VITEEE 2026 April 30 Shift 1

Question Paper with Solutions

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General Instructions

(i) **Duration:** The total duration of the examination is 2.5 hours (150 minutes).

(ii) **Total Marks:** The complete paper carries a maximum of 500 marks.

(iii) **Structure:** The paper has 4 Sections:

- **Part 1:** 35 Multiple Choice Questions (Physics).
- **Part 2:** 35 Multiple Choice Questions (Chemistry).
- **Part 3:** 40 Multiple Choice Questions (Mathematics/Biology).
- **Part 4:** 10 Multiple Choice Questions (Aptitude).
- **Part 4:** 5 Multiple Choice Questions (English)

(iv) **Compulsory Questions:** All 125 questions are compulsory.

(v) Each question has four options. Only **one** option is correct.

(vi) **Correct Answer:** +4 marks.

(vii) **Incorrect Answer:** −1 (Negative marking).

(viii) **Unanswered/Marked for Review:** 0 marks.

1. If $S_n = 3n^2 + 5n$ represents the sum of n terms of an A.P., find the 10^{th} term (a_{10}).

(A) 60

(B) 62

(C) 64

(D) 66

Correct Answer: (B) 62

Solution:

Topic: Sequence and Series (Arithmetic Progression)

Step 1: Understanding the Question:

The problem provides the formula for the sum of the first n terms (S_n) of an Arithmetic Progression.

We are required to find a specific term, the 10^{th} term (a_{10}).

Step 2: Key Formula or Approach:

The relationship between the n^{th} term and the sum of terms is given by:

$$a_n = S_n - S_{n-1}$$

To find the 10^{th} term, we calculate the difference between the sum of the first 10 terms and the sum of the first 9 terms.

Step 3: Detailed Explanation:

First, we calculate S_{10} by substituting $n = 10$ into the given formula:

$$S_{10} = 3(10)^2 + 5(10)$$

$$S_{10} = 3(100) + 50 = 300 + 50 = 350$$

Next, we calculate S_9 by substituting $n = 9$:

$$S_9 = 3(9)^2 + 5(9)$$

$$S_9 = 3(81) + 45 = 243 + 45 = 288$$

Now, we find the 10^{th} term using the subtraction rule:

$$a_{10} = S_{10} - S_9$$

$$a_{10} = 350 - 288 = 62$$

Step 4: Final Answer:

The value of the 10^{th} term is 62.

Quick Tip: For any sequence, the n^{th} term is always the difference $S_n - S_{n-1}$.
In an A.P., if S_n is a quadratic expression $An^2 + Bn$, the common difference d is always $2A$.
Here, $d = 2 \times 3 = 6$. Since $a_1 = S_1 = 3 + 5 = 8$, you can also find $a_{10} = a_1 + 9d = 8 + 9(6) = 8 + 54 = 62$.

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2. Find the distance of the point $(1, -2, 3)$ from the yz-plane.

(A) 0

(B) 1

(C) 2

(D) 3

Correct Answer: (B) 1

Solution:

Topic: Three-Dimensional Geometry

Step 1: Understanding the Question:

The question asks for the perpendicular distance of a specific point in 3D space from one of the primary coordinate planes, specifically the yz-plane.

Step 2: Key Formula or Approach:

The distance of any point $P(x, y, z)$ from the coordinate planes is given by:

1. Distance from yz-plane ($x = 0$) is $|x|$.
2. Distance from xz-plane ($y = 0$) is $|y|$.
3. Distance from xy-plane ($z = 0$) is $|z|$.

Step 3: Detailed Explanation:

The given point is $P(1, -2, 3)$.

Here, the x-coordinate is 1, the y-coordinate is -2, and the z-coordinate is 3.

To find the distance from the yz-plane, we look at the absolute value of the x-coordinate.

$$\text{Distance} = |1| = 1$$

Step 4: Final Answer:

The distance of the point from the yz-plane is 1 unit.

Quick Tip: Always remember that the distance from a plane named after two axes (like yz) is simply the absolute value of the coordinate of the missing axis (like x).

This rule makes coordinate geometry problems very fast to solve without complex formulas.

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3. Evaluate the integral $\int \frac{1}{x \log x} \, dx$.

(A) $\log |x| + C$

(B) $\log |\log x| + C$

(C) $\frac{1}{\log x} + C$

(D) $\frac{\log x}{x} + C$

Correct Answer: (B) $\log |\log x| + C$

Solution:

Topic: Indefinite Integration (Calculus)

Step 1: Understanding the Question:

The objective is to find the antiderivative of the function $\frac{1}{x \log x}$.

The structure of the integrand suggests that one part of the function is the derivative of another part.

Step 2: Key Formula or Approach:

We use the Method of Substitution.

If we identify a function $g(x)$ and its derivative $g'(x)$ in the integral, we let $u = g(x)$.

Standard formula:

$$\int \frac{f'(x)}{f(x)} dx = \log |f(x)| + C$$

Step 3: Detailed Explanation:

Let $u = \log x$.

Differentiating both sides with respect to x:

$$\frac{du}{dx} = \frac{1}{x} \implies du = \frac{1}{x} dx$$

Now, substitute u and du into the original integral:

$$\int \frac{1}{\log x} \cdot \frac{1}{x} dx = \int \frac{1}{u} du$$

Integrating with respect to u:

$$\int \frac{1}{u} du = \log |u| + C$$

Substituting back the value of $u = \log x$:

$$\log|\log x| + C$$

Step 4: Final Answer:

The integral evaluates to $\log|\log x| + C$.

Quick Tip: Whenever you see x in the denominator along with $\log x$, substitution $u = \log x$ is usually the correct path.
Identify the form $\int \frac{f'(x)}{f(x)} dx$ to write the answer as $\log|f(x)|$ instantly.

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4. Calculate the de Broglie wavelength of an electron accelerated through a potential difference of $100V$.

(A) 0.1227 Å
(B) 1.227 Å
(C) 12.27 Å
(D) 0.01227 Å

Correct Answer: (B) 1.227 Å

Solution:

Topic: Dual Nature of Matter and Radiation (Modern Physics)

Step 1: Understanding the Question:

We need to find the de Broglie wavelength (λ) associated with an electron that has been accelerated by an electric potential V.

Step 2: Key Formula or Approach:

The de Broglie wavelength is given by $\lambda = \frac{h}{p}$.

For an electron accelerated through a potential V, the kinetic energy is eV.

The simplified formula for electrons is:

$$\lambda = \frac{12.27}{\sqrt{V}} \text{ Å}$$

Step 3: Detailed Explanation:

Given potential difference, $V = 100$ V.

Using the formula:

$$\lambda = \frac{12.27}{\sqrt{100}}$$

Calculating the square root:

$$\sqrt{100} = 10$$

$$\lambda = \frac{12.27}{10} = 1.227 \text{ Å}$$

Step 4: Final Answer:

The de Broglie wavelength of the electron is 1.227 Å.

Quick Tip: Memorizing the shortcut formula $\lambda = \frac{12.27}{\sqrt{V}}$ Å for electrons saves time during exams as it combines constants like h, m_e, and e.

If V is a perfect square like 100, 400, or 64, the calculation becomes extremely simple.

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5. Find the electric flux through one face of a cube if a charge q is placed at its center.

(A) $\frac{q}{\epsilon_0}$

(B) $\frac{q}{2\epsilon_0}$

(C) $\frac{q}{6\epsilon_0}$

(D) $\frac{q}{12\epsilon_0}$

Correct Answer: (C) $\frac{q}{6\epsilon_0}$

Solution:

Topic: Electrostatics (Gauss's Law)

Step 1: Understanding the Question:

A point charge is placed at the center of a cube. We need to find the electric flux passing through only one of the six faces of the cube.

Step 2: Key Formula or Approach:

According to Gauss's Law, the total electric flux (Φ_{total}) through any closed surface enclosing a charge q is:

$$\Phi_{total} = \frac{q}{\epsilon_0}$$

Step 3: Detailed Explanation:

A cube is a symmetric closed surface consisting of 6 identical square faces.

When the charge is placed exactly at the center, the electric field lines are distributed uniformly in all directions.

By symmetry, the total flux will be divided equally among all 6 faces.

$$\Phi_{one\ face} = \frac{\Phi_{total}}{6}$$

$$\Phi_{one\ face} = \frac{q}{6\epsilon_0}$$

Step 4: Final Answer:

The electric flux through one face is $\frac{q}{6\epsilon_0}$.

Quick Tip: Symmetry is the most powerful tool in Gauss's Law problems.

If the charge is at the corner of a cube, you would need 8 such cubes to enclose it, making the flux through the entire cube $\frac{q}{8\epsilon_0}$.

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6. A coil has a self-inductance of $2H$; find the induced EMF if the current changes from $5A$ to $2A$ in 0.1 seconds.

(A) $30V$

(B) $40V$

(C) $50V$

(D) $60V$

Correct Answer: (D) $60V$

Solution:

Topic: Electromagnetic Induction

Step 1: Understanding the Question:

When the current through an inductor changes, an electromotive force (EMF) is induced. We are given the inductance, the change in current, and the time duration.

Step 2: Key Formula or Approach:

Faraday's law for self-induction states that the magnitude of the induced EMF (e) is proportional to the rate of change of current:

$$e = L\left|\frac{di}{dt}\right|$$

Where L is self-inductance, di is change in current, and dt is the time interval.

Step 3: Detailed Explanation:

Given data:

Self-inductance, $L = 2$ H.

Initial current, $i_1 = 5$ A.

Final current, $i_2 = 2$ A.

Time interval, $dt = 0.1$ s.

Magnitude of change in current:

$$|di| = |i_2 - i_1| = |2 - 5| = 3 \text{ A}$$

Applying the formula:

$$e = 2 \times \frac{3}{0.1}$$

$$e = 2 \times 30 = 60 \text{ V}$$

Step 4: Final Answer:

The magnitude of the induced EMF is 60 V.

Quick Tip: Always use the magnitude of the change in current if only the value of the EMF is asked. The unit of inductance is Henry (H) and the result will be in Volts (V) if all other parameters are in SI units.

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7. Identify the monomer units used in the preparation of Nylon-6,6.

(A) Adipic acid and Hexamethylenediamine

(B) Terephthalic acid and Ethylene glycol

(C) Caprolactam

(D) Styrene

Correct Answer: (A) Adipic acid and Hexamethylenediamine

Solution:

Topic: Polymers (Organic Chemistry)

Step 1: Understanding the Question:
The question asks for the specific starting materials (monomers) used to synthesize the synthetic fiber known as Nylon-6,6.

Step 2: Key Formula or Approach:
Nylon-6,6 is a condensation polymer.
Its name "6,6" refers to the number of carbon atoms present in each of its two monomer units.

Step 3: Detailed Explanation:
1. **Adipic Acid:** It is a dicarboxylic acid with the formula $HOOC-(CH_2)_4-COOH$. It contains 6 carbon atoms.
2. **Hexamethylenediamine:** It is a diamine with the formula $H_2N-(CH_2)_6-NH_2$. It also contains 6 carbon atoms.
When these two react, they undergo condensation polymerization, losing water molecules to form amide ($-CONH-$) linkages.
The resulting polymer is a polyamide named Nylon-6,6.

Step 4: Final Answer:

The monomers are Adipic acid and Hexamethylenediamine.

Quick Tip: Nylon nomenclature tip:

Nylon-6 comes from Caprolactam (single monomer with 6 carbons).

Nylon-6,6 comes from two monomers, each having 6 carbons.

Nylon-6,10 comes from hexamethylenediamine (6C) and sebacic acid (10C).

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8. Which of the following noble gas compounds has a square planar geometry: XeF_2, XeF_4, or XeF_6?

(A) XeF_2

(B) XeF_4

(C) XeF_6

(D) None of these

Correct Answer: (B) XeF_4

Solution:

Topic: Chemical Bonding and Molecular Structure

Step 1: Understanding the Question:

We need to determine which Xenon fluoride compound exhibits a "Square Planar" molecular geometry based on electron pair arrangements.

Step 2: Key Formula or Approach:

We use the VSEPR (Valence Shell Electron Pair Repulsion) theory.

Steric Number (SN) = (Number of valence electrons on central atom + Number of monovalent

atoms - charge) / 2.

Step 3: Detailed Explanation:

For XeF_4:

Central atom Xe has 8 valence electrons.

Number of fluorine atoms (monovalent) $= 4$.

SN $= \frac{8+4}{2} = 6$.

A Steric Number of 6 corresponds to sp^3d^2 hybridization (Octahedral geometry).

Out of 6 electron pairs, 4 are Bonding Pairs (BPs) and 2 are Lone Pairs (LPs) since there are 4 Fluorine atoms.

According to VSEPR theory, to minimize repulsion, the 2 lone pairs occupy axial positions (opposite to each other).

The 4 fluorine atoms occupy the equatorial positions, resulting in a **Square Planar** molecular shape.

Step 4: Final Answer:

XeF_4 has a square planar geometry.

Quick Tip: Remember the shapes of Xenon fluorides:

XeF_2: Linear (2 BPs, 3 LPs)

XeF_4: Square Planar (4 BPs, 2 LPs)

XeF_6: Distorted Octahedral (6 BPs, 1 LP)

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9. If 'ORANGE' is coded as 'PSBOHF', how is 'GRAPES' coded?

(A) $HSBQFT$

(B) $HRBQFT$

(C) $HSBQFS$

(D) $GSBQFT$

Correct Answer: (A) HSBQFT

Solution:

Topic: Coding and Decoding (Logical Reasoning)

Step 1: Understanding the Question:
The problem provides an example of a word and its coded version. We need to identify the pattern of transformation and apply it to a new word.

Step 2: Key Formula or Approach:
Compare each letter of the original word to the corresponding letter of the coded word to see if there is a shift in alphabetical position.

Step 3: Detailed Explanation:
Analyzing 'ORANGE' → 'PSBOHF':
$O + 1 = P$
$R + 1 = S$
$A + 1 = B$
$N + 1 = O$
$G + 1 = H$
$E + 1 = F$
The pattern is that every letter is shifted forward by 1 (+1 shift).
Applying this to 'GRAPES':
$G + 1 = H$
$R + 1 = S$
$A + 1 = B$
$P + 1 = Q$
$E + 1 = F$
$S + 1 = T$

Step 4: Final Answer:
The code for 'GRAPES' is HSBQFT.

Quick Tip: In coding-decoding, quickly write down the letters and their positions (A=1, B=2... Z=26) if the shift is larger than +1 or −1.
Always verify the last letter of the word to ensure the pattern is consistent throughout.

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10. Point out the antonym of the word 'Vague'.

(A) Ambiguous
(B) Uncertain
(C) Precise
(D) Confusing

Correct Answer: (C) Precise

Solution:

Topic: Vocabulary (English Proficiency)

Step 1: Understanding the Question:
The task is to find the "antonym," which means a word with the opposite meaning of the provided word.

Step 2: Detailed Explanation:
The word **Vague** refers to something that is not clearly expressed, described, or decided. It implies a lack of clarity or definiteness.
Let us evaluate the options:
- **Ambiguous:** Means having more than one possible meaning (Synonym).
- **Uncertain:** Means not known or not definite (Synonym).
- **Confusing:** Means difficult to understand (Related to vague).
- **Precise:** Means marked by exactness and accuracy of expression or detail.
Since "Precise" represents clarity and exactness, it is the direct opposite of "Vague".

Step 3: Final Answer:

The correct antonym is Precise.

Quick Tip: To find antonyms effectively, first determine the "charge" of the word (positive/negative). "Vague" has a somewhat negative/neutral connotation of "unclear". Looking for a word that means "clear" or "exact" leads directly to "Precise".
