

BITSAT 2025 May 29 Shift 2 Question Paper

Time Allowed :3 Hours

Maximum Marks :390

Total questions :130

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Duration of Exam: 3 Hours
2. Total Number of Questions: 130 Questions
3. Section-wise Distribution of Questions:
 - Physics - 40 Questions
 - Chemistry - 40 Questions
 - Mathematics - 50 Questions
4. Type of Questions: Multiple Choice Questions (Objective)
5. Marking Scheme: Three marks are awarded for each correct response
6. Negative Marking: One mark is deducted for every incorrect answer.
7. Each question has four options; only one is correct.
8. Questions are designed to test analytical thinking and problem-solving skills.

1. Evaluate the integral:

$$\int_0^{\pi/4} \frac{\ln(1 + \tan x)}{\cos x \sin x} dx$$

- (A) $\frac{\pi}{4} \ln 2$
 - (B) $\frac{\pi}{8} \ln 2$
 - (C) $\ln 2$
 - (D) $\frac{1}{2} \ln 2$
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2. If a point $P(x, y)$ satisfies the condition that its distance from the point $(3, -2)$ is equal to its distance from the line $y = 2x + 1$, then the locus of point P is:

- (A) A parabola
 - (B) A circle
 - (C) A straight line
 - (D) A pair of straight lines
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3. Let the function $f(x) = \sqrt{\log_e(1 - x^2)}$. Then the domain of $f(x)$ is:

- (A) $(-1, 0) \cup (0, 1)$
 - (B) $(-1, 1)$
 - (C) $(-1, 1) \setminus \{0\}$
 - (D) $\left(-1, -\frac{1}{\sqrt{e}}\right) \cup \left(\frac{1}{\sqrt{e}}, 1\right)$
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4. Evaluate the sum:

$$\sum_{n=1}^{\infty} \frac{1}{n(n+1)(n+2)}$$

- (A) $\frac{1}{4}$
 - (B) $\frac{1}{2}$
 - (C) $\frac{1}{6}$
 - (D) $\frac{1}{3}$
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5. Let $f(x) = |x^2 - 4x + 3| + |x^2 - 5x + 6|$. The minimum value of $f(x)$ is:

- (A) 2
 - (B) 3
 - (C) 1
 - (D) 0
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6. Let vectors \mathbf{a} , \mathbf{b} , \mathbf{c} be such that

$$\mathbf{a} = \hat{i} + 2\hat{j} - \hat{k}, \quad \mathbf{b} = 2\hat{i} - \hat{j} + \hat{k}, \quad \mathbf{c} = \hat{i} + \hat{j} + \hat{k}$$

Then the volume of the parallelepiped formed by these vectors is:

7. A box contains 5 red balls and 4 green balls. Two balls are drawn one after another without replacement. What is the probability that the second ball is green, given that the first ball drawn was red?

- (A) $\frac{1}{2}$
 - (B) $\frac{5}{18}$
 - (C) $\frac{2}{5}$
 - (D) $\frac{4}{8}$
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8. Evaluate:

$$\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$$

- (A) 1
 - (B) 0
 - (C) ∞
 - (D) 0.5
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9. A particle moves along the x-axis under a force $F(x) = 6x^2$ N. The work done by this force in moving the particle from $x = 1$ m to $x = 2$ m is:

- (A) 14 J
- (B) 18 J
- (C) 24 J

(D) 28 J

10. A Carnot engine operates between temperatures of 600 K and 300 K. If it absorbs 900 J of heat from the source, how much work does it perform? (A) 300 J

(B) 450 J

(C) 600 J

(D) 150 J

11. Light of wavelength 400 nm falls on a metal surface with a work function of 2.0 eV. (Planck's constant $h = 6.63 \times 10^{-34}$ Js, $c = 3 \times 10^8$ m/s, $1 \text{ eV} = 1.6 \times 10^{-19}$ J) Find the maximum kinetic energy of emitted photoelectrons.

(A) 1.1 eV

(B) 2.1 eV

(C) 0.1 eV

(D) 0.8 eV

12. Two capacitors $C_1 = 4\mu\text{F}$ and $C_2 = 6\mu\text{F}$ are connected in series across a 60 V battery. The potential difference across C_2 is:

(A) 24 V

(B) 36 V

(C) 40 V

(D) 20 V

13. A proton enters a uniform magnetic field $\vec{B} = 0.5\hat{k}$ T with velocity $\vec{v} = 10^6\hat{i}$ m/s. The magnitude of the magnetic force on the proton is:

(A) 8.0×10^{-14} N

(B) 1.6×10^{-13} N

(C) 8.0×10^{-13} N

(D) 0

14. The pH of a 0.01 M solution of a weak acid HA is 4. Calculate its dissociation constant (K_a).

- (A) 1.0×10^{-6}
 - (B) 1.0×10^{-8}
 - (C) 1.0×10^{-4}
 - (D) 1.0×10^{-5}
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15. The complex $[Cr(NH_3)_4Cl_2]^+$ shows how many geometrical isomers?

- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
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16. The standard electrode potential for Zn^{2+}/Zn is -0.76 V and for Cu^{2+}/Cu is $+0.34$ V. The EMF of the cell



is:

- (A) 1.10 V
 - (B) 0.76 V
 - (C) -0.42 V
 - (D) 0.34 V
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17. The acidic character of the oxides increases in the order:

- (A) $Na_2O < MgO < Al_2O_3 < SiO_2 < P_2O_5$
 - (B) $Na_2O < Al_2O_3 < MgO < SiO_2 < P_2O_5$
 - (C) $P_2O_5 < SiO_2 < Al_2O_3 < MgO < Na_2O$
 - (D) $Al_2O_3 < SiO_2 < MgO < P_2O_5 < Na_2O$
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18. A first-order reaction is 25% complete in 30 minutes. What is its half-life?

