Find its magnitude

$r=\sqrt{x^2+y^2+z^2}$

$$\left|\vec{P}\right| = 1 = \sqrt{0.5^2 + 0.8^2 + C^2}$$

$$C^2 + 0.25 + 0.64 = 1$$

$$C^2 = 0.11$$

$$C = \sqrt{0.11}$$

Q. 3 If $\vec{P} + \vec{Q} = \vec{R}$ and $\left|\vec{P}\right| = 8, \left|\vec{Q}\right| = 15 and \left|\vec{R}\right| = 17$ What is the angle between $\vec{P} and \vec{Q}$ is

Option 1:
π

Option 2:
$\frac{\pi}{2}$

Option 3:
0

Option 4:
none of these

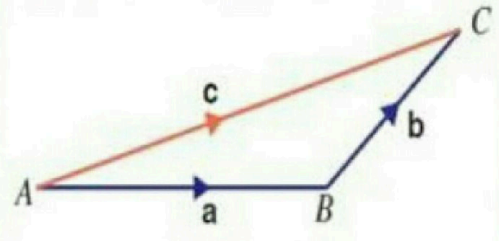
Correct Answer:
$\frac{\pi}{2}$

Solution:
As we learn

Triangle law of vector Addition -

If two vector are represented by both magnitude and direction by two sides of triangle taken in same order then their resultant is represented by 3rd side of triangle.

- wherein



Represents triangle law of vector Addition

By triangle law,

$$\left|\vec{P}+\vec{Q}\right| = \sqrt{P^2+Q^2+2PQ\cos\theta}$$

$$8^2+15^2+2*8*5\cos\theta = 17^2$$

$$\cos\theta = 0$$

$$\theta = \frac{\pi}{2}$$

Q. 4 position of a praticle in a 500 trangular co-ordinate system is (4,6,-2). They its position vector will br

Option 1:
$4\hat{i}-6\hat{j}+2k$

Option 2:
$-4\hat{i}+6\hat{j}+2\hat{k}$

Option 3:
$4\hat{i}+6\hat{j}-2\hat{k}$

Option 4:

$4\hat{i}-6\hat{j}-2\hat{k}$

Correct Answer:

$4\hat{i}+6\hat{j}-2\hat{k}$

Solution:

As we learned

Position vector -

Location of a point, in space, is an important physical quantity which is known as position vectors.

- wherein

Representation of position vector

$\vec{r}=x\hat{i}+y\hat{j}+z\hat{k}$

representation of position vector

$\vec{\gamma}=x\hat{i}+y\hat{j}+z\hat{k}$

$\vec{\gamma}=4\hat{i}+6\hat{j}-2\hat{k}$

Q. 5 If $\overrightarrow{A} and \overrightarrow{B}$ are non zero vectors. Which obey the relation $\left|\overrightarrow{A}+\overrightarrow{B}\right|=\left|\overrightarrow{A}-\overrightarrow{B}\right|$ then the angle between them is -

Option 1:

0°

Option 2:

90°

Option 3:

120°

Option 4:

40°

Correct Answer:

90°

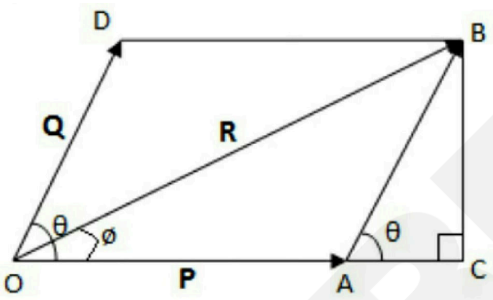
Solution:

As we learn

Parallelogram law of vector Addition -

If two vector are represented by both magnitude and direction by two adjacent side of parallelogram taken from same point then their resultant is also represented by both magnitude and direction taken from same point but by diagonal of parallelogram.

- wherein



Represents law of parallelogram vector Addition

$$\left|\vec{A}+\vec{B}\right| = \left|\vec{A}-\vec{B}\right|$$

$$A^2 + B^2 + 2AB\cos\theta = A^2 + B^2 - 2AB\cos\theta$$

$$\cos\theta = 0$$

$$\theta = 90^\circ$$

Q. 6 A man can swim in still water of 1m/s. He swim across the river flowing at 0.6m/s . The width of river is 100m. If he travels with the shortest possible time then time taken to cross the river is:

Option 1:
250s

Option 2:
100s

Option 3:
60s

Option 4:
40s

Correct Answer:
100s

Solution:
As we learn

Boat - River Problem -

To cross the river in the shortest time.

- wherein

Time taken $t = \frac{d}{v}$

For t_{min} $\overrightarrow{V_{mr}}$ should be perpendicular to the flow.

$$t = \frac{100}{1}$$

t = 100s

Q. 7 A monkey moves 6m north, 8m east and 10m vertically upward on a pole. What will be the displacement from the initial reference point?

Option 1:
$10\sqrt{2}$m

Option 2:
10m

Option 3:
5m

Option 4:
$\frac{10}{\sqrt{2}}m$

Correct Answer:
$10\sqrt{2}$m

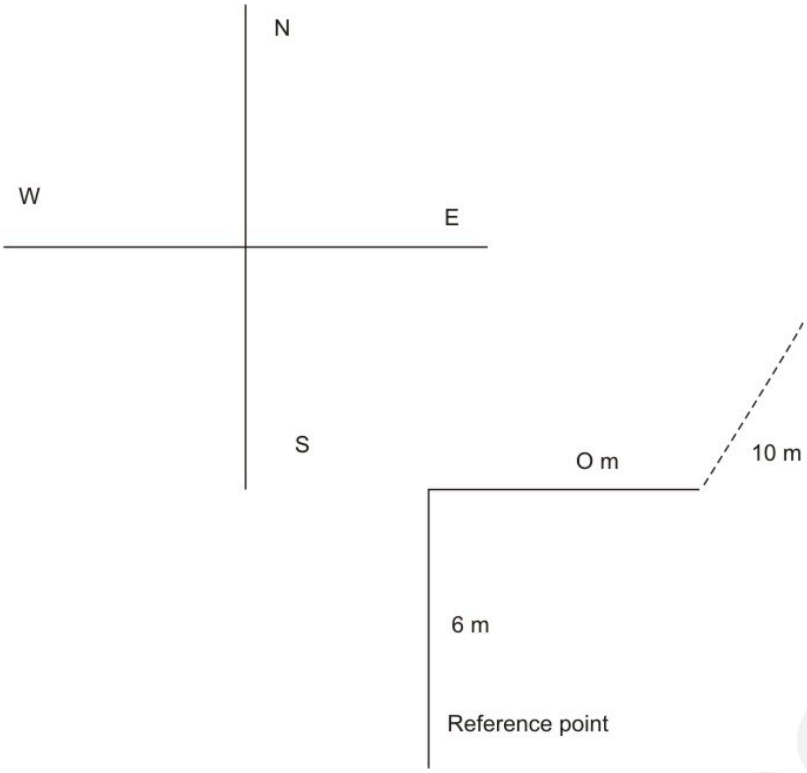
Solution:
As we have learnt,

Reference point -

For measuring position(or location) of object we need reference point.

- wherein

Origin(O) of rectangular coordiante system is taken as starting point of object as reference point.



$\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$
$\vec{r} = 2\hat{i} + 6\hat{j} + 10\hat{k}$
$|\vec{r}| = \sqrt{2^2 + 6^2 + 10^2} = 10\sqrt{2}m$

Q. 8 In which branch of physics that describes the motion of bodies without considering the forces that caused the motion?

Option 1:
Magnetism

Option 2:
Optics

Option 3:
Kinematics

Option 4:
Electrostatics

Correct Answer:
Kinematics

Solution:

As we have learnt,

Kinematics -

In kinematics, we study ways to describe motion without going into the causes of motions.

-

Definition.

Q. 9 The vector form of Biot- Savart law for $d\vec{\beta}$ is -

Option 1:

$\frac{\mu o}{4\pi}\frac{i\vec{dl}\times\vec{r}}{r^2}$

Option 2:

$\frac{\mu o}{4\pi}\frac{i\vec{dl}\times\hat{r}}{r^3}$

Option 3:

$\frac{\mu o}{4\pi}\frac{idl\times\vec{r}}{r^3}$

Option 4:

$\frac{\mu o}{4\pi}\frac{i\vec{dl}\times\vec{r}}{r}$

Correct Answer:

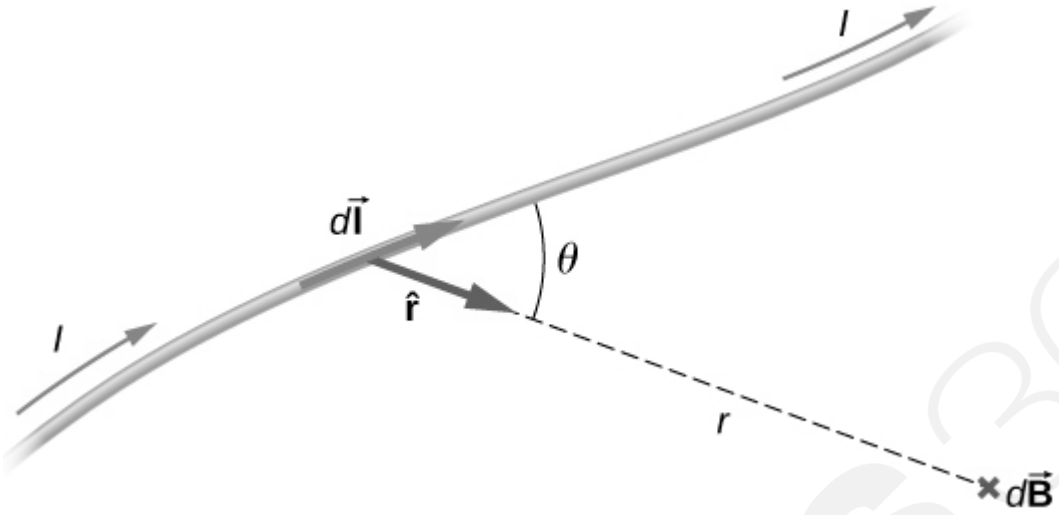
$\frac{\mu o}{4\pi}\frac{idl\times\vec{r}}{r^3}$

Solution:
As we learn

In Vector Form -

$$\vec{dB} = \frac{\mu_0}{4\pi} \frac{i\,d\,\vec{l} \times \vec{r}}{r^3}$$

- wherein



$$d\vec{\beta} = \frac{\mu o}{4\pi} \frac{ideSM\mu}{r} \hat{r}$$

$$d\vec{\beta} = \frac{\mu o}{4\pi} \frac{ide \times \vec{r}}{r^3}$$

Correct option 3.

Q. 10 Maxwell's cork screw rule is used to determine

Option 1:
Magnitude of magnetic feild

Option 2:
Magnitude of electric feild

Option 3:
Direction of magnetic feild

Option 4:
Direction of electric feild

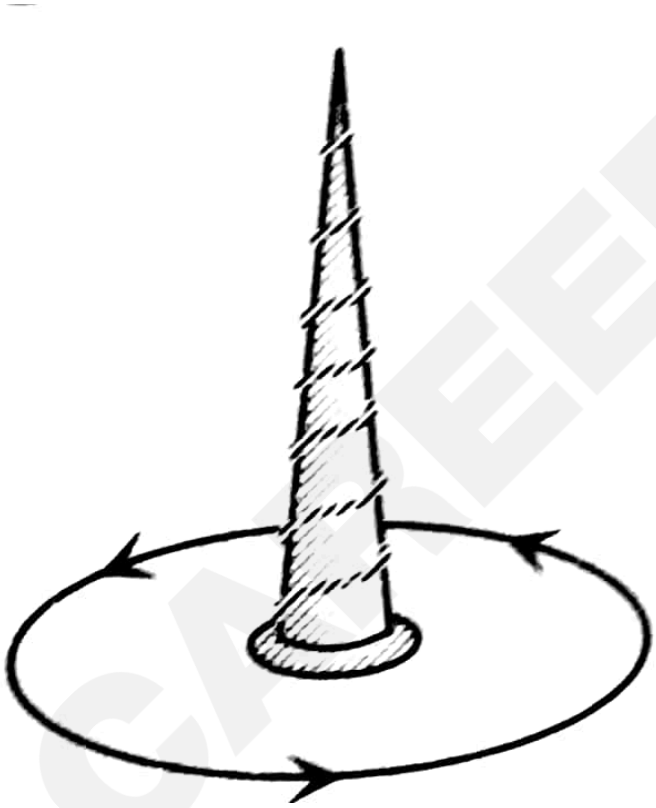
Correct Answer:
Direction of magnetic feild

Solution:
As we learn

Maxwell's Cork Screw Rule -

It states that if a screw is placed in the direction of current through a conductor then the direction of rotation of the screw gives the direction of the magnetic feild.

- wherein



Maxwell's cork screw rule is used to determine the direction of magnetic field.

Correct option is 3.

Q. 11 According to the right hand palm rule determining the direction of magnetic feild, where of the following direction we use to respect it:

Option 1:
In the direction of fingers

Option 2:
In the direction of thumb

Option 3:
Along the direction of palm

Option 4:
Perpendicular

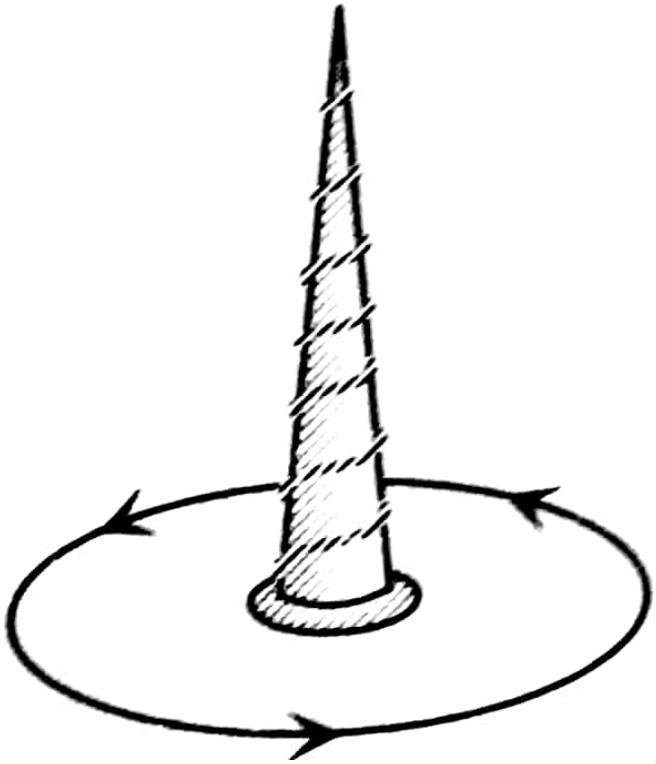
Correct Answer:
Perpendicular

Solution:
As we learn

Maxwell's Cork Screw Rule -

It states that if a screw is placed in the direction of current through a conductor then the direction of rotation of the screw gives the direction of the magnetic feild.

- wherein



According to right hand palm rule ; I in the direction of thumb then normal palm.

Correct option is 4.

Q. 12 The value of magnetic feild at any point will be zero if -

Option 1:

$\Theta = 0$

Option 2:

$\Theta = 180^0$

Option 3:

If the point is along the line of current element

Option 4:
All of above

Correct Answer:
All of above

Solution:
As we learn

Magnetic field due to Current Element -

If $\Theta = 0^{\circ} or\, \Theta = \pi$

$\sin\Theta = 0$

- wherein

Thus field at a point on the line of wire is zero.

As $d\vec{\beta} = \frac{\mu o}{4\pi}\frac{ide\sin\Theta}{r^2}\hat{r}$

For $\Theta = 0\ and\ 180^0$

$d\vec{\beta} = 0$

Correct option is 4.

Q. 13 ST unit of magnetic feild $\vec{\beta}$ is -

Option 1:
Tesla

Option 2:
Gayss

Option 3:
Webor/m

Option 4:
Maxwell / cm^2

Correct Answer:
Tesla

Solution:
As we learn

Unit of ???????B Vector -

SI unit of $\overrightarrow{B}$ is $Weber/Meter^2$

Or Tesla

CGS unit of $\overrightarrow{B}$ - Guass or Maxwell/$_{cm^2}$

-

SI unit of magnetic field is Tesla or Weber/m^2.

Correct option is 1.

Q. 14 If 1 Tesla = 10^{k} Gauss then the value of k is equal to -

Option 1:
5

Option 2:
-4

Option 3:
2

Option 4:
4

Correct Answer:
4

Solution:
As we learn

Relation between Tesla and Guass -

1 T = $10^4 Gauss$

-

1 Tesla = 10^4 Gayss

Correct option is 4.

Q. 15 A block with mass of 6 kg is suspended from an ideal spring having negligible mass and stretches the spring by 0.3m. Then find the force constant of spring in N/m:

Option 1:
250 N/m

Option 2:
196 N/m

Option 3:
208 N/m

Option 4:
98 N/m

Correct Answer:
196 N/m

Solution:
As we learn

Time period of oscillation for spring mass system -

$$T = 2\pi\sqrt{\frac{m}{K}}$$

- wherein

m = mass of block

K = spring constant

In equilibrium , KL = mg

$$K = \frac{mg}{l} = \frac{6 \times 9.8}{0.3} = 20 \times 9.8 = 196 N/m$$

Q. 16 A tuning fork of 500 Hz is used to produce resonance in a resonance tube expirement. The level of water at first resonance is 35 cm and at second resonance is 70cm. The error in calculating velocity of sound is (tahe velocity of sound in air as 330m/s):

Option 1:
10m/s

Option 2:
20 m/s

Option 3:
40 m/s

Option 4:
15 m/s

Correct Answer:
20 m/s

Solution:
As we learn

Quinck's tube -

This is an apparatus used to demonstrate the phenomena of interferance and also used to measure velocity of sound in air.

- wherein

$$x = \frac{\lambda}{2}$$

$$V = 2\nu_0 x$$

$$\nu_0 = frequency$$

Actual speed of sound in the air = 330 m/s

$$\frac{\lambda}{2} = (l_2 - l_1) = 35cm$$

$$\lambda = 70cm = 0.7m$$

Speed of the sound observed $V_0 = f\lambda$ = 500 x 0.7 = 350m/s

Error calculating velocity of sound 350-330 = 20 m/s

Q. 17 The sound waves of wave length 10000 mm and 7000 mm produces 12 beats/sec. The speed of sound is:

Option 1:
280 Hz

Option 2:
140 Hz

Option 3:
320 Hz

Option 4:
240 Hz

Correct Answer:
280 Hz

Solution:
As we learn

Beat Frequency -

$$\Delta\nu = |\nu_1 - \nu_2|$$

module of $(\nu_1 - \nu_2)$

- wherein

Where $\nu_1 \; and \; \nu_2$ are frequency of two wave differ slightly in value of frequency.

$$n = n_1 - n_2 = \frac{v}{\lambda_2} - \frac{v}{\lambda_1} = \frac{(\lambda_1 - \lambda_2)v}{\lambda_1\lambda_2}$$

$$v = \frac{n\lambda_1\lambda_2}{\lambda_1 - \lambda_2} = \frac{12 \times 10000 \times 7000 \times 10^{-6}}{3000 \times 10^{-3}} = 28 \times 10 = 280Hz$$

Q. 18 A tuning fork of $500H_2$ is used to produce resonance in a resonance tube experiment. The level of water at first resonance is 35cm and at second resonance is 70cm.
The error in calculating the velocity of sound is(Take velocity of sound in air as 330 m/s)

Option 1:
10 m/s

Option 2:
20 m/s

Option 3:
40 m/s

Option 4:
15 m/s

Correct Answer:
20 m/s

Solution:
As we learned

Quinck's tube -

This is an apparatus used to demonstrate the phenomena of interferance and also used to measure velocity of sound in air.

- wherein

$$x = \frac{\lambda}{2}$$

$$V = 2\nu_0 x$$

$$\nu_0 = frequency$$

Actual speed of sound in air = 330 m/s

$$\frac{\lambda}{2} - (l_2 l_1) = 35cm$$

$$\lambda = 70cm = 0.7m$$

speed of sound observed $V_0 = 500 \times 0.7 = 350m/s$

Error in calculating velocity of sound

$$350 - 330 = 20m/s$$

Q. 19 3 mole of He is mixed with 2 mole of O_2. Then find the value of (C_p/C_u) for the mixture

Option 1:
$\frac{5}{3}$

Option 2:
$\frac{5}{7}$

Option 3:
$\frac{17}{15}$

Option 4:
$\frac{29}{19}$

Correct Answer:
$\frac{29}{19}$

Solution:
As we learned

Atomicity or adiabatic coefficient (gamma) -

$$\gamma = \frac{C_p}{C_v}$$

$$= 1 + \frac{2}{f}$$

- wherein

for Monoatomic gas $\gamma = \frac{5}{3}$

for Diatomic gas $\gamma = \frac{7}{5}$

for Triatomic gas $\gamma = \frac{4}{3}$

For O_2

$$C_{v_2} = \frac{5}{2}RT$$

$$C_{P_2} = \frac{7}{2}RT$$

$$n_2 = 2$$

For He

$$C_{v_2} = \frac{3}{2}RT$$

$$C_{P_2} = \frac{5}{2}RT$$

$$n_1 = 3$$

$$\left(\frac{C_p}{C_v}\right)_{mix} = Y_{mix} = \frac{n_1 C_{p_1} + n_2 C_{p_2}}{n_1 C_{v_1} + n_2 C_{v_2}}$$

$$= \frac{3 \times \frac{5}{2}RT + 2 \times \frac{7}{2}RT}{3 \times \frac{3}{2}RT + 2 \times \frac{5}{2}RT}$$

$$= \frac{(3 \times 5) + (2 \times 7)}{(3 \times 3) + (2 \times 5)} = \frac{15 + 14}{9 + 10}$$

$$Y_{mix} = \frac{29}{19}$$

Q. 20 Choose the correct option regarding entropy change

Option 1:

$$\Delta S = nC_p \ln\left(\frac{T_1}{T_2}\right) + R \ln\left(\frac{V_2}{V_1}\right)$$

Option 2:

$$\Delta S = nC_p \ln\left(\frac{T_2}{T_1}\right) + nR \ln\left(\frac{V_2}{V_1}\right)$$

Option 3:

$$\Delta S = nC_p \ln\left(\frac{T_2}{T_1}\right) - nR \ln\left(\frac{V_2}{V_1}\right)$$

Option 4:

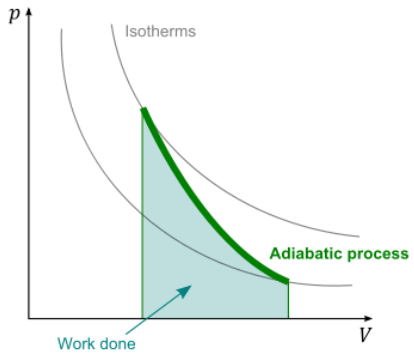
$$\Delta S = nR\ln\left(\frac{T_2}{T_1}\right) + nC_p\ln\left(\frac{V_2}{V_1}\right)$$

Correct Answer:

$$\Delta S = nC_p\ln\left(\frac{T_2}{T_1}\right) + nR\ln\left(\frac{V_2}{V_1}\right)$$

Solution:
As we learned

Comparision between isothermal and adiabatic process in expansion -



- wherein

$\omega_{isothermal} > \omega_{adia}$

$P_{isothermal} > P_{adia}$

$T_{isothermal} > T_{adia}$

Q. 21 Which is correct equation for real gas.

Option 1:

$$\left(P-\frac{n^2a}{V^2}\right)(V+nb)=nRT$$

Option 2:

$$\left(P+\frac{n^2a}{V^2}\right)(V-nb)=nRT$$

Option 3:

$$\left(V-\frac{n^2b}{P^2}\right)(V-na)=nRT$$

Option 4:

$$\left(V+\frac{n^2b}{P^2}\right)(P+na)=nRT$$

Correct Answer:

$$\left(P+\frac{n^2a}{V^2}\right)(V-nb)=nRT$$

Solution:
As we learned

Real gas equation -

$$\left(P+\frac{n^2a}{V^2}\right)(V-nb)=nRT$$

- wherein

Where a and b are called Vander wall's constant.

Q. 22 If V_1 is root mean square velocity of an H_2 gas at 200K and V_2 is teh most probable speed of molecule of an H_2 gas at 300K. Then find $\frac{V_1}{V_2}$:

Option 1:
1

Option 2:
$\frac{3}{2}$

Option 3:
$\frac{2}{3}$

Option 4:
2

Correct Answer:
1

Solution:
As we learn

Root mean square velocity -

$$V_{rms} = \sqrt{\frac{3RT}{M}}$$

$$= \sqrt{\frac{3P}{\rho}}$$

- wherein

R = Universal gas constant

M = molar mass

P = pressure due to gas

ρ = density

Most probable speed of a molecule of a gas -

$$V_{mp} = \sqrt{\frac{2KT}{m}}$$

$$= \sqrt{\frac{2RT}{M}}$$

- wherein

K = Boltzmann's Constant

m = mass of a molecule

M = molar mass

R = Universal gas constant

T = Temperature

$$V_{rms} = V_1 = \sqrt{\frac{3RT}{M}} = \sqrt{\frac{(3 \times 200)\,RT}{M}}$$

$$V_{mp} = V_2 = \sqrt{\frac{2RT}{M}} = \sqrt{\frac{(2 \times 300)\,RT}{M}}$$

$$\frac{V_1}{V_2} = 1$$

Q. 23 Maximum intensity in YOSE is I_1 . The intensity at a point on the screen where the phase difference between the two interfering beams is $\frac{\pi}{3}$

Option 1:
0.25 I_1

Option 2:
0.75 I_1

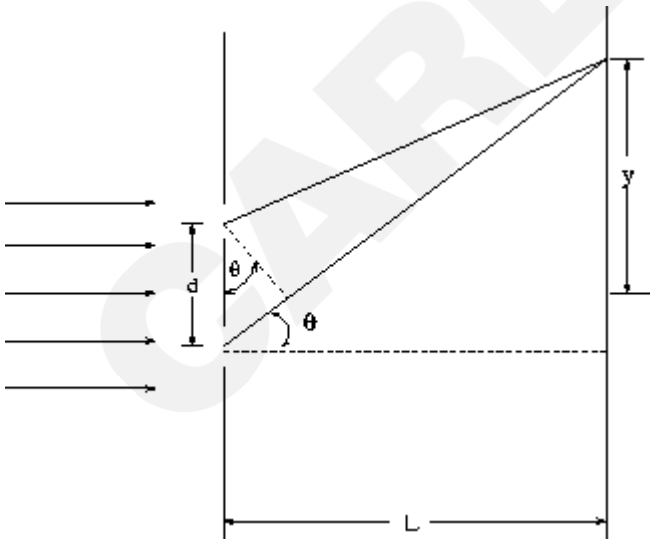
Option 3:
I_1

Option 4:
0.5 I_1

Correct Answer:
0.75 I_1

Solution:
As we learned

Young Double Slit Experiment -



- wherein

$$y = \Delta x \cdot \left(\frac{D}{d}\right)$$

$y =$ Distance of a point on screen from central maxima

$\Delta x =$ Path difference at that point

$$I = I_{max}\cos^2(\frac{\theta}{2})$$

$$I = I_1\cos^2(\frac{\pi}{6}) for \frac{\pi}{3}$$

$$I = I_1 \times \frac{3}{4}$$

$$0.75I_1$$

Q. 24 An astronomical telescope has an angular magnification of magnitude 8 for distant objects. Determine the focal length of eye piece if the separation between objective and eyepiece is 36cm

Option 1:
32 cm

Option 2:
2 cm

Option 3:
30 cm

Option 4:
4 cm

Correct Answer:
4 cm

Solution:
As we learned

Length of compound microscope -

$$L = v_o + u_e$$

- wherein

$v_o =$ Image distance from objective.

$u_e =$ Object distance from eyepiece

$$M_\alpha = \frac{f_0}{f_e}, so8 = \frac{f_0}{f_e}$$

$$L_\alpha = f_0 + f_e$$

$$36 = f_0 + f_e$$

$$9f_e$$

$$\Rightarrow f_e = 4cm$$

Q. 25 Choose the correct option regarding dispersive power (ω). when white light is incident on prism:

Option 1:

$$\omega = \frac{\mu_v - \mu_r}{\mu_y - 1}$$

Option 2:

$$\omega = \frac{\mu_v + \mu_r}{\mu_y - 1}$$

Option 3:

$$\omega = \frac{\mu_v + \mu_r + \mu_y}{\mu_y + 1}$$

Option 4:

$$\omega = \frac{\mu_v + \mu_r}{\mu_y}$$

Correct Answer:

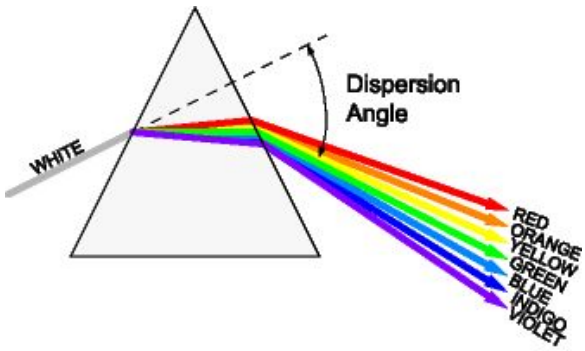
$$\omega = \frac{\mu_v - \mu_r}{\mu_y - 1}$$

Solution:

As we learn

Dispersive power (?) -

$$\omega = \frac{\mu_v - \mu_r}{\mu_y - 1}$$



- wherein

μ_v = Refractive index of violet

μ_r = Refractive index of red

μ_y = Refractive index of yellow

$= \frac{\mu_v + \mu_r}{2}$

Q. 26 focal length of a convex lens water is 40cm. Find its focal length in air. given that $Mg = \frac{3}{2}$ and $Mw = \frac{4}{3}$

Option 1:
80cm

Option 2:
5cm

Option 3:
10cm

Option 4:
40cm

Correct Answer:
10cm

Solution:
As we learned

Lensmaker's Formula -

$$\frac{1}{f}=\left(\frac{\mu_2}{\mu_1}-1\right)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$$

- wherein

$\mu_1 =$ refractive index of medium of object

$\mu_2 =$ refractive index of lens

$R_1 \, and \, R_2$ are radius of curvature of two surface

$$\frac{fwater}{fair}=\frac{(Mg-1)(\frac{1}{R_1}-\frac{1}{R_2})}{(\frac{Mg}{w/w}-1)(\frac{1}{R_1}-\frac{1}{R_2})}=\frac{(Mg-1)}{(\frac{Mg}{mw}-1)}$$

$$\frac{40}{fair}=\frac{(\frac{3}{2}-1)}{(\frac{3/2}{4/3}-1)}=\frac{\frac{1}{2}}{\frac{1}{8}}=4$$

$$fair=\frac{40}{4}=10cm$$

Q. 27 N, M are the number of α particle and β particle emitted when A radioactive substance ${}_{90}X^{238}$ decays in to ${}_{83}X^{232}$.Then $\left(\frac{M}{N}\right)$ is equal to:

Option 1:
$\frac{1}{2}$

Option 2:
$\frac{1}{4}$

Option 3:
2

Option 4:
4

Correct Answer:
$\frac{1}{4}$

Solution:
As we learn

α-decay -

$${}^{A}_{Z}X \rightarrow {}^{A-4}_{Z-2}Y + {}^{4}_{2}He + Q$$

- wherein

$$Q\ value = (M_X - M_Y - M_{He})\,c^2$$

$\alpha\beta$ Minus - decay -

$${}^{A}_{Z}X \rightarrow {}^{A}_{Z+1}Y + \beta^{-} + \bar{\nu} + Q\ value$$

- wherein

$$\bar{\nu} \rightarrow anti\ neutrino$$

$$Q\ value = [M_X - M_Y]\, c^2$$

$${}_{90}X^{238} \rightarrow {}_{83}\ X^{222} + N_2\alpha^4 + M\beta^{\circ}$$

238 = 222 + 4N+ 0XM → equating mass number

N =4

Now equate atomic number:

90=83+2N+(-1)XM

90= 83 + 2 x 4 - M

90= 83 + 8 - M

M = 1

So $\frac{M}{N} = \frac{1}{4}$

Q. 28 Choose the correct option regarding Neutrino:

Option 1:
It has zero electric charge

Option 2:
It has the mass less than that of electron

Option 3:
Both a and b

Option 4:
None of these

Correct Answer:
It has the mass less than that of electron

Solution:
As we learn

Property of neutino -

Zero electric charge

Its mass much less than mass of electron

Spin 1/2 particle

Very weak matter making it quite difficult to detect

-

Q. 29 Choose the correct option regarding Balmer's series:

Option 1:
It lives in the UV region

Option 2:
Electron jump from n=3 to n=1 is possible

Option 3:
Electron jump from n = 3 to n=2 is possible

Option 4:
All of these

Correct Answer:
Electron jump from n = 3 to n=2 is possible

Solution:
As we learn

Balmer series -

$$\frac{1}{\lambda} = R\left(\frac{1}{2^2} - \frac{1}{n^2}\right)$$

$(\ visible\ light)$

- wherein

$$n = 3, 4, 5 - - - - --$$

When electron jump from higher orbital to n=2 energy level

Q. 30 Correct form of gravitational law is:

Option 1:
$$F = -\frac{Gm_1m_2}{r^2}$$

Option 2:
$$\overrightarrow{F} = -\frac{Gm_1m_2}{r^2}$$

Option 3:

$$F = -\frac{Gm_1m_2\hat{r}}{r^3}$$

Option 4:

$$\overrightarrow{F} = -\frac{Gm_1m_2\hat{r}}{r^3}$$

Correct Answer:

$$\overrightarrow{F} = -\frac{Gm_1m_2\hat{r}}{r^3}$$

Solution:

As we learn

Vector form of formula -

$$\vec{F}_{12} = \frac{-Gm_1m_2}{r^2}(\hat{r}_{21})$$

$$\vec{F}_{12} = \frac{-Gm_1m_2}{r^3}(\vec{r}_{21})$$

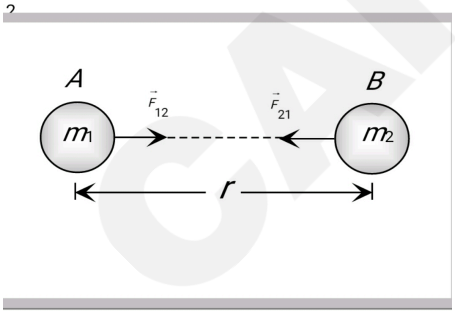
$\hat{r}_{21} \rightarrow$ Positive vector

- wherein

$\hat{r}_{12} = -\hat{r}_{21}$

So, $\vec{F}_{12} = -\vec{F}_{21}$

2



Correct form is:

$$\overrightarrow{F} = -\frac{Gm_1m_2\overrightarrow{r}}{r^3}$$

Q. 31 The unit for universal gravitational constant (G) is :

Option 1:
N m kg^{-2}

Option 2:
N m^2 kg^2

Option 3:
N m^2 kg^{-2}

Option 4:
N m^2 kg^{-1}

Correct Answer:
N m^2 kg^{-2}

Solution:
As we learn

Universal Gravitational Constant (G) -

Value of G is $6.67 \times 10^{-11}\ N\ -m^2kg^{-2}\quad (S.I.)$

Dimension Formula $\left[M^{-1}L^3T^{-2}\right]$

- wherein

(i) Value of G does not depend upon the nature & size of bodies

(ii) Also independent of nature of med. between two bodies.

$$F = \frac{Gm_1m_2}{r^2}$$

$$G = \frac{Fr^2}{m_1m_2} = Nm^2kg^{-2}$$

Q. 32 A.(A + B) is:

Option 1:
AB

Option 2:
B

Option 3:
A

Option 4:
1

Correct Answer:
A

Solution:
As we learn

Some Important relation -

$$A + A = A$$

$$A \cdot A = A$$

$$A + 1 = 1$$

$$A \cdot 1 = 1$$

$$A \cdot 0 = 0$$

$$A + 0 = A$$

-

A .A + AB = A + AB = A(1 + B) = A

Q. 33 $\overline{E+\overline{C}D}=$

Option 1:
E . (C + D)

Option 2:
$\overline{E}.(\overline{C}+\overline{D})$

Option 3:
$\overline{E}.(C+\overline{D})$

Option 4:
None of these

Correct Answer:
$\overline{E}.(C+\overline{D})$

Solution:
As we learn

D'morgan's Theorem -

1) $\overline{A+B}=\bar{A}\cdot\bar{B}$

2) $\overline{A\cdot B}=\bar{A}+\bar{B}$

3) $\overline{\bar{A}+\bar{B}}=A\cdot B$

4) $\overline{\bar{A}\cdot\bar{B}}=A+B$

- wherein

A and B are input.

$\overline{E+\overline{C}D}=\overline{E}.\overline{\overline{C}D}$

$$= \overline{E}(\overline{\overline{C}} + \overline{D})$$

$$= \overline{E}(C + \overline{D})$$

Q. 34 Which of the following do not represent a physical quantity-

Option 1:
Length

Option 2:
Mass

Option 3:
Hapiness

Option 4:
Time

Correct Answer:
Hapiness

Solution:
As we learn

Physical quantity -

A quantity which can be measured and expressed in the form of laws is called a Physical quantity.

- wherein

A physical quantity is expressed completely by it's magnitute and unit.

Correct option is 3

Q. 35 For any physical quantity Q numerical value n is related to unit u by the relation-

Option 1:

$n \alpha u^2$

Option 2:

$n \ \alpha \ u$

Option 3:

$n \ \alpha \ \sqrt{u}$

Option 4:

$n \alpha \frac{1}{u}$

Correct Answer:

$n \alpha \frac{1}{u}$

Solution:
As we learn

Physical quantity -

$Q = n \ u$

- wherein

$n = numerical \ value$(Magnitude)

$u = unit$

Chemistry

Q. 1 EMF of a cell in terms of reduction potential of its left and right electrodes is :

Option 1:
$E = E_{left} - E_{right}$

Option 2:
$E = E_{left} + E_{right}$

Option 3:
$E = E_{right} - E_{left}$

Option 4:
$E = -(E_{right} + E_{left})$

Correct Answer:
$E = E_{right} - E_{left}$

Solution:
As we learn

Electrode Potential -

The potential associated with each electrode is known as electrode potential.

-

We know that E cell

= Reduction potential of cathode + oxidation potential of Anode

= Reduction potential of Cathode - Reduction potential of Anode

$= E_{right} - E_{left}$

Q. 2 In the following reaction which species undergoes reduction?

$$2Na(s) + H_2(g) \rightarrow 2NaH(s)$$

Option 1:
Na

Option 2:
H

Option 3:
NaH

Option 4:
Not a redox reaction

Correct Answer:
H

Solution:
As we learn

Redox Reaction -

Redox reaction as a class of reactions in which oxidation and reduction reactions occur simultaneously.

-

Since Hydrogen is more electronegative than sodium, so hydrogen undergoes reduction.

Q. 3 Oxidation involves:-

Option 1:
Loss of hydrogen

Option 2:
Loss of oxygen

Option 3:
Gain in Hydrogen

Option 4:
Gain in electrons

Correct Answer:
Loss of hydrogen

Solution:
As we learn

Oxidation -

It is defined as the addition of oxygen / electronegative element to a substance or removal of hydrogen / electropositive element from a substance.

- wherein

e.g. $2H_2S(g) + 3O_2(g) \rightarrow 2SO_2(g) + 2H_2O(l)$

Addition of oxygen or removal of hydrogen from a substance called oxidation.

Q. 4 If potassium iodide (KI) acts as oxidizing agent, change occurs from, indicates presence of :-

Option 1:
Colorless to brown

Option 2:
Colorless to blue

Option 3:
Brown to colorless

Option 4:
Blue to colorless

Correct Answer:
Colorless to brown

Solution:
As we learn

Oxidising Agent -

A substance that acts as the acceptor of the electron is called oxidizing agent. Cl_2 itself get reduced in the process

- wherein

e.g. $2Na(s) + Cl_2(g) \rightarrow 2Na^+Cl^-$

Cl_2 act as oxidizing agent

Q. 5 What is the oxidation number of Cr in $Cr_2O_7^{2-}$

Option 1:
+6

Option 2:
+7

Option 3:
+5

Option 4:
Done

Correct Answer:
+6

Solution:
As we learn

Rules for Oxidation Number -

In the free or uncombined state, each atom bears an oxidation number of zero.

- wherein

e.g. H_2, O_2, Cl_2, O_3, P_4, S_8, Na, Mg, Al, etc.

$$\therefore 2O.N.(Cr) + 7O.N.(O) = -2$$

$$\therefore 2O.N(Cr) + 7(-2) = -2$$

$$\therefore ON.(Cr) = 6$$

Q. 6 In Reduction process

Option 1:
Oxidation number increases

Option 2:
Number of electron increases

Option 3:
Oxygen content increases

Option 4:
Number of ions increases

Correct Answer:
Number of electron increases

Solution:
As we learned

Redox Reaction -

Redox reaction as a class of reactions in which oxidation and reduction reactions occur simultaneously.

-

Oxidation number decreases and the number of electrons increases in the reduction process.

Q. 7 The ha;f life period of a first order reaction is 10 mins. The amount of substance left after 40 mins will be :

Option 1:
$1/4^{th}$ of the original

Option 2:
$1/8^{th}$ of the original

Option 3:
1/32 of the original

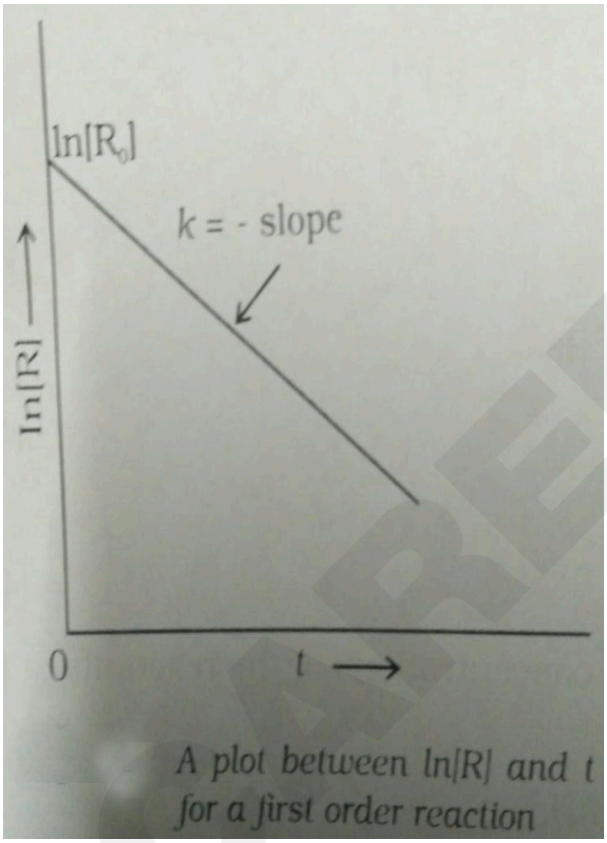
Option 4:
1/16th of the original

Correct Answer:
1/16th of the original

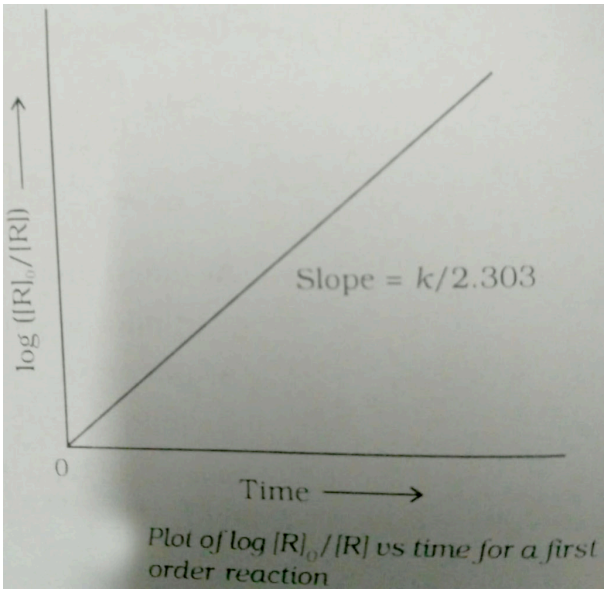
Solution:
As we learn

First Order Reaction -

The rate of the reaction is proportional to the first power of the concentration of the reactant.



A plot between ln[R] and t for a first order reaction



Plot of log $[R]_0/[R]$ vs time for a first order reaction

- wherein

Formula:

R $\rightarrow$ P

a 0

a-x x

$$rate[r] = K[R]^1$$

$$\frac{-d(a-x)}{dt} = K(a-x)$$

$$\frac{-dx}{dt} = K(a-x)$$ [differentiate rate law]

$$ln\left[\frac{a}{a-x}\right] = kt\ (Integrated rate law)$$

Unit of $k = sec^{-1}$

$$t_{\frac{1}{2}} = \frac{0.693}{k}$$

Half life for 1st order Reaction:

$$t_{\frac{1}{2}} = \frac{0.693}{k}$$

$$10 = \frac{0.693}{K}$$

$$K = 6.93 \times 10^{-2}$$

Also, $6.93 \times 10^{-2} = \frac{2.303}{40} log \frac{1}{x}$

$$x = \frac{1}{16}$$

Q. 8 For the reaction:

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

The equality relationship between $\frac{d[NH_3]}{dt}$ and $\frac{-d[H_2]}{dt}$ is:

Option 1:

$$+\frac{d[NH_3]}{dt} = \frac{-2}{3}\frac{d[H_2]}{dt}$$

Option 2:

$$+\frac{d[NH_3]}{dt} = \frac{-3}{2}\frac{d[H_2]}{dt}$$

Option 3:

$$+\frac{d[NH_3]}{dt} = \frac{-d[H_2]}{dt}$$

Option 4:

$$+\frac{d[NH_3]}{dt} = \frac{-1}{2}\frac{d[H_2]}{dt}$$

Correct Answer:

$$+\frac{d[NH_3]}{dt} = \frac{-2}{3}\frac{d[H_2]}{dt}$$

Solution:
As we learn

Rate of reaction -

The rate of the reaction during the courses of a reaction in any instant of time is the change in the concentration of reacting species. Rate is a positive quantity.

Unit = $mol\ L^{-}\ sec^{-}\ =\ [concentration][time]^{-}$

- wherein

$R \rightarrow P$

t = t_1

$R_1 \rightarrow P_1$

t = t_2

$R_2 \rightarrow P_2$

$\Delta t = t_2 - t_1\ \Delta R = [R_2] - [R_1]$

ΔP=$[P_2] - [P_1]$

As we know,

rate of consumption of reactant is denoted by -ve sign, whereas product formation is donated by +ve sign,

dividing by 3, both the sides

$$\frac{1}{3}N_2(g) + H_2(g) \rightarrow \frac{2}{3}NH_3(g)$$

for 1 mole of H_2 gas consumed, $\frac{2}{3}$ mole of NH_3 is getting produced, so the correct relation is :

$$+\frac{d[NH_3]}{dt} = \frac{-2}{3}\frac{d[H_2]}{dt}$$

Q. 9 Which of the following characteristic is not correct for physical adsorption?

Option 1:

Adsorption increases with the increase in temperature

Option 2:
Adsorption is spontaneous

Option 3:
Both enthalpy and entropy of adsorption are negative

Option 4:
Adsorption on solids is reversible

Correct Answer:
Adsorption increases with the increase in temperature

Solution:
As we learn

Chemical Kinetics -

The branch of chemistry which predicts the rate and mechanism of a process

-

As adsorption is an exothermic process, the rise in temperature will decrease adsorption.

Q. 10 For the reaction $A + 2B \rightarrow C$, rate is given by $R = [A][B]^2$, then the order of the reaction will be ;

Option 1:
2

Option 2:
5

Option 3:
3

Option 4:
7

Correct Answer:
3

Solution:
As we learn

Order of a Reaction -

The order of a reaction is determined as the sum of the powers of the concentration terms that appear in the experimental rate equation. It is an experimental quantity.

- wherein

Formula: $aA + bB \rightarrow cC + dD$

$$r = K[A]^a[B]^b$$

$$order = (a + b)$$

$\therefore$ Order has relation with stoichiometry & is determined experimentally. It can be zero/fraction/negative/positive

Order is the sum of power of the concentrations terms in rate law expression.

$R = [A]^x[B]^y$

$order = x + y$

hence order = 1+2=3

Q. 11 When the equilibrium is attained between reactant and product, which one of the following is correct for the same ?

Option 1:
Rate of change of reactant to product and vice-versa becomes constant.

Option 2:
Concentration of reactant and product becomes constant

Option 3:
Rate of conversion of reactant to product and vice -versa becomes same.

Option 4:
Both (2) and (3)

Correct Answer:
Both (2) and (3)

Solution:
As we learn

Meaning of equilibrium -

It is the state of a process in which the properties like temperature, pressure and concentration etc. of the system do not show any change with passage of time.

- wherein

It can occur in physical as well as chemical process.

When a reaction attains equilibrium the rate of reaction of forward and backward reaction becomes same and the concentration of reactants and products becomes constant.

Q. 12 Species acting as both Bronsted Acid and base is :

Option 1:
$(HSO_4)^{1-}$

Option 2:
Na_2CO_3

Option 3:
NH_3

Option 4:
OH^{-1}

Correct Answer:
$(HSO_4)^{1-}$

Solution:
As we learn

Bronsted - Lowry Acids and Bases -

According to bronsted lowry theory, acid is a substance that is capable of donating a hydrogen ion H^+ and bases are substance that are capable of accepting H^+ ion.

- wherein

$$NH_3 + H_2O \rightleftharpoons NH_4^+ + \bar{O}H$$

$$NH_4^+ \rightarrow add\ proton$$

$$\bar{O}H \rightarrow lose\ proton$$

The substance which can donate as well accept H^+ ions can acts as bronsted acid as bronsted base.

$$HSO_4^- + H^+ \rightarrow H_2SO_4$$

$$HSO_4^- \rightarrow H^+ + SO_4^{2-}$$

Q. 13 Which of the following is a lewis acid ?

Option 1:
PH_3

Option 2:
$B(CH_3)_3$

Option 3:
NaH

Option 4:
NF_3

Correct Answer:
$B(CH_3)_3$

Solution:
As we learn

Lewis acids and bases -

Lewis defined an acid as a species which accepts electron pair and base which donate an electron.

- wherein

In lewis acid many acid do not have protons.

$e.g.\ BF_3$

$BF_3 + NH_3 \rightarrow BF_3 : NH_3$

In lewis acid many acid do not have protons.

$e.g.\ BF_3$

$BF_3 + NH_3 \rightarrow BF_3 : NH_3$

It is electron deficient/ so it can accept lone pair of electron and behave as lewis Acid.

Q. 14 If the solubility of CL_2 gas in water at STP is 0.0729 m , calculate Henrry constant ?

Option 1:
815.5

Option 2:
822.5

Option 3:
840.5

Option 4:
838.5

Correct Answer:
822.5

Solution:
As we learn

Henry's Law -

The mass of a gas dissolved in a given mass of solvent at any temperature is proportional to the pressure of the gas above the solvent.

- wherein

This amount decrease with increase in temperature.

Solubility of Cl_2 = 0.0729$\rightarrow$0.0729 mole in 1 kg solvent

$$n_{solvent} = \frac{1000}{18} = 55.55 moles$$

$$\therefore x\ Cl_2 = \frac{0.0729}{0.0729 + 55.55}$$

$$= 0.0012$$

at STP , P = 0.987

$$P_{cl_2} = K_H \times Cl_2$$

$$P_{cl_2} = K_H \times Cl_2$$

$$K_H = \frac{0.987}{0.0012} = 822.5\ bar$$

Q. 15 Which option is correct for the compound A_xB_y.

Option 1:
Mole of A = Mole of B = Mole of A_xB_y

Option 2:
Eq. of A = Eq. of B = Eq. of A_xB_y

Option 3:
Y*x Mole of A = Y*x Mole of B

Option 4:
x * y Mole of A =x X y Mole of B = (x +y)* yMole of A_xB_y

Correct Answer:
Eq. of A = Eq. of B = Eq. of A_xB_y

Solution:
As we learn

Mole Concept -

One mole is the amount of a substance that contains as many particles or entities as there are atoms in exactly 12 g (or 0.012 kg) of the 12C isotope.

- wherein

one mole = $6.0221367 \text{ X } 10^{23}$

Equal equivalents of reactant ready to give same equivalents of product.

Q. 16 The molality of 20 % (Mass/Vol) solution of H_2SO_4 of density 1.59 g/ cm^3 is approximately:

Option 1:
1.69

Option 2:
1.56

Option 3:
1.7

Option 4:
2.0

Correct Answer:
1.56

Solution:
As we learn

Molality -

Molality (m) = (number of moles of solute)/(mass of solvent in kg)

- wherein

It is defined as the number of moles of solute present in 1 kg of solvent. It is denoted by m.

Mass percent of solution -

Mass percent = ((mass of solute)/(mass of solution)) X 100

- wherein

it is mass of solute present in 100 gram solution.

$$M = \frac{20}{98 \times (\frac{100 \times 1.5 - 20}{1000})} = 1.56g$$

Q. 17 How many atoms are contained in a mole of 2- HYDROXY-PROPANOIC ACID (Lactic acid).

Option 1:
12 X NA

Option 2:
10 X NA

Option 3:
8 X NA

Option 4:
14 X NA

Correct Answer:
12 X NA

Solution:
As we learn

Mole Concept -

One mole is the amount of a substance that contains as many particles or entities as there are atoms in exactly 12 g (or 0.012 kg) of the 12C isotope.

- wherein

one mole = 6.0221367×10^{23}

1 mole of lactic acid $C_3H_6O_3$ contains 12 mole of atoms. So, 1 mole contains 12 N atoms.

Q. 18 In 100 me of UREA, 6.02×10^{21} molecules are present. The molarity of urea solution is :

Option 1:
0.01

Option 2:
0.1

Option 3:
0.001

Option 4:
1

Correct Answer:
0.1

Solution:
As we learn

Molarity -

Molarity (M) = (Number of moles of solute)/(volume of solution in litres)

- wherein

It is defined as the number of moles of the solute in 1 litre of the solution.

$$M = \frac{mole\ of\ urea}{volume\ in\ littre} = \frac{6.02 \times 10^{21}}{6.02 \times 10^{23} \times \frac{100}{100}}$$

$$= 0.1M$$

Q. 19 The molarity of 0.006 moles of NaCl in 100 ml solutions in -

Option 1:
0.6

Option 2:
0.06

Option 3:
0.006

Option 4:
0.066

Correct Answer:
0.06

Solution:
As we learn

Molarity -

$$Molarity = \frac{Moles\ of\ solute}{Vol.of\ solution(L)}$$

-

$$Molarity = \frac{Moles\ of\ solute}{Vol.of\ solution(L)}$$

$$M = \frac{n}{V(l)} = \frac{0.006}{0.1} = 0.06$$

Q. 20 A mixture has 18 g water and 414 g of ethamol. The mole fraction of water in mixture is :

Option 1:
0.1

Option 2:
0.4

Option 3:
0.7

Option 4:
0.9

Correct Answer:
0.1

Solution:

As we learn

Mole Fraction -

$$Mole\ Fraction = \frac{Moles\ of\ solute}{Moles\ of solute + Moles\ of solvent}$$

-

$$Mole\ Fraction = \frac{Moles\ of\ solute}{Moles\ of solute + Moles\ of solvent}$$

The mole fraction of water = $\frac{\frac{18}{18}}{\frac{18}{18}+\frac{414}{46}} = 0.1$

Q. 21 Which of the following will have highest freezing point at 1 atm?

Option 1:
0.1 M Nacl solution

Option 2:
0.1 M sugar solution

Option 3:
0.1 M $BaCl_2$ solution

Option 4:
0.1 M $Fecl_3$ solution

Correct Answer:
0.1 M sugar solution

Solution:
As we learn

Non electrolyte solute -

Solute which neither dissociates nor associates when dissolved in solvent.

e.g. Glucose ,Urea

-

Lesser the number of particles in solution, lesser the depression in freezing point, hence higher freezing point.

Q. 22 The correct sequence for the ions of their radii-

Option 1:
$F^- > Be^+ > B^{2+} > Cl^-$

Option 2:
$F^- > Cl^- > Be^+ > Be^{2+}$

Option 3:
$Cl^- > F^- > Be^{2+} > Be^+$

Option 4:
$Cl^- > F^- > Be^+ > Be^{2+}$

Correct Answer:
$Cl^- > F^- > Be^+ > Be^{2+}$

Solution:
As we learn

Size of atom and ion in a group -

In a group moving from top to the bottom the number of shell increases.So the atomic size increases.

- wherein

$Li < Na < K < Rb < Cs$

$$Ionic\,radii\ \alpha\ \frac{z}{e} = \frac{Atomic\,number}{Total\,electron}$$

Correct option is 4.

Q. 23 Which of the following ions has the lowest magnetic moment?

Option 1:
Fe^{2+}

Option 2:
Co^{3+}

Option 3:
Ni^{2+}

Option 4:
Cu^{2+}

Correct Answer:
Cu^{2+}

Solution:
As we learn

Magnetic property -

They are paramagnetic since they contain unpaired electrons. Each electron act as a small magnet.

-

$\mu = \sqrt{n(n+2)}$, Cu^{2+} has a lowest value of μ among them.

Correct option is 4.

Q. 24 The most non-metallic element among the following is :

Option 1:
$Is^2, 2s^2, 2P^6$

Option 2:
$Is^2, 2s^2, 2P^2$

Option 3:
$Is^2, 2s^2, 2P^4$

Option 4:
$Is^2, 2s^2, 2P^3$

Correct Answer:
$Is^2, 2s^2, 2P^4$

Solution:
As we learn

Electronegativity -

A qualitative measure of the ability of an atom in a chemical compound to attract shared electron is electronegativity.

- wherein

It is not a measurable quantity.

$Is^2, 2s^2, 2P^4 \rightarrow$oxygen is the most metallic element.

Q. 25 $NaCl \ and \ NH_4cl$ can be separated by

Option 1:
Distillation

Option 2:
Fractional distillation

Option 3:
Sublimation

Option 4:
None of these

Correct Answer:
Sublimation

Solution:
As we learned

Sublimation -

This method is used to separate the sublimable compounds.

- wherein

e.g. salicylic and $HgCl_2$, $AlCl_3$, $FeCl_3$

NH_4cl is sublimable substance, so it can be separated by sublimation.

Q. 26 Chloroform and Aniline are easily separated by the technique of

Option 1:
Sublimation

Option 2:
Crystallisation

Option 3:
Distillation

Option 4:
None

Correct Answer:
Distillation

Solution:
As we learned

Distillation -

This method is used to separate volatile liquid to a nonvolatile liquid having sufficient difference in their boiling point.

- wherein

Hexane + Toluene

If the difference in boiling points of two liquids is not much, fractional distillation can be used to separate them.

Q. 27 Which technique is used to separate glycerol from spent-lye in soap industry.

Option 1:
Simple distillation

Option 2:
Sublimation

Option 3:
Distillation under reduced pressure

Option 4:
Crystallisation

Correct Answer:
Distillation under reduced pressure

Solution:

As we learned

Distillation under reduced pressure -

This method is used to purify liquid having high boiling points and decomposes below their boiling point.

-

Glycerol can be separated from spent - lye in soap industry by distillation under reduced pressure.

Q. 28 Which of the following is the best method to prepare n-butane?

Option 1:

$$CH_3Br + C_3H_7Br + 2Na \overset{dryether}{\rightarrow}$$

Option 2:

$$2C_2H_5Br + 2Na \overset{dryether}{\rightarrow}$$

Option 3:

$$CH_3 - C \equiv C - CH_3 + H_2 \xrightarrow[\Delta]{pt/pd/ni}$$

Option 4:

None of these

Correct Answer:

$$2C_2H_5Br + 2Na \overset{dryether}{\rightarrow}$$

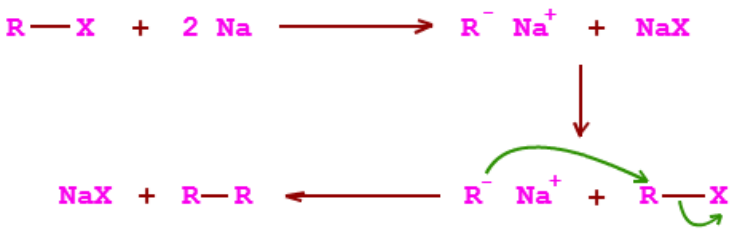
Solution:

As we learn

Preparation of Alkane from alkyl halide (Wurtz Reaction) -

Alkyl halide on treatment with metal in dry ether (free from moisture) solution give higher alkane.

- wherein



$$C_2H_5Br + 2Na + C_2H_5Br \overset{dryether}{\rightarrow} C_4H_{10} + 2NaBr$$

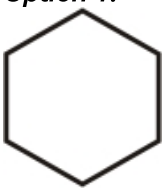
Option 1 will give mixture.

Option 3 will give alkene.

Hence, correct option is 2.

Q. 29 You have n- alkanes having six carbon atom. You heat that compound at 773 k and pressure is 10-20 atm in the presence of V_2O_5. The final product will be ?

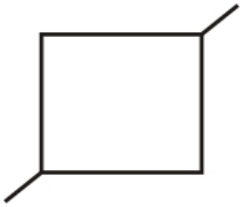
Option 1:



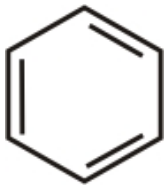
Option 2:

Option 3:

Option 4:



Correct Answer:



Solution:
As we learn

Boiling Point -

$$Boiling\ Point\ \alpha\ Surface\ area$$

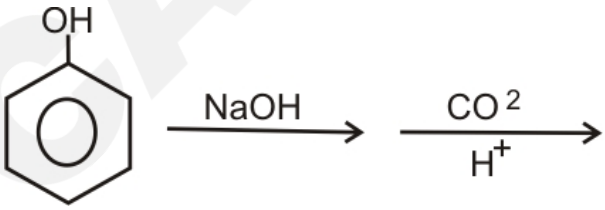
$$Boiling\ Point\ \alpha\ Molecular\ Mass$$

- wherein

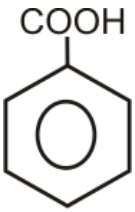
$$Boiling\ Point \Rightarrow n-pentane > isopentane > neopentane$$

Correct option is 2.

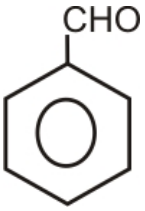
Q. 30 Major product of the given reaction :



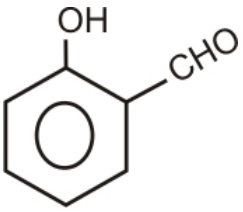
Option 1:



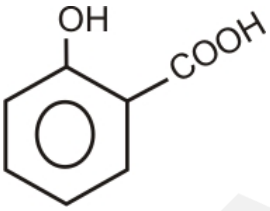
Option 2:



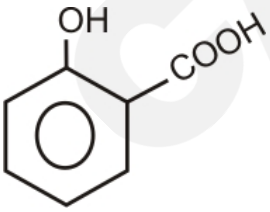
Option 3:



Option 4:



Correct Answer:

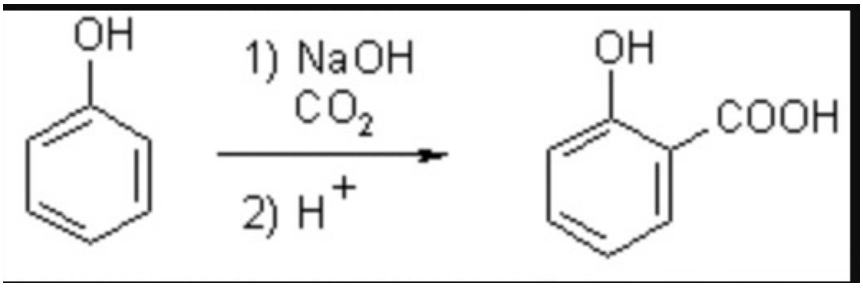


Solution:
As we learn

Kolbe's Schmidth reaction -

Phenoxide ion undergo electrophilic substitution with CO_2, a weak electrophile.

- wherein



Q. 31 HBr reacts fastest with :

Option 1:
Propan-2-01

Option 2:
2-methyl-propan-1-01

Option 3:
2- methyl-propan-2-01

Option 4:
Propan-1-01

Correct Answer:
2- methyl-propan-2-01

Solution:
As we learn

Physical properties of Phenol -

– Phenols are more acidic than phenol.

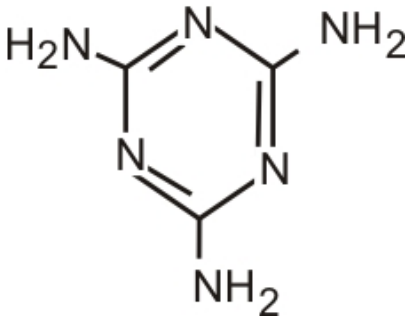
– They are less soluble in water but readily soluble in organic solvents.

– They liquify due to high hygroscopic nature.

-

2-methyl-2-propanol will react fastest with HBr.

Q. 32 What is the name of the given compound :



Option 1:
Styrene

Option 2:
Melamine

Option 3:
Thiokol

Option 4:
Terylene

Correct Answer:
Melamine

Solution:
As we learn

Melanin formaldehyde resin -

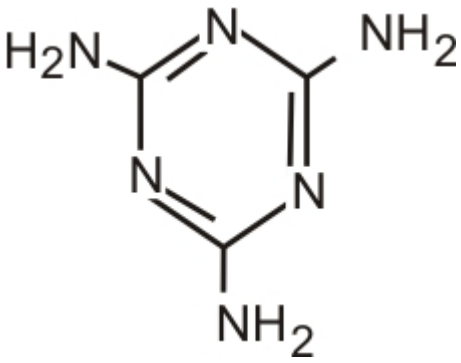
- Obtained by condensation polymerization of melanin and formaldehyde.

- Step-growth, copolymer

- wherein

- Hard

- Used in non-breakable crockery



is melamine.

Q. 33 Which one of the following statement is wrong ?

Option 1:
PVC stands for polyvinyl chloride

Option 2:
PTFE stands for deflon

Option 3:
PMMA stands for polymethyl methyl acrylate

Option 4:
Buna -S stands for natural rubber

Correct Answer:
Buna -S stands for natural rubber

Solution:
As we learn

Buna- S -

- Obtained by copolymerisation of 1, 3- butadiene and styrene

- wherein

- Resistant to wear and tear.

- Used in making tyres and mechanical rubber goods.

Buna -S is a synthetic rubber.

Q. 34 Carbohydrates which differ in configuration at a carbon other than the anomeric carbon are called:

Option 1:
Anoners

Option 2:
Mutarotation

Option 3:
Epimers

Option 4:
Hydrolase

Correct Answer:
Epimers

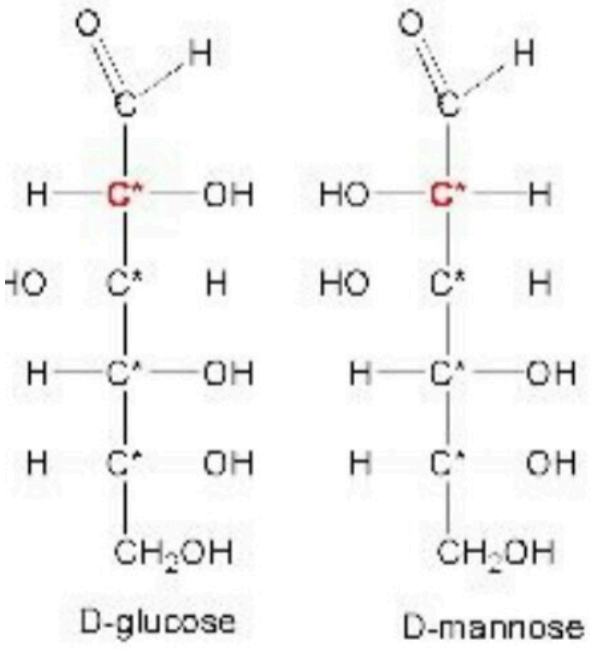
Solution:
As we learn

Epimer -

When molecules differ from one another at one of the asymmetric / chiral centre .

- wherein

Eg. Glucose and Mannose



This is the defination of Epimers like glucose and galactose are C_4- epimers.

Correct option is 3.

Q. 35 The function of DNA is :

Option 1:
To synthesis RNA

Option 2:
To synthesis the necessary protein

Option 3:
To carry the heriditary characteristics

Option 4:
All are correct

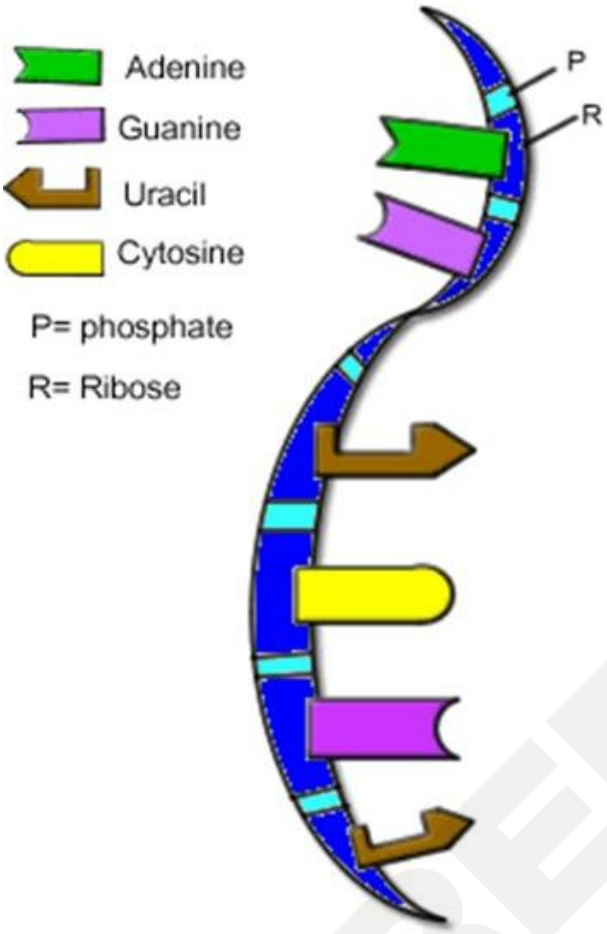
Correct Answer:
All are correct

Solution:
As we learn

Structure of RNA -

Exist as single stranded structure

- wherein



DNA allows all modern living thing to function, grow and reproduce.

Correct option is 4.

Maths

Q. 1 If 2

$$f(x) = ln\frac{x^2}{2}, 3g(x) = ln\frac{x^3}{3}, 4n(x) = ln\frac{x^4}{4} \ and \ f'(x) = F(x), g'(x) = G(x) \ and h'(x) = H(x) \ Then$$

Option 1:
f (x) = g(x) = h(x)

Option 2:
f (x) = g(x) > h(x)

Option 3:
f (x) > g(x) = h(x)

Option 4:
none of these

Correct Answer:
f (x) = g(x) = h(x)

Solution:
As we have learned

Reason for indefinite integration -

We know that $\frac{\mathrm{d}}{\mathrm{d}x}(c)=0$, this implies that $F(x)$ and $F(x)+c$ are both integrals of the same function $f(x)$. For different values of c, we obtain different integrals of $f(x)$. So $f(x)$ is not definite hence indefinite .

- wherein

Where $\frac{\mathrm{d}}{\mathrm{d}x}(c)$ is differential of constant w.r.to x

$$f'(x)=F(x)$$

$$f(x)=1/2ln\frac{x^2}{2}$$

$$f'(x)=1/2lnx^2-ln2$$

$$2/2lnx-ln2$$

$$f'(x)=1/x=F(x)$$

similarly

G(x)

= 1/x

= H(x)

Q. 2 $\int_0^{2\pi} |\cos x| dx = ?$

Option 1:
1

Option 2:
2

Option 3:
3

Option 4:
4

Correct Answer:
4

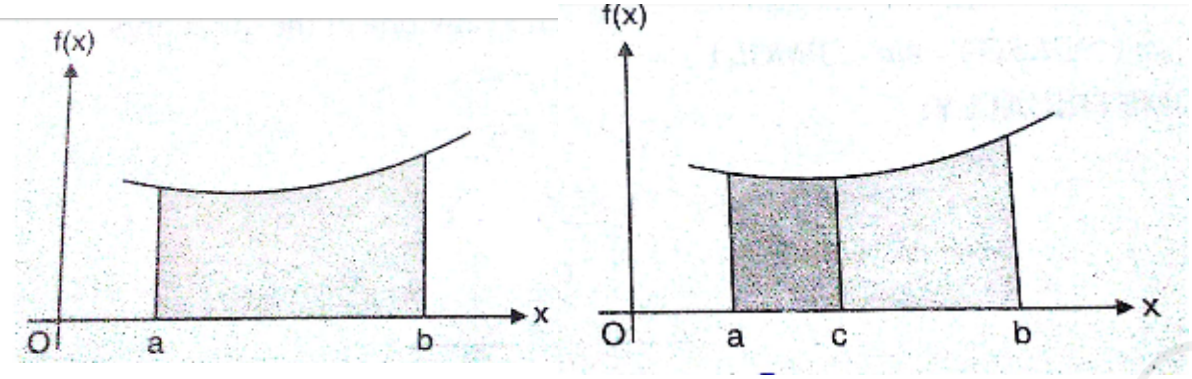
Solution:
As we have learnt,

Fundamental Properties of Definite integration -

If the function is continuous in (a, b) then integration of a function a to b will be same as the sum of integrals of the same function from a to c and c to b.

$$\int_b^a f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$$

- wherein



$$\int_0^{2\pi} |\cos x| dx = \int_0^{\frac{\pi}{2}} |\cos x| dx + \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} |\cos x| dx + \int_{\frac{3\pi}{2}}^{\pi} |\cos x| dx$$

$$= \int_0^{\frac{\pi}{2}} \cos x dx - \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} \cos x dx + \int_{\frac{3\pi}{2}}^{\pi} \cos x dx$$

$$= \sin x|_0^{\frac{\pi}{2}} - \sin x|_{\frac{\pi}{2}}^{\frac{3\pi}{2}} + \sin x|_{\frac{3\pi}{2}}^{\frac{\pi}{2}}$$

$$= 4$$

Q. 3 $\int_0^6 \frac{\log x^2}{\log x^2 + \log(81 - 18x + x^2)} dx =$

Option 1:

$-\frac{3}{2}$

Option 2:

$\frac{3}{2}$

Option 3:

$\frac{2}{3}$

Option 4:

$-\frac{2}{3}$

Correct Answer:

$\frac{3}{2}$

Solution:

As we have learnt,

Properties of Definite integration -

$$\int_a^b f(x)\,dx = \int_a^b f(a+b-x)\,dx$$

When $\int_0^b f(x)\,dx = \int_0^b f(b-x)\,dx$

- wherein

Put the $(a+b-x)$ at the place of x in $f(x)$

$$\int_3^6 \frac{\log x^2}{\log x^2 + \log(81-18x-x^2)}dx = \int_3^6 \frac{2\log x}{2\log x + 2\log(9-x)}dx$$

$$\Rightarrow I = \int_3^6 \frac{\log x}{\log x + \log(9-x)}dx \quad ...(i)$$

$$\Rightarrow I = \int_3^6 \frac{\log(6+3-x)}{\log(6+3-x) + \log[6+3-(9-x)]}dx$$

$$\Rightarrow I = \int_3^6 \frac{\log x}{\log(9-x) + \log x}dx \quad ...(ii)$$

Add (i) and (ii)

$$\Rightarrow 2I = \int_3^6 \frac{\log x + log(9-x)}{\log(9-x) + \log x} dx$$

$$\Rightarrow 2I = \int_3^6 1dx = [x]\,|_3^6 = 3$$

$$\Rightarrow I = \frac{3}{-2}$$

Q. 4 $$I = \int_{\log(\frac{1}{x})}^{\log x} x^3 \sin^4(x) dx$$

Option 1:

$$2\log^2(x)\left[sin^5\left(\log\left(\frac{1}{x}\right)\right)\right]$$

Option 2:

1

Option 3:

$$\frac{1}{5}\log^5(x)\left[\cos^5\left(\log\left(x\right)\right)\right]$$

Option 4:

None of these

Correct Answer:

None of these

Solution:

As we have learnt,

Properties of Definite Integration -

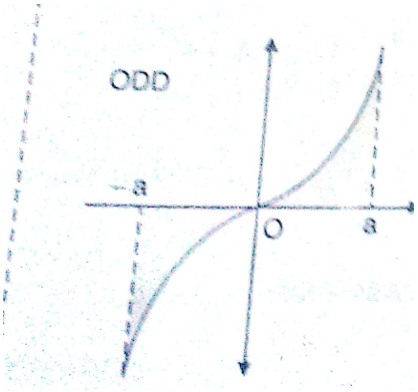
If $f(x)$ is an odd function of x then integral of the function from -a to a is ZERO

$$\int_{-a}^{a} f(x)dx = 0$$

- wherein

Check

Odd function $f(-x) = -f(x)$



$$\log\left(\frac{1}{x}\right) = -\log(x)$$

So,

$$\int_{-\log(x)}^{\log(x)} x^3 \sin^4(x)dx$$

Let,

$$f(x) = x^3 \sin^4(x)$$

$$f(-x) = (-x)^3 \sin^4(-x) = x^3[\sin(-x)]^4$$

$$= -x^3(-\sin x)^4 = -x^3 \sin^4(x) = -f(x)$$

So, $f(x)$ is an odd function

$$I = 0$$

Q. 5 Area enclosed by the curve $[|x|] + [|y|] = 2$ is ($[.]$ is the greatest integer function)

Option 1:
4

Option 2:
12

Option 3:
8

Option 4:
16

Correct Answer:
12

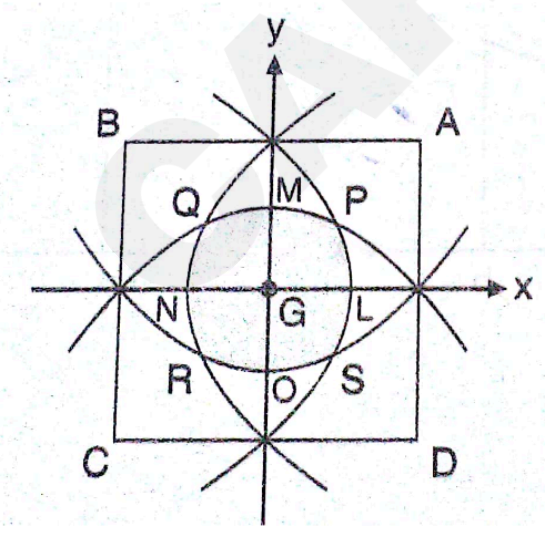
Solution:
As we have learnt,

Properties of Definite Integration -

If the function $f(x)$ is symmetric in x as well as y axis, then the absolute area of the closed figure is four times the integral of the same function in any one of the quadrant.

$$ar(PQRSP) = 4ar(LPMGL)$$

- wherein



The graph [|x|] + [|y|] = 2$ is symmetrical about x-axis and y-axis.

in the 1 quad. area will be 1 sq. unit each block

Block 1: $0 < x < 1$ and $2 < y < 3$

Block 2: $1 < x < 2$ and $1 < y < 2$

Block 3: $2 < x < 3$ and $0 < y < 1$

Total area = $1unit \times 3 \times 4 = 12units$

Q. 6 $f(x)$ and $g(x)$ are two functions whose graph intersect at 4 points (0,3), (1,2), (2,1) and (3,0) with $f(x) > g(x)$ for $0 < x < 1$ and $g(x) > f(x)$ for $1 < x < 2$ and $f(x) > g(x)$ for $2 < x < 3$. If $\int_0^3 [f(x) - g(x)]\,dx = 15$ and $\int_1^3 [g(x) - f(x)]\,dx = 10$ then area between two curve for $0 < x < 1$ is

Option 1:
10

Option 2:
20

Option 3:
15

Option 4:
25

Correct Answer:
25

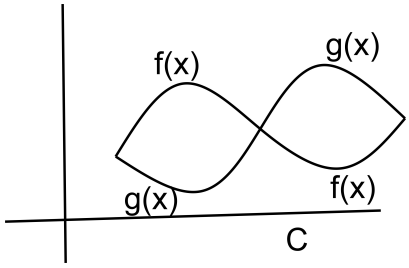
Solution:
As we have learnt,

Area between two curves -

$If\ f(x) \geqslant g(x)$
$in[a, c)\ and\ g(x) \geqslant f(x)\ in(c, b]$
$Then\ area =$

$$\int_a^c (f(x) - g(x))\,dx + \int_c^b (g(x) - f(x))\,dx$$

- wherein



Given,

$$\int_0^3 f(x)dx - \int_0^3 g(x)dx = 15$$

$$\Rightarrow A_1 + A_2 + A_3 + A_4 + A_5 + A_6 - (A_2 + A_3 + A_4 + A_6) = 15$$

$$\Rightarrow A_1 + A_5 - A_3 = 15 \quad ...(i)$$

Again,

$$\int_1^3 g(x)dx - \int_1^3 f(x)dx = 10$$

$$\Rightarrow A_3 + A_4 + A_6 - (A_4 + A_5 + A_6) = 10$$

$$\Rightarrow A_3 - A_5 = 10$$

$$\Rightarrow A_3 = 10 + A_5 \quad ....(ii)$$

from (i) and (ii)

$$A_1 + A_5 - 10 - A_5 = 15$$

$$A_1 = 25$$

Q. 7 The function $f(x) = \dfrac{|x+1|}{\tan^{-1}|x+1|}$ is continous for

Option 1:

$x \epsilon R$

Option 2:

$x \epsilon R - (-1)$

Option 3:

$x \epsilon R - (0)$

Option 4:

none of these

Correct Answer:

$x \epsilon R - (-1)$

Solution:

As we have learned

Continuity in a closed interval -

f(x) is said to be continuous in a closed interval [a, b] or

$a \leq x \leq b$ if

1. f is continuous at each and every point in (a, b)

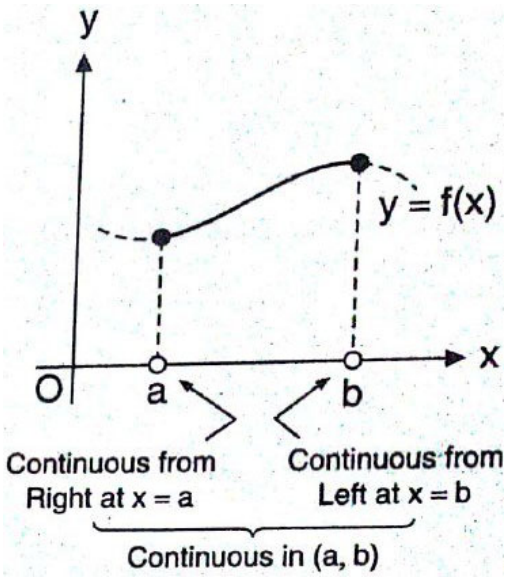
2. Right hand limit at x = a must exist and

$$\lim_{x \to a^+} f(x) = f(a)$$

3. Left hand limit at x = b must exist and

$$\lim_{x \to b^-} f(x) = f(b)$$

- wherein



f is continous except possibility x = -1

$$\lim_{x\to 1^+} f(x) = \lim_{x\to -1^+} \frac{(x+1)}{\tan^{-1}(x+1)} = 1$$

RHL = $LHL = \lim_{x\to 1^-} f(x)$

$$= \lim_{x\to -1^-} \frac{-(x+1)}{\tan^{-1}(x+1)} = -1$$

RHL is not equal to LHL hence discontonuous at -1 and continuous elsewhere

Q. 8 FInd the value of f' (0) . If f (x) is even function and f '(0) exist

Option 1:
0

Option 2:
-1

Option 3:
1

Option 4:
none

Correct Answer:
0

Solution:
As we have learned

Differentiability -

Let f(x) be a real valued function defined on an open interval (a, b) and $x\epsilon$ (a, b).Then the function f(x) is said to be differentiable at $x_\circ$ if

$$\lim_{h\to 0}\frac{f(x_0+h)-f(x_0)}{(x_0+h)-x_0}$$

$$or \quad \lim_{x\to x_0}\frac{f(x)-f(x_0)}{x-x_0}$$

-

f'(0) exist so , RHL = LHL at x = 0

$$\lim_{h\to 0}\frac{f(h)-f(0)}{h}=\lim_{h\to 0}\frac{f(-h)-f(0)}{-h}$$

f is even function , f (x) = f (-x)

$$so, \lim_{h\to 0}\frac{f(h)-f(0)}{h}=-\lim_{h\to 0}\frac{f(h)-f(0)}{h}$$

$$2\lim_{h\to 0}\frac{f(h)-f(0)}{h}=0\Rightarrow 2f'(0)=0$$

$$f'(0)=0$$

Q. 9 Let f (x) = h(x) / g (x) , where h and g are continous function on open interval (a,b) which of the following statement is true

Option 1:
f is continous at all x for which $x\neq 0$

Option 2:
f is continous at all x for which g (x) = 0

Option 3:
f is continous at all x for which $g(x) \neq 0$

Option 4:
f is continous at all x for which $h(x) \neq 0$

Correct Answer:
f is continous at all x for which $g(x) \neq 0$

Solution:
As we have learned

Properties of Continuous function -

If f, g are two continuous functions at a point a of their common domain D.Then $f \pm g$ fg are continuous at a and if $g(a) \neq 0$ then

$\frac{f}{g}$ is also continuous at x = a.

-

If h and g are continous on (a,b) then f is also continous at all x for which g (x)

is not equal to 0

Q. 10 if $f(x) = \begin{cases} x, when x > 1 \\ x^2, When x < 1 \end{cases} then \lim_{x \to 1} f(x) =$

Option 1:
x^2

Option 2:
x

Option 3:
-1

Option 4:
1

Correct Answer:
1

Solution:
As we learned

Limit -

Limits describe the behaviour of a function $f(x)$ as its variable x approaches a particular number.

- wherein

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

$$as\ x\ approaches\ 1$$

To find L.H.L at x=1 i.e.

$$\lim_{x \to 1^-} f(x) = \lim_{h \to 0} (1-h)^2 = \lim_{h \to 0} (1 + h^2 - 2h) = 1$$

$$i.e. \lim_{x \to 1^-} f(x) = 1 \cdots\cdots\cdots\cdots\cdots (i)$$

Now find R.H.L. at x=1 i.e.

$$\lim_{x \to 1^+} f(x) = \lim_{h \to 0} f(1+h) = 1 i.e. \lim_{x \to 1^+} f(x) = 1 \cdots\cdots\cdots\cdots\cdots (ii)$$

from (i) and (ii), L.H.L.=R.H.L. $\Rightarrow \lim_{x \to 1} f(x) = 1.$

Q. 11 If f(1) = f(3), and f(x) is continuous in [1,3] and differentiable in (1,3), then there exists atleast one $c\epsilon(1,3)$ such that $f'(c) =$

Option 1:
-1

Option 2:
0

Option 3:
1

Option 4:
2

Correct Answer:
0

Solution:
As we learned

Rolle's Theorems -

Let f(x) be a function of x subject to the following conditions.

1. f(x) is continuous function of $x : x\epsilon[a,b]$
2. f'(x) is exists for every point : $x\epsilon[a,b]$
3. $f(a) = f(b) \;\; then \;\; f'(c) = 0 \;\; such\ that \;\; a < c < b.$

-

Q. 12 $x^5+10x^4a+40x^3a^2+80x^2a^3+80xa^4+32a^5=$

Option 1:
$(x+a)^5$

Option 2:
$(3x+a)^5$

Option 3:
$(x+2a)^5$

Option 4:
$(x+2a)^3$

Correct Answer:
$(x+2a)^5$

Solution:
As we learned

Expression of Binomial Theorem -

$(x+a)^n = {}^nc_0x^na^0 + {}^nc_1x^{n-1}a^1 + {}^nc_2x^{n-2}a^2x - - - - - {}^nc_nx^0a^n$

- wherein

for n +ve integral .

Conversely $(x+y)^n = {}^nC_0 + {}^nC_1x^{n-1}y^1 + {}^nC_2x^{n-2}y^2 + ... + {}^nC_nx^0y^n$

$(x+2a)^5 = {}^5C_0x^5 + {}^5C_1x^4(2a)^1 + {}^5C_2x^3(2a)^2 + {}^5C_3x^2(2a)^3 + {}^5C_4x^1(2a)^4 + {}^5C_5x^0(2a)^5$

$= x^5+10x^4a+40x^3a^2+80x^2a^3+80xa^4+32a^5$

Q. 13 If the 4th term in the expansion of $(px+x^{-1})^m$ is 2.5 for all $x \epsilon R$ then

Option 1:
$p=5/2, m=3$

Option 2:
$p=\frac{1}{2}, m=6$

Option 3:
$p=-\frac{1}{2}, m=6$

Option 4:
$None\ of\ these$

Correct Answer:
$p=\frac{1}{2}, m=6$

Solution:
As we learned

General Term in the expansion of (x+a)^n -

$T_{r+1} = {}^n c_r \cdot x^{n-r} \cdot a^r$

- wherein

Where $r \geqslant 0 and r \leqslant n$

$r = 0, 1, 2, - - - - n$

$$T_4 = \frac{5}{2} \Rightarrow T_{3+1} = \frac{5}{2} \Rightarrow {}^m C_3 (px)^{m-3} \left(\frac{1}{x}\right)^3 = \frac{5}{2} \Rightarrow {}^m C_3 p^{m-3} x^{m-6} = \frac{5}{2} .....(i)$$

Clearly, R.H.S. of the above equality is independent of x

$\therefore\ m-6=0, m=6$

$Putting\ m = 6\ in\ (i)\ we\ get\ {}^{6}C_3 p^3 = \frac{5}{2} \Rightarrow p = \frac{1}{2}.\ Hence\ p = 1/2, m = 6.$

Q. 14 The coefficient of x^n in the expansion of $(1+x)(1-x)^n$ is

Option 1:
$(-1)^{n-1}n$

Option 2:
$(-1)^n(1-n)$

Option 3:
$(-1)^{n-1}(n-1)^2$

Option 4:
$(n-1)$

Correct Answer:
$(-1)^n(1-n)$

Solution:
As we learned

Comparing of Coefficients -

$T_{r+1} =^n c_r \cdot x^{n-r} \left(f\left(r\right)\right)^2$

We arrange all of x together and make $x^{(n,r)}$

compare :$x^{(n\,c,r)} = x^R$

find r

$T_{r+1} =^n c_r \cdot x^{n-r} \left(f\left(r\right)\right)^2$

We arrange all of x together and make $x^{(n,r)}$

compare :$x^{(n\,c,r)} = x^R$

find r

- wherein

r can not be -ve or fractions .

Coefficient of x^n in $(1+x)(1-x)^n$ = Coefficient of x^n in $(1-x)^n$ + Coefficient of x^{n-1} in $(1-x)^n$

= Coefficient of x^n in $\left[{}^nC_n(-x)^n + x.{}^nC_{n-1}(-x)^{n-1}\right]$

= $(-1)^n\,{}^nC_n + (-1)^{n-1}.{}^nC_1$

= $(-1)^n + (-1)^n.(-n) = (-1)^n\,[1-n]$.

Q. 15 The term independent of *x* in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ is

Option 1:
7/12

Option 2:
7/18

Option 3:
-7/12

Option 4:
-7/16

Correct Answer:
7/18

Solution:
As we leared

Independent term -

A term which does not contains x, then

$x^{(n,r)} = x^0$

$\therefore (n,r) = 0$ find r

- wherein

Where $r \geqslant 0$

$n = 9, \alpha = 2, \beta = 1. Then\ r = \frac{9(2)}{1+2} = 6. Hence\ T_7 = {}^9C_6 \left(\frac{3}{2}\right)^3 \left(-\frac{1}{3}\right)^6$

$= \frac{9 \times 8 \times 7}{3 \times 2 \times 1} . \frac{1}{2^3 . 3^3} = \frac{7}{18}.$

Q. 16 The greatest coefficient in the expansion of $(1+x)^{2n+2}$ is

Option 1:
$\frac{(2n)!}{n!^2}$

Option 2:
$\frac{(2n+2)!}{[(n+1)!]^2}$

Option 3:
$\frac{(2n+2)!}{n!(n+1)!}$

Option 4:
$\frac{(2n)!}{n!.(n+1)!}$

Correct Answer:
$\frac{(2n+2)!}{[(n+1)!]^2}$

Solution:
As we learned

Gretest Binomial Coefficient -

In Binomial expansion of $(x+a)^n$ greatest coefficient is ${}^nC_{\frac{n}{2}}$ when n is even

and ${}^nC_{\frac{n+1}{2}}$ & ${}^nC_{\frac{n-1}{2}}$ When n is odd.

- wherein

$\because {}^nC_{\frac{n+1}{2}} = {}^nC_{\frac{n-1}{2}}$

$\because$ *n* is even so greatest coefficient in

$(1+x)^{2n+2}\ is = {}^{2n+2}C_{n+1} = \frac{(2n+2)!}{[(n+1)!]^2}$

Q. 17 If $\sin A = 3/5, where\ 0 < A < 90. Then\ the\ value\ of\ \sin(2A)?$

Option 1:
-24/25

Option 2:
7/25

Option 3:
24/25

Option 4:
none of these

Correct Answer:
24/25

Solution:
As we have learned

Trigonometric Identities -

$\sin^2\Theta + \cos^2\Theta = 1$

$1 + \tan^2 \Theta = \sec^2 \Theta$

$1 + \cot^2 \Theta = cosec^2 \Theta$

- wherein

They are true for all real values of Θ

we have

$\sin A = 3/5$

$\cos^2 A = 1 - \sin^2 A = 1 - 3/5 * 3/5 = 1 - 9/25 = 16/25$

$\cos A = +4/5$

$\sin(2a) = 2 \sin A \cos A = 2 * 3/5 * 4/5 = 24/25$

Q. 18 No. of solution of the equation

$\cos 2\theta + 2 \sin^2 \theta = 0$

Option 1:
3

Option 2:
2

Option 3:
1

Option 4:
none

Correct Answer:
none

Solution:
As we have learned

Double Angle Formula -

$$\begin{array}{lcl} \sin 2\alpha & = & 2\sin\alpha\cos\alpha \\ \cos 2\alpha & = & \cos^2\alpha - \sin^2\alpha \\ & = & 2\cos^2\alpha - 1 \\ & = & 1 - 2\sin^2\alpha \\ \tan 2\alpha & = & \dfrac{2\tan\alpha}{1-\tan^2\alpha} \end{array}$$

- wherein

These are formulae for double angles.

$$1 - 2\sin^2 1\theta + 2\sin^2\theta = 0$$

$$1 = 0$$

$$no \;\; solution$$

Q. 19 $\cos^{-1} x = \tan^{-1} x, then \cos^2\Theta = ?$

Option 1:
$\dfrac{\sqrt{5}-1}{2}$

Option 2:
$\sqrt{5}+2$

Option 3:
$\dfrac{\sqrt{5}+1}{2}$

Option 4:
none

Correct Answer:

$$\frac{\sqrt{5}-1}{2}$$

Solution:

As we have learned

Trigonometric Identities -

$$\sin^2\Theta+\cos^2\Theta=1$$

$$1+\tan^2\Theta=\sec^2\Theta$$

$$1+\cot^2\Theta=cosec^2\Theta$$

- wherein

They are true for all real values of Θ

$$x=\cos\theta=\tan\theta\Rightarrow\cos^2\theta=\sin\theta$$

$$1-\sin^2\theta=\sin\theta\Rightarrow\sin^2\theta+\sin\theta-1=0$$

$$\sin\theta=\frac{1+\sqrt{5}}{2}$$

$$now,1-\cos^2\theta+\sin\theta-1=0$$

$$\cos^2\theta=\frac{\sqrt{5}-1}{2}$$

Q. 20 Let f (x) = $\tan^{-1}x+\cot^{-1}x,\ then\ \pi/2\ is\ equal\ to$

Option 1:

f (-1/ 2)

Option 2:

$f(k^2+2k-4)$

Option 3:

f ($1/k^2$)

Option 4:
all of the above

Correct Answer:
all of the above

Solution:
As we have learned

Important Results of Inverse Trigonometric Functions -

$$\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}$$

- wherein

When $x \epsilon R$

$$\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}$$

- wherein

When $x \epsilon R$

Q. 21 If 'A' = (2,3) , 'B' = (3,-5) , 'C' = (-7,2) , 'D' (-1,-4) then choose the correct option

Option 1:
'A' lies in 1 Quadrant , 'B' ;lies in 2nd quadrant

Option 2:
'A' lies in 2nd Quadrant , 'B' ;lies in 1st quadrant

Option 3:
'C' lies in 2nd Quadrant , 'D' ;lies in 4th quadrant

Option 4:
none of the above

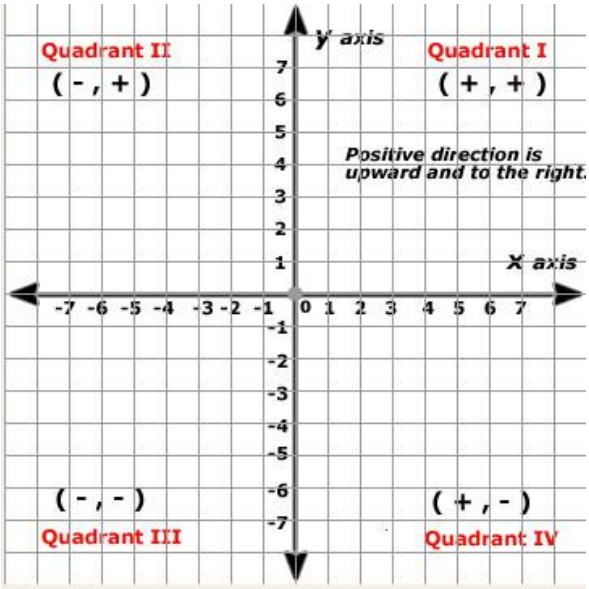
Correct Answer:
none of the above

Solution:
As we have learned

Cartesian coordinate system -

Coordinate system that specifics each point uniquely in a plane by a pair of numerical coordinates.

- wherein



A = 1st quadrant

B = 4 Quadrant

C = 2 Quadrant

D = 3 Quadrant

Q. 22 In a rectangle cartesian coordinate system

Option 1:
x = 0 represnts X-axis , y= 0 represents Y - axis

Option 2:
x = 0 represnts Y-axis , y= 0 represents X - axis

Option 3:
x = 2 represnts X-axis

Option 4:
none of the above

Correct Answer:
x = 0 represnts Y-axis , y= 0 represents X - axis

Solution:
As we have learned

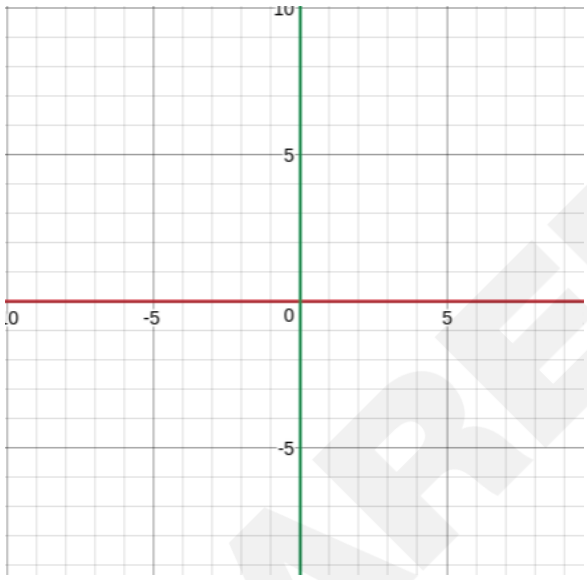
Axis -

A fixed reference line for the measurement of coordinates.

- wherein

Horizontal axis is called the x-axis and vertical axis is called the y-axis.

$\mathbf{y = 0}$
$\mathbf{x = 0}$



Q. 23 If A = (3,5) and B = (2,7) then (abiscissa A - abscissa B) = ??

Option 1:
+ve integer

Option 2:
-ve integer

Option 3:
Zero

Option 4:
Irrational number

Correct Answer:
+ve integer

Solution:
As we have learned

Abscissa -

The distance from a point to the vertical or y-axis.

- wherein

The x coordinate.

abscissa of A = (3,5) => 3

abscissa of B = (2,7) => 2

abscissa of A - abscissa of B = 3-2 = 1

=> +ve integer

Q. 24 If A = (3,5) and B = (2,7) then (ordinate A - ordinate B) = ??

Option 1:
+ve integer

Option 2:
-ve integer

Option 3:
zero

Option 4:
irrational number

Correct Answer:
-ve integer

Solution:
As we have learned

Ordinate -

The distance from a point to the horizontal or x-axis.

- wherein

The y coordinate.

ordinate of A = (3,5) = 5

ordinate of B = (2,7) = 7

=> ordinate of A - ordinate of B = 5-7 = -2

=> -ve integer

Q. 25 An event A is independent of itself only when

Option 1:
Always

Option 2:
if and only P(A) = 0

Option 3:
if only P(A)

Option 4:
If and Only If P(A) = 0 or 1

Correct Answer:
If and Only If P(A) = 0 or 1

Solution:
As we have learned

Independent events -

Two or more events are said to be independent if occurence or non occurence of any of them does not affect the probability of occurence of or non - occurence of other events.

-

The evnent can only be independent of itself when either there is no chance of happening it or when it is certain to happen

Event A and B is independent when

$$P(A \cap B) = P(A)'P(B)$$

$now\ is\ \ B = A$

$$P(AA) = P(A)\ \ when P(A) = 0 or 1$$

Q. 26 What is an operation which results in some well defined out comes ?

Option 1:
Work

Option 2:
Experiment

Option 3:
Trial

Option 4:
None of these

Correct Answer:
Experiment

Solution:
As we learned

Experiment -

An operation which results in some well-defined outcomes is called an experiment.

-

Q. 27 what is an experiment whose outcome cannot be predicted with certainty?

Option 1:
Arbitrary experiment

Option 2:
Real experiment

Option 3:
Random experiment

Option 4:
Ordinary experiment

Correct Answer:
Random experiment

Solution:
As we learned

Random Experiment -

An experiment whose outcome cannot be predicted with certainty is called a random experiment.

-

Q. 28 The sine of the angle between the vectors $a = 3i + j + k, b = 2i - 2j + k$ is

Option 1:
$\sqrt{\frac{74}{99}}$

Option 2:
$\sqrt{\frac{25}{99}}$

Option 3:
$\sqrt{\frac{37}{99}}$

Option 4:
$\frac{5}{\sqrt{41}}$

Correct Answer:
$\sqrt{\frac{74}{99}}$

Solution:
As we learn

Vector Product of two vectors(cross product) -

If $\vec{a}$ and $\vec{b}$ are two vectors and Θ is the angle between them , then $\vec{a} \times \vec{b} = \left|\vec{a}\right|\left|\vec{b}\right| Sin\Theta\hat{n}$

- wherein

$\hat{n}$ is unit vector perpendicular to both $\vec{a}\ and\ \vec{b}$

$$a \times b = \begin{vmatrix} i & j & k \\ 3 & 1 & 1 \\ 2 & -2 & 1 \end{vmatrix} = 3i - j - 8k; \sin\Theta = \frac{|a \times b|}{|a|\,|b|} = \frac{\sqrt{74}}{\sqrt{11}.\sqrt{9}} = \sqrt{\frac{74}{99}}$$

Q. 29 If $a = i + j + k, b = 4i + 3j + 4k$ and $c = i + \alpha j + \beta k$ are linearly dependent vectors and $|c| = \sqrt{3}$, then

Option 1:
$\alpha = 1, \beta = -1$

Option 2:
$\alpha = 1, \beta = \pm 1$

Option 3:
$\alpha = -1, \beta = \pm 1$

Option 4:
$\alpha = \pm 1, \beta = 1$

Correct Answer:
$\alpha = \pm 1, \beta = 1$

Solution:
As we learn

Linear combination of vectors -

Any vector $\vec{r}$, copalant with non-collinear vectors $\vec{a}$ and $\vec{b}$ can be expressed as linear combination of vectors. $\vec{r} = m\vec{a} + n\vec{b}$

- wherein

m, n are scalar.

The given vectors are linearly dependent hence, there exist scalars x,y,z not all zero, such that x**a**+y**b**+z**c**=0

i.e., $x(i + j + k) + y(4i + 3j + 4k) + z(i + \alpha j + \beta k) = 0,$

i.e., $(x + 4y + z)i + (x + 3y + \alpha z)j + (x + 4y + \beta z)k = 0,$

$\Rightarrow x+4y+z=0, x+3y+\alpha z=0, x+4y+\beta z=0,$

For non-trivial solution, $\begin{vmatrix}1 & 4 & 1\\ 1 & 3 & \alpha\\ 1 & 4 & \beta\end{vmatrix}=0 \Rightarrow \beta=1$

$|c|^2=3 \Rightarrow 1+\alpha^2+\beta^2=3 \Rightarrow \alpha^2=2-\beta^2=2-1=1; \therefore \alpha=\pm 1$

Trick : $|c|=\sqrt{1+\alpha^2+\beta^2}=\sqrt{3} \Rightarrow \alpha^2+\beta^2=2$

$\because$ a, b,c are linearly dependent,

hence $\begin{vmatrix}1 & 1 & 1\\ 4 & 3 & 4\\ 1 & \alpha & \beta\end{vmatrix}=0 \Rightarrow \beta=1.$

$\therefore \alpha^2=1 \Rightarrow \alpha=\pm 1$

Q. 30 If A is 2x2 matrix (non-zero matrix) such that $A^2=0$, where 0 is null matrix. Then tr(A)=?

Option 1:
0

Option 2:
1

Option 3:
-1

Option 4:
i

Correct Answer:
0

Solution:
As we have learnt

Trace of a Matrix -

$$tr\,(A)=\sum_{i=1}^{n} a_{ii}$$

if $A=[a_{ij}]_{n\times n}$

- wherein

The sum of the elements of a square matrix A lying along the principal diagonal

Let $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}$

$A^2=\begin{bmatrix}a^2+bc & b(a+d)\\ c(a+d) & bc+d^2\end{bmatrix}$

$=\begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$

$b(a+d)=0\,;\ c(a+d)=0$

$a^2+bc=0\ and\ bc+d^2=0$

If $a+d\neq 0$, then b=0, c=0 and hence a=0 , d=0 which is contradiction

$\therefore (a+d)=0$

Q. 31 If $\begin{bmatrix}x+2 & 0\\ y & 3y^2+y\end{bmatrix}=\begin{bmatrix}3x+8 & 0\\ 12-y^2 & -10y\end{bmatrix}$

Find the ordered pair (x,y).

Option 1:

$(-3,-\frac{1}{3})$

Option 2:

$(-3,-3)$

Option 3:

$(-3,4)$

Option 4:

$(3,3)$

Correct Answer:
$(-3, -3)$

Solution:
As we have learnt

Equal Matrices -

Same order and each element of one is equal to the corresponding element of the other.

-

$x + 2 = 3x + 8$

$x = -3$

$y^2 - y - 12 = 0$

$y = 4, -3$

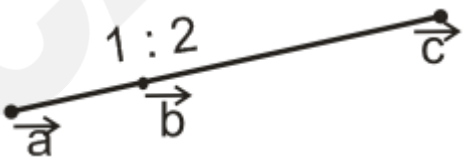
and

$3y^2 + 3 + 10y = 0$

$y = -3, -\frac{1}{3}$

So, $(x, y) = (-3, -3)$

Q. 32 In the adjoining figure, find position vector of $\vec{c}$.



Option 1:
$3\vec{b} - 2\vec{a}$

Option 2:

$\frac{\vec{a}+2\vec{b}}{3}$

Option 3:

$2\vec{a}-\vec{b}$

Option 4:

$\vec{a}-2\vec{b}$

Correct Answer:

$3\vec{b}-2\vec{a}$

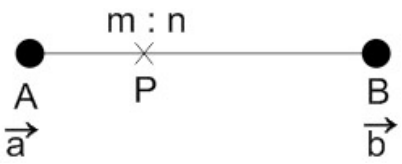
Solution:

As we have learnt

The position vector of the point P -

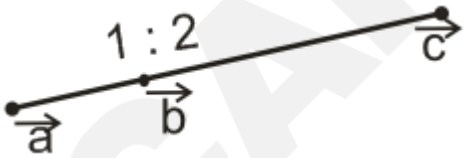
$$Position\ Vector=\frac{m\vec{b}+n\vec{a}}{m+n}$$

- wherein



form the question m=1 and n=2

so for the below figure



so $Position\ Vector=\vec{b}=\frac{1\vec{c}+2\vec{a}}{1+2}=\frac{1\vec{c}+2\vec{a}}{3}$

so $Position\ Vector=\vec{c}=3\vec{b}-2\vec{a}$

Q. 33 Write sample space of tossing a coin alongwith throwing a dice .

Option 1:
$s = (H,1)(T,1),(H,2),(T,2),(H,3),(T,3),(H,4),(T,4),(H,5),(T,5),(H,6),(T,6)$

Option 2:
$S = H,T$

Option 3:
$S = H,T,1,2,3,4,5,6$

Option 4:
None of these

Correct Answer:
None of these

Solution:
As we learned

Discrete Sample Space -

A sample space S is called a discrete sample space if S is a finite set.

-

Q. 34 Which is an example of discrete sample space ?

Option 1:
$S = x : x \epsilon N$

Option 2:
$S = 2,4,6,8,.....\infty$

Option 3:
$S = x : x\ is\ a\ prime\ \ no.$

Option 4:
$S = x : x \epsilon (1, 2)$

Correct Answer:
$S = x : x \epsilon (1, 2)$

Solution:
As we learned

Discrete Sample Space -

A sample space S is called a discrete sample space if S is a finite set.

-

Q. 35 A subset of the sample space is called :

Option 1:
Partial Set

Option 2:
Outcome

Option 3:
Event

Option 4:
Result

Correct Answer:
Event

Solution:
As we learned

Event -

A subset of the sample space is called an event.

-

Q. 36 FInd the value of k so that the equation :

$x^2+y^2-2kx+4y-7=0 \ \ is \ \ a \ \ point \ \ circle$

Option 1:

$k^2=11$

Option 2:

k = 11

Option 3:

k = 6

Option 4:

no real value

Correct Answer:

no real value

Solution:

As we have learned

Vector Area -

area of $\triangle ABC$

$=\frac{1}{2}\left[\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}\right]$

- wherein

$\vec{a}, \vec{b}$ and $\vec{c}$ are three vectors.

we have

$$g^2 + f^2 - c = 0$$

$$\Rightarrow (-k)^2 + (2)^2 - (-7) = 0$$

$$\Rightarrow k^2 + 11 = 0$$

$$k^2 = -11$$

no real value of k is possible

Q. 37 Find the sum of divisors of 240

Option 1:
720

Option 2:
744

Option 3:
124

Option 4:
186

Correct Answer:
744

Solution:
As we learnt

Sum of Divisors -

Let $n = (a_1)^{k_1}(a_2)^{k_2}.....(a_n)^{k_n}$ then

$$Sum\ of\ divisors = \left(1 + a_1 + a_1^2.....a_1^{k_1}\right)$$

$$\left(1 + a_2 + a_2^2.....a_2^{k_2}\right)$$

$$\vdots$$

$$\left(1+a_m+a_m^2.....a_m^{k_m}\right)$$

- wherein

Use sum of G.P. formed $=\frac{a(r^n-1)}{(r-1)}$. for $r \neq 1$

$$240=2^4*3*5$$

$$Sum\ of\ divisors=\left(1+a_1+a_1^2.....a_1^{k_1}\right)$$

$$\left(1+2+2^2+2^3+2^4\right)(1+3)(1+5)$$

$$=31*4*6=744$$

Q. 38 What are the total no of proper divisors of 240?

Option 1:
20

Option 2:
19

Option 3:
21

Option 4:
18

Correct Answer:
18

Solution:
As we learnt

Factors of Numbers -

Let $n = p_1^{n_1} p_2^{n_2} .....p_k^{n_k}$.The total number of proper divisors are $(1+n_1)(1+n_2)(1+n_3)..... - 2$.

- wherein

1 and self number no. not included.

$240 = 2^4 * 3 * 5$

No. of proper divisors

$= 5 * 2 * 2 - 2$

$= 18$

Q. 39 Find the no. of ways in which 3600 can be resolved into the product of 2 factors?

Option 1:
24

Option 2:
23

Option 3:
20

Option 4:
16

Correct Answer:
23

Solution:
As we learnt

Rule for Factors of Numbers -

$\frac{1}{2}(1+\alpha_1)(1+\alpha_2).....(1+\alpha_k)+1$ where $n = p_1^{\alpha_1}p_2^{\alpha_2}.....p_k^{\alpha_k}$

- wherein

Where n is a perfect square.

3600 is a perfect square,

& $3600 = 2^4 * 3^2 * 5^2$

So, No. of 2 multiples of 3600 = $\frac{5*3*3+1}{2}$

$= 23$

Q. 40 What is the number of solutions of the equation : $x_1 + x_2 + x_3 + x_4 = 11$, where $x_i, i \in \{1, 2, 3, 4\}$ are non-negative integers?

Option 1:
$^{14}P_{11}$

Option 2:
$^{11}C_8$

Option 3:
182

Option 4:
$^{10}C_3$

Correct Answer:
$^{10}C_3$

Solution:
As we learnt

Theorem of Integral Solutions -

Number of positive integral solutions of equation $x_1 + x_2 + x_3 + ...+ x_r = n$ is ${}^{n-1}C_{r-1}$.

- wherein

Where $x_i \geq 0$

$${}^{11-1}C_{4-1} = {}^{10}C_3$$

English

Q. 1 Find out the correct prepositions.

Please do not interfere ____my life.

Option 1:
in

Option 2:
on

Option 3:
about

Option 4:
with

Option 5:
into

Correct Answer:
in

Solution:
When it is a generalized concept, we use in with interfere.

Q. 2 Find out the correct prepositions.

The curd is delicious; it is made ____milk

Option 1:
of

Option 2:
from

Option 3:
off

Option 4:
up

Option 5:
with

Correct Answer:
from

Solution:
When the form of the original component is altered, we use from.

Q. 3 Change the speech.

Amit asked me, "Did you see the movie the last evening?"

Option 1:
Amit asked me whether I would see the movie earlier evening.

Option 2:
Amit asked me did I see the movie.

Option 3:
Amit asked me whether I had seen the movie the last evening.

Option 4:
Amit asked me whether I saw the movie earlier evening.

Option 5:
Amit asked me whether I had seen the movie.

Correct Answer:
Amit asked me whether I had seen the movie the last evening.

Solution:
While changing the speech, from direct to indirect, we remove the quotation marks and use a conjunction or a verb. Idiomatically and grammatically, only the last sentence is appropriate.

Q. 4 Read the following passage and answer the question that follows:

History cannot be altered and its myriad paths would follow their own destined course. However, it would not be entirely futile to indulge our imagination in picturing the course of history if such and such an event had not taken place. One such occurrence is the British colonization of India. The British colonized India gradually and established their rule over the country for more than a century. If the British colonization had not happened at all, where would we be today?

To begin with, we would not have suffered all that we did under the British in the process of winning freedom from them. Today, India's history bears the scars of British colonialism and exploitation that the memory finds hard to erase. The country was forced to undergo humiliation in terms of its pride besides suffering political, economic and social exploitation. In colonized India, the people were stripped of their rights in every sense. They could not participate in the political and economic development of their own country. They were denied the right to form their own government and run the administration of their country. The country's primary institutions including those related to judiciary, defense and law were run by outsiders who did not care about the welfare of the nation and its people. The people's attempt to win their rights only brought about suffering and death. It was not only loss of wealth and prosperity that the masses had to endure; thousands of people lost their lives in the fight for freedom from the British yoke. The country's nationalist leaders paid a heavy price in their attempt to secure freedom for India. All this would not have happened if the British had not come to reign in India.

Which of the following is synonymous to freedom?

Option 1:
Right to act

Option 2:
Right to protest

Option 3:
Self-rule

Option 4:
Right to discuss

Option 5:
Right to speak

Correct Answer:
Self-rule

Solution:
Indians had to fight the British to establish self-rule

Q. 5 Read the following passage and answer the question that follows

History cannot be altered and its myriad paths would follow their own destined course. However, it would not be entirely futile to indulge our imagination in picturing the course of history if such and such an event had not taken place. One such occurrence is the British colonization of India. The British colonized India gradually and established their rule over the country for more than a century. If the British colonization had not happened at all, where would we be today?

To begin with, we would not have suffered all that we did under the British in the process of winning freedom from them. Today, India's history bears the scars of British colonialism and exploitation that the memory finds hard to erase. The country was forced to undergo humiliation in terms of its pride besides suffering political, economic and social exploitation. In colonized India, the people were stripped of their rights in every sense. They could not participate in the political and economic development of their own country. They were denied the right to form their own government and run the administration of their country. The country's primary institutions including those related to judiciary, defense and law were run by outsiders who did not care about the welfare of the nation and its people. The people's attempt to win their rights only brought about suffering and death. It was not only loss of wealth and prosperity that the masses had to endure; thousands of people lost their lives in the fight for freedom from the British yoke. The country's nationalist leaders paid a heavy price in their attempt to secure freedom for India. All this would not have happened if the British had not come to reign in India.

Which of the following is true?

Option 1:
The British were imperialistic in nature

Option 2:
None of these

Option 3:
The British buttressed the Indians

Option 4:
The British did not want Indians to be educated

Option 5:
The Indians never mutinied

Correct Answer:
The British were imperialistic in nature

Solution:
Refer to: “In colonized India, the people were stripped of their rights in every sense. They could not participate in the political and economic development of their own country”. This is done by imperialistic powers

Aptitude

Q. 1 What is the maximum number of students among whom 1095 pens and 1168 pencils can be distributed in such a way that each student gets equal number of pens and equal number of pencils.

Option 1:
71

Option 2:
73

Option 3:
63

Option 4:
65

Option 5:
-

Correct Answer:
73

Solution:
$\text{HCF of } (1095, 1168) = 73$

Q. 2 Out of the 75 students enrolled in the Economics class, 12% did not qualify to take the final examination on account of lack of attendance. Of those who qualified to take the test, 9.09% absented themselves from the exam. Two-third of those who took the exam passed the examination. 75% of those who passed secured a first class in the paper. How many students who pass the exam scored less than first class?

Option 1:
15

Option 2:
10

Option 3:
14

Option 4:
None of these

Option 5:
12

Correct Answer:
10

Solution:
Number of students who passed the exam but scored less than 1st class =

$$75 \times \frac{88}{100} \times \frac{90.91}{100} \times \frac{2}{3} \times \frac{1}{4} = 10$$

Q. 3 A number is doubled and 9 is added. If the resultant is tripled, it becomes 75. What is that number?

Option 1:
3.5

Option 2:
6

Option 3:
8

Option 4:
9

Option 5:
None of these

Correct Answer:
8

Solution:
$3(2x+9)=75$

$By\ solving\ this\ x\ =8$

Q. 4 The price of sugar having risen by 50% by what fraction must a householder reduce his consumption of sugar so as not to increase his expenditure?

Option 1:
$\frac{1}{5}$

Option 2:
$\frac{1}{3}$

Option 3:
$\frac{1}{2}$

Option 4:
none

Option 5:
$\frac{1}{4}$

Correct Answer:
$\frac{1}{3}$

Solution:
Price 100---------->150

Here the Expenditure is the same.

So, Quantity 150---------->100

Required Percentage = 50/150 => 1/3

Q. 5 The population of a town is 12000, if the number of males be increased by 6% and that of females by 8%, the population would be increased to 12800. Find the strength of females in the town.

Option 1:
3500

Option 2:
4000

Option 3:
4500

Option 4:
4200

Option 5:
5000

Correct Answer:
5000

Solution:
Let's assume Males = x

Number of female = 12000 - x

As per the question,

x*(1.06) + (12000 - x)*(1.08) = 12800

x = 10,000

Females = 15000 - 10,000 => 5,000

Q. 6 In a mixture of 80 litres of milk and water, 25% of the mixture is milk. How much water should be added to the mixture so that milk becomes 20% of the mixture?

Option 1:
20 litres

Option 2:
30 litres

Option 3:
25 litres

Option 4:
24 litres

Option 5:
15 litres

Correct Answer:
20 litres

Solution:
Total Mixture = 80L

Milk = 80 x 0.25 => 20L

Water = 60L

As per the question,

Total Quantity x 20/100 = 20

Total Quantity = 100L

Quanity Increased/Water Added = 100-80 => 20L

Q. 7 **Directions :**

Eight persons I, J, K, L, M, N, O and P are sitting around a circulars table but not necessarily in the same order. Three of them are facing outward while five are facing towards the centre. M is third to the right of K. N is sitting third to the left of M. Three persons are sitting between N and J. O is sitting third to the right of N, who is not facing the centre. L is sitting third to the right of I, who is not facing the centre.

Who sits between N and I?

Option 1:
J

Option 2:
K

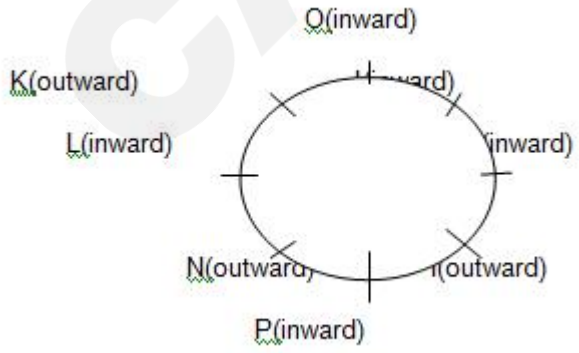
Option 3:
M

Option 4:
P

Option 5:
None of these

Correct Answer:
P

Solution:



Q. 8 **Directions :**

Eight persons I, J, K, L, M, N, O and P are sitting around a circulars table but not necessarily in the same order. Three of them are facing outward while five are facing towards the centre. M is third to the right of K. N is sitting third to the left of M. Three persons are sitting between N and J. O is sitting third to the right of N, who is not facing the centre. L is sitting third to the right of I, who is not facing the centre.

Who among the following is second to the right of J?

Option 1:
L

Option 2:
K

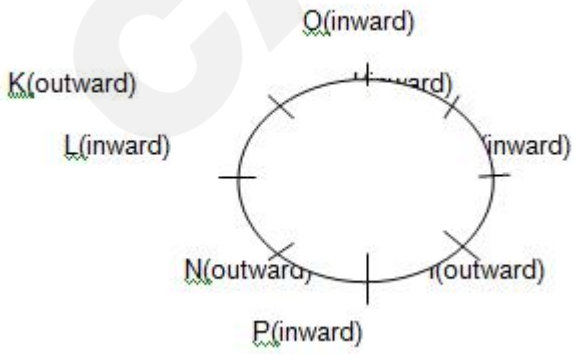
Option 3:
M

Option 4:
N

Option 5:
None of these

Correct Answer:
K

Solution:



Q. 9 **Directions :** If you start running from a point to north and after covering 4 kms you turn to your left and run 5 km, and then again turn to your left and run 5 km and then turn to the left again and run another 6 km and before finishing you take another left turn and run 1 km then answer the question.

From the finishing point if you have to reach the point where you started, in which direction will you have to run?

Option 1:
East

Option 2:
West

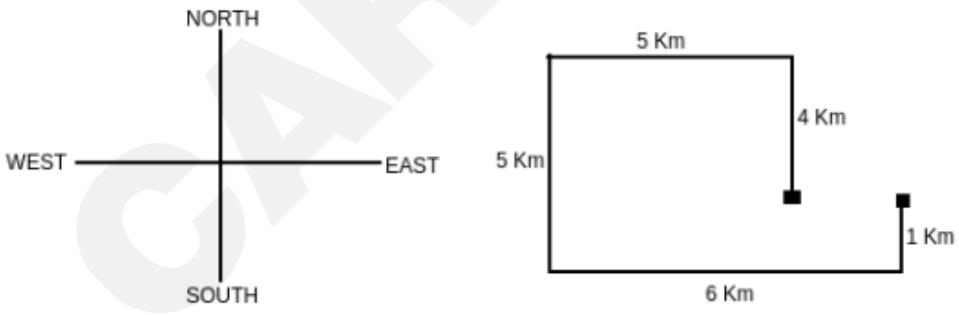
Option 3:
None of these

Option 4:
South

Option 5:
North

Correct Answer:
West

Solution:



I have to run in west direction.

Q. 10 **Direction :** Ram walks 2 km. towards north and turn to his right and walked 4 km more. He then turns to his right and walks 4 km and turn again to his right and walk another 4 km. Here he meets Renu coming from the opposite direction. They both stop here.

What is the distance between the starting point and ending point?

Option 1:
10 km

Option 2:
7 km

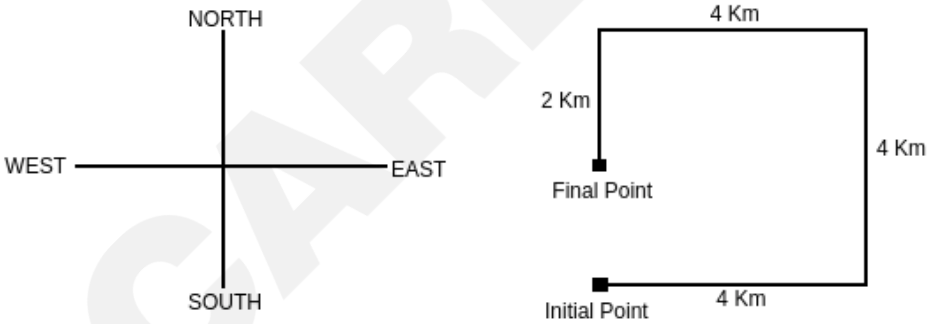
Option 3:
6 km

Option 4:
2 km

Option 5:
8 km

Correct Answer:
2 km

Solution:



Distance between starting point & endpoint = 2Km.