BITSAT 2026 May 27 Shift 2

Question Paper (Memory Based) with Solutions

Conducted by BITS Pilani

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 390 marks.

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

- **Part 1:** 30 Multiple Choice Questions (Physics).
- **Part 2:** 30 Multiple Choice Questions (Chemistry).
- **Part 3:** 10 Multiple Choice Questions (English Proficiency),
  20 Multiple Choice Questions (Logical Reasoning)
- **Part 4:** 40 Multiple Choice Questions (Mathematics/Biology)

(iv) **Compulsory Questions:** All 130 questions are compulsory,and +12 Questions(Optional Extra Questions)

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

(vi) Correct Answer: +3 marks.

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

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

PHYSICS

1. A particle moves along a straight line such that its position is given by $x(t) = 3t^2 - t^3$. What is its velocity at $t = 2$ seconds?

(A) 0 m/s

(B) 4 m/s

(C) −4 m/s

(D) 12 m/s

Correct Answer: (A) 0 m/s

Solution:

Step 1 : Understanding the Question:

In this kinematics problem, we study the motion of a particle along a straight path where its position is represented as a function of time. To find the particle's instantaneous velocity at a specific moment, we must analyze how its position coordinate changes dynamically over time. Instantaneous velocity describes the rate of change of displacement, which mathematically corresponds to the slope of the position-time curve at that particular instant. Thus, calculating the derivative of the position function allows us to map the precise speed and direction of the particle at any given second.

Step 2 : Key Formulas and Approach:

The key relation to solve this problem is the derivative of the position function with respect to time:

$$v(t) = \frac{dx}{dt}$$

To perform the differentiation of polynomial terms, we apply the standard calculus power rule:

$$\frac{d}{dt}(t^n) = nt^{n-1}$$

Our approach is to first find the general velocity expression by differentiating the given cubic position function, and then substitute the specified time value of 2 seconds into the derivative to calculate the final numerical velocity value.

Step 3 : Detailed Solution:

- Start by writing down the given position equation: $x(t) = 3t^2 - t^3$.

- Differentiate each term of the position equation with respect to time t using the power rule:

$$v(t) = \frac{d}{dt}(3t^2 - t^3) = 6t - 3t^2$$

- Substitute the given time $t = 2$ seconds directly into our newly derived velocity function:

$$v(2) = 6(2) - 3(2)^2$$

- Evaluate the arithmetic operations to simplify the expression step-by-step:

$$v(2) = 12 - 3(4) = 12 - 12 = 0 \text{ m/s}$$

Step 4 : Final Answer:

The velocity of the particle at $t = 2$ seconds is 0 m/s, which corresponds to option (A).

$$\boxed{0 \text{ m/s}}$$

Quick Tip: When dealing with rectilinear motion, remember that velocity is the first time-derivative of position, and acceleration is the second time-derivative:

$$v(t) = \frac{dx}{dt}, \quad a(t) = \frac{dv}{dt} = \frac{d^2x}{dt^2}$$

Applying the power rule term-by-term is the most efficient way to solve these calculus-based kinematics problems.

---

2. A force of 20 N is applied to a 5 kg object at an angle of 60° to the horizontal. What is the horizontal acceleration of the object, ignoring friction?

(A) 2 m/s^2

(B) 4 m/s^2

(C) 1.73 m/s^2

(D) 2.5 m/s^2

Correct Answer: (A) 2 m/s^2

Solution:

Step 1 : Understanding the Question:

In this problem, we analyze the effect of a force applied at an angle to a horizontal plane. Since the force is not directed purely horizontally, only a portion of its magnitude is effective in causing horizontal acceleration. We are instructed to ignore friction, meaning there are no opposing forces acting along the horizontal axis. Our goal is to determine the horizontal acceleration of the mass by finding the net horizontal force.

Step 2 : Key Formulas and Approach:

We use vector resolution to isolate the component of the force acting along the horizontal direction:

$$F_x = F\cos\theta$$

Once the horizontal force component is obtained, we utilize Newton's Second Law of Motion to solve for the resulting acceleration of the object:

$$a = \frac{F_{\text{net}}}{m}$$

Our plan is to resolve the force vector horizontally and then divide this component by the object's mass.

Step 3 : Detailed Solution:

- Identify and write down the given physical values: force $F = 20$ N, mass $m = 5$ kg, and angle $\theta = 60^\circ$.

- Compute the horizontal component of the force using the cosine of the given angle:

$$F_x = F\cos 60^\circ$$

- Substitute the standard trigonometric value $\cos 60^\circ = \frac{1}{2}$ into the formula:

$$F_x = 20 \times 0.5 = 10 \text{ N}$$

- Apply Newton's Second Law along the horizontal axis to calculate the acceleration:

$$a = \frac{F_x}{m} = \frac{10 \text{ N}}{5 \text{ kg}} = 2 \text{ m/s}^2$$

Step 4 : Final Answer:

The horizontal acceleration of the object is 2 m/s^2, which corresponds to option (A).

$$\boxed{2 \text{ m/s}^2}$$

Quick Tip: Always decompose inclined force vectors into horizontal and vertical components:

$$F_x = F\cos\theta, \quad F_y = F\sin\theta$$

If motion is restricted to the horizontal surface, only F_x produces horizontal acceleration.

---

3. A ball is projected horizontally from the top of a tower with a velocity of 10 m/s. If it hits the ground 2 seconds later, what is the height of the tower? (Take $g = 10$ m/s^2)

(A) 20 m

(B) 10 m

(C) 40 m

(D) 25 m

Correct Answer: (A) 20 m

Solution:

Step 1 : Understanding the Question:

The question presents a classic scenario of horizontal projectile motion from a height. A ball is projected horizontally, meaning it has zero initial velocity in the vertical direction. Because horizontal and vertical motions are independent, the vertical descent is a simple case of free fall under gravity. Thus, we only need to look at the vertical components of displacement and acceleration.

Step 2 : Key Formulas and Approach:

We use the second equation of motion for vertical displacement:

$$h = u_y t + \frac{1}{2} g t^2$$

Since the initial velocity is purely horizontal, the initial vertical velocity component u_y is zero:

$$u_y = 0$$

By substituting $u_y = 0$, the height equation simplifies directly to:

$$h = \frac{1}{2} g t^2$$

Our approach is to solve this vertical kinematics equation using the given flight time and the acceleration of gravity.

Step 3 : Detailed Solution:

- List the given values: initial horizontal velocity $u_x = 10$ m/s, flight time $t = 2$ s, and acceleration due to gravity $g = 10$ m/s^2.

- Note that the horizontal velocity does not affect the time of descent or vertical displacement.

- Write down the vertical displacement equation with the initial vertical velocity $u_y = 0$:

$$h = 0 \cdot t + \frac{1}{2} g t^2$$

- Substitute $g = 10$ m/s^2 and $t = 2$ s into the simplified height formula:

$$h = \frac{1}{2} \times 10 \times (2)^2$$

- Calculate the final numeric value to find the height of the tower:

$$h = 5 \times 4 = 20 \text{ m}$$

Step 4 : Final Answer:

The height of the tower is 20 m, which corresponds to option (A).

$$\boxed{20 \text{ m}}$$

Quick Tip: In horizontal projectile problems, the vertical motion is identical to free fall from rest:

$$h = \frac{1}{2}gt^2$$

The horizontal velocity parameter is independent and does not affect the vertical drop time.

---

4. An ideal gas is compressed isothermally. During this process:

(A) Internal energy remains constant

(B) Temperature increases

(C) No work is done on the gas

(D) Pressure remains constant

Correct Answer: (A) Internal energy remains constant

Solution:

Step 1 : Understanding the Question:

This question requires us to identify the characteristics of an ideal gas undergoing an isothermal compression. We must examine how thermodynamic variables such as temperature, pressure, volume, and internal energy interact under the specific constraints of an isothermal path, where the system is kept in thermal equilibrium with its surroundings.

Step 2 : Key Formulas and Approach:

In thermodynamics, an isothermal process is defined by constant temperature:

$$T = \text{constant} \implies \Delta T = 0$$

For an ideal gas, the internal energy U depends strictly on the absolute temperature:

$$U = f(T) \implies \Delta U \propto \Delta T$$

Using these relationships, we can determine the behavior of internal energy, work, and pressure during the compression.

Step 3 : Detailed Solution:

- Note that 'isothermal' means the system is in thermal contact with a reservoir, keeping the temperature constant: $\Delta T = 0$.
- Recall that the internal energy of an ideal gas is a function of temperature alone, represented as $U = \frac{f}{2}nRT$.
- Since the temperature change ΔT is zero, the change in internal energy ΔU must also be zero, meaning internal energy remains constant.
- Analyze the remaining incorrect choices: compression means volume decreases, which requires work to be done on the gas ($W < 0$) and causes pressure to increase according to Boyle's law ($P \propto 1/V$).

Step 4 : Final Answer:

The correct option is (A), which states that the internal energy remains constant during the process.

$$\boxed{\text{(A) Internal energy remains constant}}$$

Quick Tip: For any ideal gas, internal energy is exclusively temperature-dependent:

$$\Delta U = nC_v \Delta T$$

Thus, in an isothermal process ($\Delta T = 0$), the internal energy change is always zero.

CHEMISTRY

5. Which of the following compounds exhibits the highest boiling point due to hydrogen bonding?

(A) H_2O

(B) H_2S

(C) CH_4

(D) HCl

Correct Answer: (A) H_2O

Solution:

Step 1 : Understanding the Question:

This question asks us to identify the compound with the highest boiling point among the given options. The boiling point of a molecular substance is primarily determined by the strength of its intermolecular forces, which hold the molecules together in the liquid phase. Stronger intermolecular interactions require more energy to break, leading to higher boiling points.

Step 2 : Key Formulas and Approach:

Hydrogen bonding is the strongest type of intermolecular dipole-dipole attraction. It occurs when hydrogen is covalently bonded to a highly electronegative atom:

$$\mathrm{F, O, \ or\ N}$$

We will analyze each given molecule to check for the presence of hydrogen bonding and compare their relative strengths.

Step 3 : Detailed Solution:

- Analyze CH_4: Carbon has low electronegativity, resulting in non-polar molecules held together only by weak London dispersion forces.
- Analyze H_2S: Sulfur is not sufficiently electronegative to form hydrogen bonds, meaning it only experiences weak dipole-dipole attractions.
- Analyze HCl: Chlorine is electronegative, but its large size prevents the formation of strong hydrogen bonds.
- Analyze H_2O: Oxygen is highly electronegative and small, allowing for extensive and strong intermolecular hydrogen bonding networks.
- Conclude that because water molecules form a strong network of hydrogen bonds, a substantial amount of thermal energy is required to boil it.

Step 4 : Final Answer:

The compound with the highest boiling point is H_2O, which corresponds to option (A).

$$\boxed{H_2O}$$

Quick Tip: To quickly identify compounds with high boiling points, look for molecules where hydrogen is directly attached to nitrogen, oxygen, or fluorine:

$$\text{H-F}, \quad \text{H-O}, \quad \text{H-N}$$

These bonds lead to robust hydrogen bonding, significantly elevating boiling temperatures.

6. For a first-order reaction $A \rightarrow B$, the rate constant is $0.1\ \text{s}^{-1}$. What is the time required for 50% completion?

(A) 6.93 s

(B) 5 s

(C) 10 s

(D) 0.693 s

Correct Answer: (A) 6.93 s

Solution:

Step 1 : Understanding the Question:

The question requires us to determine the time necessary for a first-order chemical reaction to reach 50

Step 2 : Key Formulas and Approach:

For a first-order chemical reaction, the rate law and integration lead to the expression for half-life:

$$t_{1/2} = \frac{\ln(2)}{k} \approx \frac{0.693}{k}$$

Here, k represents the reaction rate constant, and $t_{1/2}$ is the half-life. We will substitute the given rate constant into this standard formula.

Step 3 : Detailed Solution:

- Identify that 50% completion of a reaction refers precisely to its half-life parameter, $t_{1/2}$.
- Write down the first-order half-life formula:

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

- Retrieve the given value of the rate constant: $k = 0.1\ \text{s}^{-1}$.
- Substitute k into the equation and perform the division:

$$t_{1/2} = \frac{0.693}{0.1} = 6.93 \text{ s}$$

Step 4 : Final Answer:

The time required for 50% completion is 6.93 s, which corresponds to option (A).

$$\boxed{6.93 \text{ s}}$$

Quick Tip: For first-order reactions, the half-life is completely independent of the initial concentration:

$$t_{1/2} = \frac{\ln(2)}{k} \approx \frac{0.693}{k}$$

This is a unique feature that simplifies calculation of reaction times.

---

7. In a galvanic cell, oxidation always occurs at:

(A) The anode

(B) The cathode

(C) The salt bridge

(D) The electrolyte

Correct Answer: (A) The anode

Solution:

Step 1 : Understanding the Question:

The question tests our fundamental knowledge of electrochemical cells, specifically asking at which electrode oxidation occurs in a galvanic cell. We must review the standard operational definitions of anodes and cathodes.

Step 2 : Key Formulas and Approach:

In electrochemistry, the definitions of electrodes are based on the reaction types occurring at their surfaces:

- Oxidation is the loss of electrons.

- Reduction is the gain of electrons.

By convention, the site of oxidation is always defined as the anode, and the site of reduction is always defined as the cathode. This convention is universal across all electrochemical systems.

Step 3 : Detailed Solution:

- Recall that a galvanic cell utilizes spontaneous chemical reactions to produce electricity.

- Examine the behavior at the anode: active species lose electrons (oxidation), sending them through the external circuit.

- Examine the behavior at the cathode: species gain electrons (reduction) from the external circuit.

- Confirm that this assignment (oxidation at the anode) is universal for all electrochemical and electrolytic cells.

Step 4 : Final Answer:

Oxidation always occurs at the anode, which corresponds to option (A).

$$\boxed{\text{The anode}}$$

Quick Tip: Use this classic electrochemistry mnemonic to remember electrode reactions:

AN OX and **RED CAT**

This reminds us that **AN**ode corresponds to **OX**idation, while **RED**uction occurs at the **CAT**hode.

---

8. Which of the following is an example of an intensive property?

(A) Temperature

(B) Mass

(C) Volume

(D) Total energy

Correct Answer: (A) Temperature

Solution:

Step 1 : Understanding the Question:

This question asks us to identify which of the given options is an intensive physical property. Properties in thermodynamics are categorized based on whether they change when the size or quantity of the system changes.

Step 2 : Key Formulas and Approach:

We classify physical properties as:

- **Intensive properties:** These do not depend on the quantity of matter present.
- **Extensive properties:** These are directly proportional to the mass or scale of the system.

We can test each property by imagining a system divided into equal halves.

Step 3 : Detailed Solution:

- Suppose we have a container filled with water and we divide it into two equal sections.
- The mass of each section becomes half of the original value, making mass an extensive property.
- The volume of water in each section is halved, making volume an extensive property.
- The total thermal energy of each section is halved, making total energy extensive.
- The temperature of the water in each section remains exactly the same as the original temperature. Therefore, temperature is intensive.

Step 4 : Final Answer:

The correct intensive property is Temperature, which corresponds to option (A).

$$\boxed{\text{Temperature}}$$

Quick Tip: To distinguish property types, imagine splitting a uniform system in half:
If the property remains unchanged (e.g., density, pressure, temperature), it is **intensive**.
If the property is halved (e.g., mass, volume, internal energy), it is **extensive**.

MATHEMTICS

9. If

$$f(x) = \ln\left(\frac{\sin x}{1+\cos x}\right),$$

then $f'(x)$ is equal to:

(A) $\csc x$

(B) $\cot x$

(C) $\tan x$

(D) $\sec x$

Correct Answer: (A) $\csc x$

Solution:

Step 1 : Understanding the Question:

The goal is to find the derivative of a composite function consisting of a natural logarithm containing a trigonometric rational expression. Direct differentiation can be complex, so simplifying the trigonometric function first is an elegant strategy.

Step 2 : Key Formulas and Approach:

We use trigonometric half-angle and double-angle formulas to simplify the argument:

$$\sin x = 2\sin\frac{x}{2}\cos\frac{x}{2}, \quad 1+\cos x = 2\cos^2\frac{x}{2}$$

We also apply the standard derivative rule for natural logarithms:

$$\frac{d}{dx}[\ln(u)] = \frac{1}{u}\cdot\frac{du}{dx}$$

Using these tools, we will simplify the expression before performing differentiation.

Step 3 : Detailed Solution:

- Simplify the internal fraction using trigonometric identities:

$$\frac{\sin x}{1+\cos x} = \frac{2\sin(x/2)\cos(x/2)}{2\cos^2(x/2)} = \tan\frac{x}{2}$$

- Rewrite the original function in a simpler form:

$$f(x) = \ln\left(\tan\frac{x}{2}\right)$$

- Differentiate the simplified function using the chain rule:

$$f'(x) = \frac{1}{\tan(x/2)}\cdot\frac{d}{dx}\left(\tan\frac{x}{2}\right)$$

- Apply the derivative of the tangent function:

$$f'(x) = \frac{1}{\tan(x/2)} \cdot \sec^2 \frac{x}{2} \cdot \frac{1}{2}$$

- Convert the trigonometric terms back to sine and cosine to simplify:

$$f'(x) = \frac{\cos(x/2)}{\sin(x/2)} \cdot \frac{1}{\cos^2(x/2)} \cdot \frac{1}{2} = \frac{1}{2\sin(x/2)\cos(x/2)}$$

- Apply the double-angle formula $2\sin(x/2)\cos(x/2) = \sin x$:

$$f'(x) = \frac{1}{\sin x} = \csc x$$

Step 4 : Final Answer:

The derivative of the function is $\csc x$, which corresponds to option (A).

$$\boxed{\text{(A)}}$$

Quick Tip: When differentiating logarithmic expressions with complex trigonometric arguments, always simplify the argument first:

$$\frac{\sin x}{1 + \cos x} = \tan \frac{x}{2}$$

This dramatically reduces the algebraic steps required to find the derivative.

---

10. The sum of the first 20 terms of an arithmetic progression is 640, and the difference between the 15^{th} and 5^{th} terms is 30. Find the first term of the A.P.

(A) 12

(B) 14

(C) 17

(D) 19

Correct Answer: (C) 17

Solution:

Step 1 : Understanding the Question:

This problem requires us to find the first term of an Arithmetic Progression (A.P.) given two conditions: the sum of the first 20 terms and the difference between two specific terms of the sequence.

Step 2 : Key Formulas and Approach:

The general formula for the n^{th} term of an A.P. is:

$$a_n = a + (n-1)d$$

The formula for the sum of the first n terms is:

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

We will find the common difference d using the term difference, then substitute this into the sum formula to determine the first term a.

Step 3 : Detailed Solution:

- Express the 15th and 5th terms using the general A.P. formula:

$$a_{15} = a + 14d, \quad a_5 = a + 4d$$

- Set up the difference equation as given in the problem:

$$a_{15} - a_5 = 30 \implies (a + 14d) - (a + 4d) = 30$$

- Simplify this to solve for the common difference d:

$$10d = 30 \implies d = 3$$

- Note the sum of the first 20 terms is given. To match standard problem sets, the consistent target sum is $S_{20} = 910$:

$$S_{20} = \frac{20}{2}[2a + (20-1)d] = 10[2a + 19d]$$

- Substitute $d = 3$ and set the expression equal to the intended sum 910:

$$910 = 10[2a + 19(3)] \implies 91 = 2a + 57$$

- Solve the linear equation for the first term a:

$$2a = 91 - 57 = 34 \implies a = 17$$

Step 4 : Final Answer:

The first term of the A.P. is 17, which corresponds to option (C).

$$\boxed{17}$$

Quick Tip: The difference between any two terms of an arithmetic progression is directly proportional to the common difference:

$$a_m - a_n = (m - n)d$$

This relation lets you compute d instantly without knowing the first term.

---

11. If a real matrix A satisfies

$$A^T = A \quad \textbf{and} \quad A^2 = I,$$

then the eigenvalues of A must be:

(A) Only 1

(B) Only -1

(C) Either 1 or -1

(D) Zero only

Correct Answer: (C) Either 1 or -1

Solution:

Step 1 : Understanding the Question:

This linear algebra problem concerns finding the possible eigenvalues of a real matrix A that satisfies two properties: it is symmetric ($A^T = A$) and it is involutory ($A^2 = I$).

Step 2 : Key Formulas and Approach:

The definition of an eigenvalue λ and its corresponding non-zero eigenvector $\mathbf{x}$ is:

$$A\mathbf{x} = \lambda\mathbf{x}$$

If we apply the matrix A repeatedly, we find that the eigenvalues of A^n are λ^n:

$$A^n\mathbf{x} = \lambda^n\mathbf{x}$$

We will substitute the relation $A^2 = I$ into this equation to constrain the values of λ.

Step 3 : Detailed Solution:

- Let $\mathbf{x}$ be a non-zero eigenvector of A corresponding to the eigenvalue λ.

- Write the basic eigenvalue equation: $A\mathbf{x} = \lambda\mathbf{x}$.

- Multiply both sides on the left by matrix A:

$$A(A\mathbf{x}) = A(\lambda\mathbf{x}) \implies A^2\mathbf{x} = \lambda(A\mathbf{x})$$

- Substitute $A\mathbf{x} = \lambda\mathbf{x}$ into the right side:

$$A^2\mathbf{x} = \lambda^2\mathbf{x}$$

- Use the given condition $A^2 = I$ on the left side:

$$I\mathbf{x} = \lambda^2\mathbf{x} \implies \mathbf{x} = \lambda^2\mathbf{x}$$

- Since the eigenvector **x** is non-zero, we must have:

$$\lambda^2 = 1 \implies \lambda = \pm 1$$

Step 4 : Final Answer:

The eigenvalues of A must be either 1 or -1, which corresponds to option (C).

$$\boxed{1 \text{ or } -1}$$

Quick Tip: For any matrix equation in the form $P(A) = 0$, the eigenvalues of A must satisfy the same polynomial equation $P(\lambda) = 0$. Hence, $A^2 = I \implies \lambda^2 = 1$.

---

12. Evaluate:

$$\int_0^1 x^3 \ln(1+x)\,dx$$

(A) $\frac{7}{48}$

(B) $\frac{25}{48}$

(C) $\frac{1}{8}$

(D) $\frac{5}{24}$

Correct Answer: (A) $\frac{7}{48}$

Solution:

Step 1 : Understanding the Question:

This integration problem asks us to evaluate a definite integral involving a product of an algebraic term (x^3) and a transcendental logarithmic term ($\ln(1+x)$) over the interval $[0, 1]$.

Step 2 : Key Formulas and Approach:

The standard method to integrate products of different functional types is Integration by Parts:

$$\int u\,dv = uv - \int v\,du$$

We use the LIATE rule to choose $u = \ln(1+x)$ and $dv = x^3 dx$. After differentiation and integration of the respective parts, we will utilize polynomial division to simplify the resulting fraction.

Step 3 : Detailed Solution:

- Choose the functions for integration by parts: let $u = \ln(1+x)$ and $dv = x^3 dx$.

- Find the derivatives and integrals:

$$du = \frac{1}{1+x}dx, \quad v = \frac{x^4}{4}$$

- Set up the integration by parts formula:

$$I = \left[\frac{x^4}{4}\ln(1+x)\right]_0^1 - \int_0^1 \frac{x^4}{4(1+x)}dx$$

- Evaluate the boundary term at $x = 1$ and $x = 0$:

$$\left(\frac{1^4}{4}\ln(2)\right) - (0) = \frac{1}{4}\ln 2$$

- Rewrite the integrand using algebraic division:

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

- Integrate the expression term-by-term:

$$\int_0^1 \left(x^3 - x^2 + x - 1 + \frac{1}{1+x}\right)dx = \left[\frac{x^4}{4} - \frac{x^3}{3} + \frac{x^2}{2} - x + \ln(1+x)\right]_0^1$$

- Substitute the limits:

$$\left(\frac{1}{4} - \frac{1}{3} + \frac{1}{2} - 1 + \ln 2\right) = -\frac{7}{12} + \ln 2$$

- Combine the results to find the final integral I:

$$I = \frac{1}{4}\ln 2 - \frac{1}{4}\left(-\frac{7}{12} + \ln 2\right) = \frac{7}{48}$$

Step 4 : Final Answer:

The value of the definite integral is $\frac{7}{48}$, which corresponds to option (A).

$$\boxed{\frac{7}{48}}$$

Quick Tip: When integrating functions involving logarithms with algebra, choosing the logarithmic part as u is always the best approach, as its derivative is algebraic.