MHT CET 2026 May 15 Shift 1

Question Paper (Memory-Based) with Solutions

Conducted by CET Cell, Maharashtra

General Instructions

(i) **Duration:** The total duration of the examination is 3 hours (180 minutes).

(ii) **Total Marks:** The complete paper carries a maximum of 200 marks.

(iii) **Structure:** The paper has 3 Sections:

- **Section A:** 50 Multiple Choice Questions (Physics).
- **Section B:** 50 Multiple Choice Questions (Chemistry).
- **Section B:** 100 Multiple Choice Questions (Mathematics).

(iv) **Compulsory Questions:** All 200 questions are compulsory.

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

(vi) Correct Answer: +1 marks.

(vii) **Incorrect Answer:** (No Negative marking).

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

1. The rate of reaction A → P is 1.25×10^{-2} mol dm^{-3} s^{-1} when $[A] = 0.5$ M. Calculate the rate constant if the reaction is second order in A.

(A) 0.05

(B) 0.04

(C) 0.03

(D) 0.01

Correct Answer: (A) 0.05

Solution:

Step 1: Understanding the Concept:

The rate of a chemical reaction is proportional to the concentration of reactants raised to their stoichiometric coefficients in the rate law.

For a second-order reaction involving a single reactant A, the rate expression is given by $r = k[A]^2$.

Step 2: Key Formula or Approach:

The formula to be used is:

$$\text{Rate} = k[A]^2$$

Where:

k is the rate constant.

$[A]$ is the concentration of reactant A.

Step 3: Detailed Explanation:

Given values from the problem:

Rate $(r) = 1.25 \times 10^{-2}$ mol dm^{-3} s^{-1}

Concentration $([A]) = 0.5 \text{ M} = 0.5$ mol dm^{-3}

Substitute these values into the second-order rate equation:

$$1.25 \times 10^{-2} = k \times (0.5)^2$$

$$1.25 \times 10^{-2} = k \times 0.25$$

To find k, divide the rate by the square of the concentration:

$$k = \frac{1.25 \times 10^{-2}}{0.25}$$

$$k = \frac{0.0125}{0.25}$$

$$k = 0.05$$

Step 4: Final Answer:

The rate constant for the reaction is 0.05.

Quick Tip: To quickly divide by 0.25, simply multiply the numerator by 4. $0.0125 \times 4 = 0.0500$. This saves time in competitive exams!

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2. Which of the following is a correct set of four quantum numbers for 4d orbital?

(A) (4, 3, 2, +1/2)

(B) (4, 2, 1, +1/2)

(C) (4, 1, 2, +1/2)

(D) None of these

Correct Answer: (B) (4, 2, 1, +1/2)

Solution:

Step 1: Understanding the Concept:

An electron's state in an atom is described by four quantum numbers: principal (n), azimuthal (l), magnetic (m_l), and spin (s).

For any subshell designated as nl, the first number is n and the letter indicates the value of l.

Step 2: Key Formula or Approach:

1. Principal quantum number (n) corresponds to the shell number.
2. Azimuthal quantum number (l): $s \to 0$, $p \to 1$, $d \to 2$, $f \to 3$.

3. Magnetic quantum number (m_l) ranges from $-l$ to $+l$.
4. Spin quantum number (s) is either $+1/2$ or $-1/2$.

Step 3: Detailed Explanation:

For a **4d** orbital:

$n = 4$ (Principal shell is 4).

$l = 2$ (The subshell is 'd').

Now check the conditions for m_l:

If $l = 2$, then m_l can be $-2, -1, 0, 1, 2$.

Check the options:

(A) (4, 3, 2, +1/2): Here $l = 3$, which corresponds to 4f. Incorrect.

(B) (4, 2, 1, +1/2): Here $n = 4, l = 2, m_l = 1$. Since $|1| \leq 2$, this is valid. Correct.

(C) (4, 1, 2, +1/2): Here $l = 1$, which corresponds to 4p. Also $m_l = 2$ is impossible for $l = 1$. Incorrect.

Step 4: Final Answer:

The correct set is $(4, 2, 1, +1/2)$.

Quick Tip: Always remember the l value sequence: s=0, p=1, d=2, f=3.
Then check if $|m_l| \leq l$. If this is violated, the set is impossible.

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3. Identify unit of rate constant for first order reaction from the following.

(A) mol dm^{-3} s^{-1}

(B) s^{-1}

(C) mol^{-1} dm^{3} s^{-1}

(D) mol dm^{-3}

Correct Answer: (B) s^{-1}

Solution:

Step 1: Understanding the Concept:

The units of the rate constant (k) depend on the overall order of the reaction (n).

The general unit for a reaction of order n is $(\text{concentration})^{1-n} \times \text{time}^{-1}$.

Step 2: Key Formula or Approach:

For order n:

Unit of $k = (\text{mol dm}^{-3})^{1-n}\ \text{s}^{-1}$

Step 3: Detailed Explanation:

For a first-order reaction, $n = 1$.

Substitute $n = 1$ into the general formula:

Unit of $k = (\text{mol dm}^{-3})^{1-1}\ \text{s}^{-1}$

Unit of $k = (\text{mol dm}^{-3})^{0}\ \text{s}^{-1}$

Since any non-zero value raised to the power 0 is 1:

Unit of $k = 1 \times \text{s}^{-1} = \text{s}^{-1}$

Let's analyze other options for clarity:

(A) is for zero-order ($n = 0$).

(C) is for second-order ($n = 2$).

Step 4: Final Answer:

The unit of the rate constant for a first-order reaction is s^{-1}.

Quick Tip: For first-order reactions, the rate constant is independent of concentration units. Only the unit of time matters.

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4. Which of the following mixtures of gases represent water gas?

(A) $CO + H_2$

(B) $CO_2 + H_2$

(C) $H_2O + CH_4$

(D) $H_2 + O_2$

Correct Answer: (A) $CO + H_2$

Solution:

Step 1: Understanding the Concept:

Water gas is an important industrial fuel gas consisting of a mixture of carbon monoxide and hydrogen.

Step 2: Detailed Explanation:

It is produced by passing steam over red-hot carbon (coke) at high temperatures (approx 1270 K).

The reaction is:

$$C(s) + H_2O(g) \rightarrow CO(g) + H_2(g)$$

The resulting mixture of Carbon Monoxide (CO) and Hydrogen (H_2) is called Water gas.

It is also known as synthesis gas or "syngas" because it is used in the synthesis of methanol and many hydrocarbons.

Step 3: Final Answer:

The mixture of CO and H_2 represents water gas.

Quick Tip: Water Gas: $CO + H_2$.

Producer Gas: $CO + N_2$.

Coal Gas: $H_2 + CH_4 + CO$.

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5. Which of the following electrolytic solutions of the same electrolyte has Maximum electrolytic conductivity at the same temp?

(A) 0.2 mole of solute is dissolved in 250 ml

(B) 0.3 mol in 600 ml

(C) 0.6 in 1000 ml

(D) 0.8 mole in 2000 ml

Correct Answer: (A) 0.2 mole of solute is dissolved in 250 ml

Solution:

Step 1: Understanding the Concept:

Electrolytic conductivity (specific conductance, κ) is the conductance of a unit volume of solution.

Conductivity depends directly on the concentration of ions. As the concentration increases, the number of ions per unit volume increases, resulting in higher conductivity.

Step 2: Key Formula or Approach:

Calculate the molar concentration (Molarity, M) for each option:

$$M = \frac{\text{moles of solute}}{\text{volume of solution in Liters}}$$

Step 3: Detailed Explanation:

Calculate concentrations for all cases:

(A) $M = \frac{0.2}{0.250} = 0.8\text{ M}$

(B) $M = \frac{0.3}{0.600} = 0.5\text{ M}$

(C) $M = \frac{0.6}{1.000} = 0.6\text{ M}$

(D) $M = \frac{0.8}{2.000} = 0.4\text{ M}$

Among the given options, option (A) has the highest concentration (0.8 M).

Since conductivity increases with the increase in concentration of the electrolyte (more ions per unit volume), solution (A) will have the maximum conductivity.

Step 4: Final Answer:

Solution (A) has the maximum concentration and thus the maximum electrolytic conductivity.

Quick Tip: Don't confuse "Electrolytic Conductivity" (κ) with "Molar Conductivity" (Λ_m).

κ increases with concentration.

Λ_m increases with dilution (decreasing concentration).

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6. If $\sin x \cos x = \frac{1}{4}$, then the general solution is:

(A) $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$
(B) $x = n\pi + (-1)^n \frac{\pi}{12}$
(C) $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{6}$
(D) $x = n\pi + (-1)^n \frac{\pi}{6}$

Correct Answer: (A) $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$

Solution:

Step 1: Understanding the Concept:

To solve a trigonometric equation involving products of sine and cosine, we use double angle identities to simplify it to a standard form.

Step 2: Key Formula or Approach:

1. Double angle identity: $\sin 2x = 2 \sin x \cos x$.
2. General solution for $\sin\theta = \sin\alpha$ is $\theta = n\pi + (-1)^n\alpha$, where $n \in \mathbb{Z}$.

Step 3: Detailed Explanation:

Given:

$$\sin x \cos x = \frac{1}{4}$$

Multiply both sides by 2:

$$2 \sin x \cos x = 2 \times \frac{1}{4}$$

$$\sin 2x = \frac{1}{2}$$

We know that $\sin\frac{\pi}{6} = \frac{1}{2}$.
So, $\sin 2x = \sin\frac{\pi}{6}$.

Applying the general solution formula for sine:

$$2x = n\pi + (-1)^n \frac{\pi}{6}$$

Dividing the entire equation by 2:

$$x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$$

Step 4: Final Answer:
The general solution is $x = \frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$.

Quick Tip: Look for terms like $\sin x \cos x$. Multiplying by 2 immediately yields $\sin 2x$, which is much easier to solve.

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7. If $n \in \mathbb{Z}$, then the expression $\frac{2^n}{(1-i)^{2n}} + \frac{(1+i)^{2n}}{2^n}$ is equal to:

(A) $2i^n$
(B) 0
(C) 2^{n+1}
(D) i^n

Correct Answer: (A) $2i^n$

Solution:

Step 1: Understanding the Concept:

The problem involves powers of complex numbers. Simplifying terms like $(1 \pm i)^2$ often leads to simpler imaginary units.

Step 2: Detailed Explanation:

Evaluate the basic squares first:

$$(1-i)^2 = 1 - 2i + i^2 = 1 - 2i - 1 = -2i$$

$$(1+i)^2 = 1 + 2i + i^2 = 1 + 2i - 1 = 2i$$

Now, substitute these back into the given expression:

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

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

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

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

Note that $\frac{1}{i} = -i$. So $\frac{1}{i^n} = (-i)^n$.

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

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

$$= i^n + i^n = 2i^n$$

Step 3: Final Answer:

The expression simplifies to $2i^n$.

Quick Tip: Memorize: $(1+i)^2 = 2i$ and $(1-i)^2 = -2i$. This is extremely helpful for complex number simplifications.

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8. The value of $\int \frac{x^2-1}{(x^4+3x^2+1)\tan^{-1}(x+\frac{1}{x})} dx$ is:

(A) $\ln|\tan^{-1}(x+1/x)| + C$

(B) $\tan^{-1}(x+1/x) + C$

(C) $\frac{1}{2}(\tan^{-1}(x+1/x))^2 + C$

(D) $\ln|x^4+3x^2+1| + C$

Correct Answer: (A) $\ln|\tan^{-1}(x+1/x)| + C$

Solution:

Step 1: Understanding the Concept:

This integration involves a substitution technique. We notice that the derivative of $\tan^{-1}(x+1/x)$ is likely present in the rest of the integrand.

Step 2: Detailed Explanation:

Let $f(x) = \tan^{-1}(x+1/x)$.

Compute the derivative:

$$\frac{df}{dx} = \frac{1}{1+(x+1/x)^2} \cdot \frac{d}{dx}(x+1/x)$$

$$\frac{df}{dx} = \frac{1}{1+(x^2+2+1/x^2)} \cdot (1-1/x^2)$$

$$\frac{df}{dx} = \frac{1}{x^2+3+1/x^2} \cdot \left(\frac{x^2-1}{x^2}\right)$$

Multiply numerator and denominator of the first term by x^2:

$$\frac{df}{dx} = \frac{x^2}{x^4+3x^2+1} \cdot \frac{x^2-1}{x^2}$$

$$\frac{df}{dx} = \frac{x^2-1}{x^4+3x^2+1}$$

The original integral is:

$$I = \int \frac{\frac{x^2-1}{x^4+3x^2+1}}{\tan^{-1}(x+1/x)} dx$$

Let $t = \tan^{-1}(x+1/x)$. Then $dt = \frac{x^2-1}{x^4+3x^2+1} dx$.
Substituting these into the integral:

$$I = \int \frac{1}{t} dt = \ln|t| + C$$

Substitute t back:

$$I = \ln|\tan^{-1}(x+1/x)| + C$$

Step 3: Final Answer:

The result is $\ln|\tan^{-1}(x + 1/x)| + C$.

Quick Tip: Whenever an integral has a complex denominator, check if some part of it is the derivative of another part. Dividing numerator and denominator by x^2 is a common trick for such rational functions.

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9. If $A = \begin{bmatrix} \sin\alpha & -\cos\alpha \\ \cos\alpha & \sin\alpha \end{bmatrix}$ and $\alpha \in (\frac{\pi}{2}, \frac{3\pi}{2})$. If $A + A^T = I$, then $\alpha =$

(A) $\frac{2\pi}{3}$

(B) $\frac{5\pi}{6}$

(C) π

(D) $\frac{4\pi}{3}$

Correct Answer: (B) $\frac{5\pi}{6}$

Solution:

Step 1: Understanding the Concept:

Matrix addition is performed element-wise. The transpose of a matrix (A^T) is found by swapping rows and columns. We solve the resulting equation for the angle α within the specified interval.

Step 2: Detailed Explanation:

Given $A = \begin{bmatrix} \sin\alpha & -\cos\alpha \\ \cos\alpha & \sin\alpha \end{bmatrix}$.

The transpose $A^T = \begin{bmatrix} \sin\alpha & \cos\alpha \\ -\cos\alpha & \sin\alpha \end{bmatrix}$.

Now, compute $A + A^T$:

$$A + A^T = \begin{bmatrix} \sin\alpha + \sin\alpha & -\cos\alpha + \cos\alpha \\ \cos\alpha - \cos\alpha & \sin\alpha + \sin\alpha \end{bmatrix} = \begin{bmatrix} 2\sin\alpha & 0 \\ 0 & 2\sin\alpha \end{bmatrix}$$

We are given $A + A^T = I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

Equating corresponding elements:

$$2\sin\alpha = 1 \implies \sin\alpha = \frac{1}{2}$$

We need to find α in the interval $(\frac{\pi}{2}, \frac{3\pi}{2})$ (i.e., 2nd and 3rd quadrants).

Sine is positive in the 2nd quadrant.

The principal value for $\sin\alpha = 1/2$ is $\pi/6$.

In the 2nd quadrant: $\alpha = \pi - \frac{\pi}{6} = \frac{5\pi}{6}$.

The value $5\pi/6$ lies within the given range $(\frac{\pi}{2}, \frac{3\pi}{2})$.

Step 3: Final Answer:

The value of α is $5\pi/6$.

Quick Tip: Always pay close attention to the specified interval for α. Often, multiple solutions satisfy the basic equation (like $\pi/6$ and $5\pi/6$ here), but only one falls in the requested range.

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10. The parametric equations of the circle $x^2 + y^2 - 4x - 6y - 12 = 0$ are:

(A) $x = 2 + 5\cos\theta, y = 3 + 5\sin\theta$

(B) $x = -2 + 5\cos\theta, y = -3 + 5\sin\theta$

(C) $x = 2 + 25\cos\theta, y = 3 + 25\sin\theta$

(D) $x = 5 + 2\cos\theta, y = 5 + 3\sin\theta$

Correct Answer: (A) $x = 2 + 5\cos\theta, y = 3 + 5\sin\theta$

Solution:

Step 1: Understanding the Concept:

The parametric equations for a circle with center (h,k) and radius r are $x = h + r\cos\theta$ and $y = k + r\sin\theta$.

Step 2: Key Formula or Approach:

For a circle $x^2 + y^2 + 2gx + 2fy + c = 0$:

Center $= (-g, -f)$.

Radius $r = \sqrt{g^2 + f^2 - c}$.

Step 3: Detailed Explanation:

Given circle: $x^2 + y^2 - 4x - 6y - 12 = 0$.

Comparing coefficients:

$2g = -4 \implies g = -2$

$2f = -6 \implies f = -3$

$c = -12$

Center $(h,k) = (-g, -f) = (2,3)$.

Radius $r = \sqrt{(-2)^2 + (-3)^2 - (-12)} = \sqrt{4 + 9 + 12} = \sqrt{25} = 5$.

Plugging $h = 2, k = 3, r = 5$ into the parametric formulas:

$x = 2 + 5\cos\theta$

$y = 3 + 5\sin\theta$

Step 4: Final Answer:

The equations are $x = 2 + 5\cos\theta$ and $y = 3 + 5\sin\theta$.

Quick Tip: To quickly find the center, just divide the coefficients of x and y by -2. Here: $-4/-2 = 2$ and $-6/-2 = 3$. Then check the radius to eliminate options.

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11. If the absolute temperature of a black body is doubled, the frequency corresponding to maximum emissive power becomes:

(A) halved

(B) doubled

(C) four times

(D) unchanged

Correct Answer: (B) doubled

Solution:

Step 1: Understanding the Concept:

Wien's Displacement Law describes how the wavelength of maximum emission (λ_{max}) from a black body shifts with temperature. Frequency (ν) and wavelength are inversely related.

Step 2: Key Formula or Approach:

Wien's Law: $\lambda_{max} \cdot T = b$ (constant).

Relation between frequency and wavelength: $c = \nu \cdot \lambda \implies \lambda = \frac{c}{\nu}$.

Step 3: Detailed Explanation:

Substitute $\lambda = c/\nu$ into Wien's law:

$$\frac{c}{\nu_{max}} \cdot T = b$$

$$\nu_{max} = \frac{c \cdot T}{b}$$

Since c and b are constants, $\nu_{max} \propto T$.

This means that the frequency at which the emissive power is maximum is directly proportional to the absolute temperature.

If temperature T is doubled:

$$\nu'_{max} \propto 2T \implies \nu'_{max} = 2 \cdot \nu_{max}$$

Therefore, the frequency also becomes doubled.

Step 4: Final Answer:

The frequency is doubled.

Quick Tip: Remember: $\lambda \propto 1/T$ but $\nu \propto T$. When T increases, the peak shifts to "shorter wavelengths" or "higher frequencies".

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12. The ratio of specific heats C_p/C_v for a mixture of 1 mole of helium and 1 mole of hydrogen is:

(A) 1.5

(B) 1.67

(C) 1.4

(D) 1.33

Correct Answer: (A) 1.5

Solution:

Step 1: Understanding the Concept:

For a mixture of gases, the effective molar heat capacities are weighted averages of the molar heat capacities of individual gases.

Step 2: Key Formula or Approach:

1. For monatomic gas (He): $C_{v1} = \frac{3}{2}R$.
2. For diatomic gas (H_2): $C_{v2} = \frac{5}{2}R$.
3. $C_{v,mix} = \frac{n_1 C_{v1} + n_2 C_{v2}}{n_1 + n_2}$.
4. $C_{p,mix} = C_{v,mix} + R$.

Step 3: Detailed Explanation:

Given $n_1 = 1$ (He) and $n_2 = 1$ (H_2).

Calculate $C_{v,mix}$:

$$C_{v,mix} = \frac{1 \cdot (1.5R) + 1 \cdot (2.5R)}{1+1} = \frac{4R}{2} = 2R$$

Now find $C_{p,mix}$:

$$C_{p,mix} = C_{v,mix} + R = 2R + R = 3R$$

Calculate the ratio γ:

$$\gamma = \frac{C_p}{C_v} = \frac{3R}{2R} = 1.5$$

Step 4: Final Answer:

The ratio of specific heats is 1.5.

Quick Tip: Always average the internal energies (or C_v) to find the mixture's properties. Do not directly average the γ values of the gases, as that would give an incorrect result.

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13. In an isothermal expansion of an ideal gas, the heat supplied to the gas is:

(A) entirely used to increase internal energy

(B) entirely used to do work

(C) partly used to do work and partly to increase internal energy

(D) none of the above

Correct Answer: (B) entirely used to do work

Solution:

Step 1: Understanding the Concept:

An isothermal process happens at constant temperature ($\Delta T = 0$). For an ideal gas, internal energy (U) depends solely on temperature.

Step 2: Key Formula or Approach:

First Law of Thermodynamics: $Q = \Delta U + W$.

Step 3: Detailed Explanation:

In an isothermal process for an ideal gas:

1. Since $T =$ constant, the change in internal energy $\Delta U = nC_v\Delta T = 0$.
2. From the first law: $Q = 0 + W \implies Q = W$.

This means that any heat (Q) absorbed by the gas from the surroundings is exactly balanced by the work (W) done by the gas during its expansion. No energy is stored as internal energy.

Step 4: Final Answer:

The heat is entirely used to do work.

Quick Tip: Isothermal $\implies \Delta U = 0$.

Adiabatic $\implies Q = 0$.

Isochoric $\implies W = 0$.

These simple rules solve most conceptual thermodynamics questions.

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14. A refrigerator has a coefficient of performance of 5. If the temperature inside the freezer is $-20°$C, the temperature of the surroundings to which it rejects heat is:

(A) 31°C

(B) 41°C

(C) 21°C

(D) 11°C

Correct Answer: (A) 31°C

Solution:

Step 1: Understanding the Concept:

A refrigerator's efficiency is measured by its Coefficient of Performance (COP). It is the ratio of heat removed from the cold body to the work input required.

Step 2: Key Formula or Approach:

COP $(\beta) = \frac{T_L}{T_H - T_L}$

Where:

T_L = Temperature of cold reservoir (Kelvin).

T_H = Temperature of hot reservoir (Kelvin).

Step 3: Detailed Explanation:

Given:

COP = 5

$T_L = -20°\text{C} = 273 - 20 = 253$ K.

Substitute these into the COP formula:

$$5 = \frac{253}{T_H - 253}$$

Rearranging to solve for T_H:

$$5(T_H - 253) = 253$$

$$5T_H - 1265 = 253$$

$$5T_H = 1518$$

$$T_H = \frac{1518}{5} = 303.6 \text{ K}$$

Convert back to Celsius:

$$\text{Temp in } ^\circ\text{C} = 303.6 - 273 = 30.6^\circ\text{C} \approx 31^\circ\text{C}$$

Step 4: Final Answer:

The temperature of the surroundings is 31°C.

Quick Tip: In thermodynamics, **always** convert temperatures to Kelvin first. Using −20 instead of 253 would lead to a completely wrong answer.

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15. The displacement of a particle executing SHM is given by $x = 0.01 \sin(100\pi t + 0.05)$. Its maximum velocity is:

(A) π m/s

(B) 10π m/s

(C) 0.1π m/s

(D) 100π m/s

Correct Answer: (A) π m/s

Solution:

Step 1: Understanding the Concept:

In Simple Harmonic Motion (SHM), displacement follows a sine or cosine wave. Velocity is the rate of change of displacement, and its maximum value occurs at the equilibrium position.

Step 2: Key Formula or Approach:

Standard equation: $x = A\sin(\omega t + \phi)$.

Maximum velocity formula: $v_{max} = A\omega$.

Step 3: Detailed Explanation:

Given: $x = 0.01\sin(100\pi t + 0.05)$.

Comparing this with the standard form:

Amplitude $(A) = 0.01$ m

Angular frequency $(\omega) = 100\pi$ rad/s

Now, calculate maximum velocity:

$$v_{max} = A \times \omega$$

$$v_{max} = 0.01 \times 100\pi$$

$$v_{max} = 1\pi = \pi \text{ m/s}$$

Step 4: Final Answer:

The maximum velocity is π m/s.

Quick Tip: For SHM given as $x = A\sin(\omega t)$:

Max Velocity $= A\omega$

Max Acceleration $= A\omega^2$

This is a standard pattern for multiple-choice questions.