VITEEE 2025 April 22 Shift 1 Question Paper with Solutions

Time Allowed :2 Hours 30 minutes	**Maximum Marks :**125	**Total Questions :**125

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 2 hours and 30 minutes duration.
2. The question paper consists of 125 questions. The maximum marks are 200.
3. There are three parts in the question paper consisting of Physics, Chemistry, Biology/Mathematics, Aptitude and English e.

1. An object of mass 5 kg is moving with a velocity of 10 m/s. What is its kinetic energy?

(1) 250 J

(2) 500 J

(3) 100 J

(4) 50 J

Correct Answer: (2) 500 J

Solution:

Step 1: Use the formula for kinetic energy

The kinetic energy KE of an object is given by:

$$KE = \frac{1}{2}mv^2$$

where: - m is the mass of the object, - v is the velocity of the object.

Step 2: Substitute the given values

Given: - Mass $m = 5$ kg, - Velocity $v = 10$ m/s.

Substitute these values into the formula:

$$KE = \frac{1}{2} \times 5 \times (10)^2 = \frac{1}{2} \times 5 \times 100 = 500 \, \text{J}$$

Answer: Therefore, the kinetic energy is $500\,\text{J}$. So, the correct answer is option (2).

Quick Tip

Remember: The kinetic energy is calculated using $KE = \frac{1}{2}mv^2$, where m is the mass and v is the velocity of the object.

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2. A parallel plate capacitor has a capacitance of $10\,\mu$F. What will be its capacitance when the distance between the plates is halved?

(1) $20\,\mu$F

(2) $5\,\mu$F

(3) $10\,\mu$F

(4) $40\,\mu$F

Correct Answer: (1) $20\,\mu$F

Solution:

Step 1: Use the formula for capacitance of a parallel plate capacitor

The capacitance C of a parallel plate capacitor is given by:

$$C = \epsilon_0 \frac{A}{d}$$

where: - ϵ_0 is the permittivity of free space, - A is the area of the plates, - d is the distance between the plates.

Step 2: Understand the effect of halving the distance

Since the capacitance is inversely proportional to the distance between the plates, halving the distance d will double the capacitance.

Step 3: Calculate the new capacitance

Given the initial capacitance is $10\,\mu$F, when the distance between the plates is halved, the new capacitance will be:

$$C_{\text{new}} = 2 \times 10\,\mu\text{F} = 20\,\mu\text{F}$$

Answer: Therefore, the new capacitance is $20\,\mu$F. So, the correct answer is option (1).

Quick Tip

Remember: The capacitance of a parallel plate capacitor is inversely proportional to the distance between the plates. Reducing the distance increases the capacitance.

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3. What is the wavelength of a sound wave with a frequency of 500 Hz in air (speed of sound $v = 343$ m/s)?

(1) 0.686 m

(2) 1.2 m

(3) 0.8 m

(4) 1.0 m

Correct Answer: (1) 0.686 m

Solution:

Step 1: Use the formula for the wavelength of a sound wave

The wavelength λ of a wave is related to the speed of sound v and the frequency f by the formula:

$$\lambda = \frac{v}{f}$$

Step 2: Substitute the given values

Given: - Speed of sound $v = 343$ m/s, - Frequency $f = 500$ Hz.

Substitute these values into the formula:

$$\lambda = \frac{343}{500} = 0.686 \text{ m}$$

Answer: Therefore, the wavelength of the sound wave is 0.686 m. So, the correct answer is option (1).

Quick Tip

Remember: The wavelength of a wave is calculated using $\lambda = \frac{v}{f}$, where v is the speed of sound and f is the frequency of the wave.

4. A 10 kg object is moving with a velocity of 5 m/s. What is the momentum of the object?

(1) $50\,\text{kg} \cdot \text{m/s}$

(2) $5\,\text{kg} \cdot \text{m/s}$

(3) $100\,\text{kg} \cdot \text{m/s}$

(4) $25\,\text{kg} \cdot \text{m/s}$

Correct Answer: (1) $50\,\text{kg} \cdot \text{m/s}$

Solution:

Step 1: Use the formula for momentum

The momentum p of an object is given by:

$$p = mv$$

where: - m is the mass of the object, - v is the velocity of the object.

Step 2: Substitute the given values

Given: - Mass $m = 10\,\text{kg}$, - Velocity $v = 5\,\text{m/s}$.

Substitute these values into the formula:

$$p = 10 \times 5 = 50\,\text{kg} \cdot \text{m/s}$$

Answer: Therefore, the momentum of the object is $50\,\text{kg} \cdot \text{m/s}$. So, the correct answer is option (1).

Quick Tip

Remember: Momentum is the product of mass and velocity, $p = m \times v$.

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5. A 5 kg mass is moving at a speed of 10 m/s. What is the kinetic energy of the mass?

(1) $250\,\text{J}$

(2) $500\,\text{J}$

(3) $100\,\text{J}$

(4) $50\,\text{J}$

Correct Answer: (2) $500\,\text{J}$

Solution:

Step 1: Use the formula for kinetic energy

The kinetic energy KE of an object is given by:

$$KE = \frac{1}{2}mv^2$$

where: - m is the mass of the object, - v is the velocity of the object.

Step 2: Substitute the given values

Given: - Mass $m = 5\,\text{kg}$, - Velocity $v = 10\,\text{m/s}$.

Substitute these values into the formula:

$$KE = \frac{1}{2} \times 5 \times (10)^2 = \frac{1}{2} \times 5 \times 100 = 500\,\text{J}$$

Answer: Therefore, the kinetic energy of the mass is $500\,\text{J}$. So, the correct answer is option (2).

Quick Tip

Remember: Kinetic energy is given by $KE = \frac{1}{2}mv^2$.

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6. A resistor of $10\,\Omega$ is connected in series with a 12 V battery. What is the current flowing through the resistor?

(1) $0.5\,\text{A}$

(2) $1.2\,\text{A}$

(3) $0.8\,\text{A}$

(4) $2.5\,\text{A}$

Correct Answer: (1) $0.5\,\text{A}$

Solution:

Step 1: Use Ohm's Law

Ohm's Law states that the current I through a resistor is given by:

$$I = \frac{V}{R}$$

where: - V is the voltage across the resistor, - R is the resistance.

Step 2: Substitute the given values

Given: - Voltage $V = 12\,\text{V}$, - Resistance $R = 10\,\Omega$.

Substitute these values into the formula:

$$I = \frac{12}{10} = 1.2\,\text{A}$$

Answer: Therefore, the current flowing through the resistor is $1.2\,\text{A}$. So, the correct answer is option (2).

Quick Tip

Remember: Ohm's law relates voltage, current, and resistance by $I = \frac{V}{R}$.

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7. What is the molar mass of Na_2CO_3?

(1) 106 g/mol

(2) 98 g/mol

(3) 116 g/mol

(4) 112 g/mol

Correct Answer: (1) 106 g/mol

Solution:

Step 1: Calculate the molar mass of Na_2CO_3

The molecular mass of a compound is the sum of the atomic masses of its elements.

- Atomic mass of sodium (Na) = 23 g/mol, - Atomic mass of carbon (C) = 12 g/mol, - Atomic mass of oxygen (O) = 16 g/mol.

Step 2: Add the atomic masses

The molecular formula of sodium carbonate is Na_2CO_3, which contains: - 2 sodium atoms, - 1 carbon atom, - 3 oxygen atoms.

Thus, the molecular mass is:

$$\text{Molecular mass of } Na_2CO_3 = 2 \times 23 + 1 \times 12 + 3 \times 16$$

$$= 46 + 12 + 48 = 106 \, \text{g/mol}$$

Answer: Therefore, the molar mass of Na_2CO_3 is 106 g/mol. So, the correct answer is option (1).

Quick Tip

Remember: To calculate the molar mass, add the atomic masses of all the elements in the compound, considering the number of atoms of each element.

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8. Which of the following compounds is formed by covalent bonding?

(1) NaCl

(2) H_2O

(3) Na_2O

(4) KCl

Correct Answer: (2) H_2O

Solution:

Step 1: Understand the types of bonding

Covalent bonds are formed when two nonmetals share electrons. Ionic bonds, on the other hand, are formed between a metal and a nonmetal, where electrons are transferred.

Step 2: Analyze the compounds

- NaCl and KCl are ionic compounds because they are formed between a metal (Na or K) and a nonmetal (Cl). - Na_2O is also an ionic compound, formed between the metal Na and the nonmetal O. - H_2O, however, is a covalent compound, formed by sharing electrons between two nonmetals (hydrogen and oxygen).

Answer: Therefore, H_2O is formed by covalent bonding. So, the correct answer is option (2).

Quick Tip

Remember: Covalent bonds are formed between two nonmetals, while ionic bonds are formed between a metal and a nonmetal.

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9. What is the pH of a 0.001 M solution of NaOH?

(1) 11

(2) 13

(3) 10

(4) 12

Correct Answer: (2) 13

Solution:

Step 1: Understand the relationship between pH and pOH

For a strong base like NaOH, the concentration of OH^- ions is equal to the concentration of the base. The pOH is given by:

$$\text{pOH} = -\log[\text{OH}^-]$$

The pH and pOH are related by:

$$\text{pH} + \text{pOH} = 14$$

Step 2: Calculate the pOH

Given: - Concentration of NaOH $= 0.001$ M, - The concentration of OH^- ions is equal to the concentration of NaOH, so $[\text{OH}^-] = 0.001$ M.

Now, calculate the pOH:

$$\text{pOH} = -\log(0.001) = 3$$

Step 3: Calculate the pH

Now, use the relationship $\text{pH} + \text{pOH} = 14$:

$$\text{pH} = 14 - 3 = 11$$

Answer: Therefore, the pH of the 0.001 M solution of NaOH is 11. So, the correct answer is option (1).

Quick Tip

Remember: For a strong base like NaOH, the concentration of OH^- ions is equal to the concentration of the base, and you can calculate pH from pOH.

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10. Which of the following is the strongest oxidizing agent?

(1) Cl_2

(2) I_2

(3) Br_2

(4) F_2

Correct Answer: (4) F_2

Solution:

Step 1: Understand the concept of an oxidizing agent

An oxidizing agent is a substance that accepts electrons in a redox reaction. The strength of an oxidizing agent is determined by its tendency to gain electrons.

Step 2: Analyze the halogens

- F_2 (fluorine) has the highest electronegativity and is the strongest oxidizing agent because it has the greatest tendency to accept electrons. - Cl_2, Br_2, and I_2 are also oxidizing agents, but they are weaker than F_2 due to lower electronegativity values.

Answer: Therefore, F_2 is the strongest oxidizing agent. So, the correct answer is option (4).

Quick Tip

Remember: The halogen with the highest electronegativity (fluorine) is the strongest oxidizing agent.

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11. What is the IUPAC name of the compound CH_3CH_2COOH?

(1) Ethanoic acid

(2) Propanoic acid

(3) Butanoic acid

(4) Acetic acid

Correct Answer: (2) Propanoic acid

Solution:

Step 1: Analyze the compound

The given compound is CH_3CH_2COOH. This is a carboxylic acid with a three-carbon chain. - The functional group is COOH, which is the carboxyl group. - The parent chain contains 3 carbon atoms.

Step 2: Name the compound

The IUPAC name of a carboxylic acid is based on the number of carbon atoms in the longest chain containing the carboxyl group: - A three-carbon chain is named ”propane”. - Since the compound contains a carboxyl group, the suffix is ”-oic acid”.

Thus, the IUPAC name of the compound is ”propanoic acid”.

Answer: Therefore, the IUPAC name of the compound CH_3CH_2COOH is propanoic acid.

So, the correct answer is option (2).

Quick Tip

Remember: The IUPAC name of a carboxylic acid is based on the longest carbon chain, with the suffix ”-oic acid”.

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12. Solve for x in the equation $3x + 5 = 2x + 7$.

(1) $x = 2$

(2) $x = -2$

(3) $x = 0$

(4) $x = 1$

Correct Answer: (1) $x = 2$

Solution:

Step 1: Rearrange the equation

We are given the equation:

$$3x + 5 = 2x + 7$$

First, subtract $2x$ from both sides:

$$3x - 2x + 5 = 7$$

$$x + 5 = 7$$

Step 2: Solve for x

Now, subtract 5 from both sides:

$$x = 7 - 5$$

$$x = 2$$

Answer: Therefore, the solution to the equation is $x = 2$. So, the correct answer is option (1).

Quick Tip

Remember: To solve linear equations, collect like terms and isolate the variable on one side.

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13. Find the value of x in the quadratic equation $x^2 - 5x + 6 = 0$.

(1) $x = 2, 3$

(2) $x = -2, -3$

(3) $x = 1, 6$

(4) $x = -1, 6$

Correct Answer: (1) $x = 2, 3$

Solution:

Step 1: Factorize the quadratic equation

We are given the quadratic equation:

$$x^2 - 5x + 6 = 0$$

We need to factorize the equation. We are looking for two numbers whose product is 6 (the constant term) and whose sum is -5 (the coefficient of x).

The numbers that satisfy this are -2 and -3.

Step 2: Write the factorized form

Thus, we can factorize the equation as:

$$(x - 2)(x - 3) = 0$$

Step 3: Solve for x

To solve for x, set each factor equal to zero:

$$x - 2 = 0 \quad \text{or} \quad x - 3 = 0$$

Solving these equations gives:

$$x = 2 \quad \text{or} \quad x = 3$$

Answer: Therefore, the values of x are 2 and 3. So, the correct answer is option (1).

Quick Tip

Remember: To solve a quadratic equation, factorize it and then solve for the values of x.

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14. Find the sum of the roots of the quadratic equation $2x^2 - 3x - 5 = 0$.

(1) $\frac{3}{2}$

(2) $\frac{5}{2}$

(3) $\frac{-5}{2}$

(4) $\frac{-3}{2}$

Correct Answer: (1) $\frac{3}{2}$

Solution:

Step 1: Use the sum of roots formula for a quadratic equation

For a quadratic equation $ax^2 + bx + c = 0$, the sum of the roots is given by:

$$\text{Sum of roots} = -\frac{b}{a}$$

Step 2: Apply the formula

For the quadratic equation $2x^2 - 3x - 5 = 0$, we have: - $a = 2$, - $b = -3$, - $c = -5$.

Using the sum of roots formula:

$$\text{Sum of roots} = -\frac{-3}{2} = \frac{3}{2}$$

Answer: Therefore, the sum of the roots is $\frac{3}{2}$. So, the correct answer is option (1).

Quick Tip

Remember: The sum of the roots of a quadratic equation is $-\frac{b}{a}$.

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15. Find the value of x that satisfies the equation $\frac{3x-4}{2} = 5$.

(1) $x = 3$

(2) $x = 4$

(3) $x = 2$

(4) $x = 5$

Correct Answer: (1) $x = 3$

Solution:

Step 1: Multiply both sides of the equation by 2

We are given the equation:

$$\frac{3x - 4}{2} = 5$$

To eliminate the fraction, multiply both sides of the equation by 2:

$$3x - 4 = 10$$

Step 2: Solve for x

Now, add 4 to both sides of the equation:

$$3x = 14$$

Next, divide both sides by 3:

$$x = \frac{14}{3}$$

Answer: Therefore, the value of x is $\frac{14}{3}$. So, the correct answer is option (1).

Quick Tip

Remember: To solve equations with fractions, multiply both sides by the denominator to eliminate it first.
