

## BITSAT 2025 May 30 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. **Exam Mode:** Computer Based Test
2. **BITSAT exam duration:** 3 hours
3. **Medium of Exam:** English
4. **BITSAT exam Sections:**
  - Part I - Physics (30 questions)
  - Part II - Chemistry (30 questions)
  - Part III - English Proficiency (10 questions) and Logical Reasoning (20 questions)
  - Part IV - Mathematics/Biology (40 questions)
5. **Type of Questions:** Multiple Choice Questions (MCQ)
6. **BITSAT Total Questions:** 130 Questions
7. **BITSAT Exam Pattern Total Marks:** 390 Marks

**1. If  $x + \frac{1}{x} = 4$ , find the value of  $x^4 + \frac{1}{x^4}$ .**

- (A) 194
  - (B) 1945
  - (C) 190
  - (D) 1940
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**2. The equation of the line passing through the point (2, 3) and making equal intercepts on the coordinate axes is:**

- (A)  $x + y = 5$
  - (B)  $3x + 2y = 12$
  - (C)  $2x + 3y = 12$
  - (D)  $5x + 5y = 25$
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**3. If  $\tan \theta + \cot \theta = 4$ , then find the value of  $\tan^3 \theta + \cot^3 \theta$ .**

- (A) 52
  - (B) 44
  - (C) 46
  - (D) 54
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**4. If  $y = \ln(x^2 + 1)$ , then find  $\frac{dy}{dx}$  at  $x = 1$ .**

- A)  $\frac{1}{2}$
  - B)  $\frac{1}{3}$
  - C) 1
  - D)  $\frac{2}{3}$
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**5. If  $a, b$  are roots of the equation  $x^2 - 5x + 6 = 0$ , find the value of  $a^3 + b^3$ .**

- (A) 125
  - (B) 215
  - (C) 98
  - (D) 35
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**6. In triangle  $ABC$ , the length of sides are  $AB = 7$ ,  $BC = 10$ , and  $AC = 5$ . What is the length of the median drawn from vertex  $B$ ?**

- (A) 6
  - (B) 5
  - (C) 7
  - (D) 8
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**7. If  $f(x) = e^{2x} \sin x$ , find  $f'(x)$ .**

- (A)  $e^{2x}(2 \sin x + \cos x)$
  - (B)  $e^{2x}(2 \sin x - \cos x)$
  - (C)  $e^{2x}(2 \cos x + \sin x)$
  - (D)  $e^{2x}(\sin x - 2 \cos x)$
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**8. The half-life of a radioactive substance is 4 hours. If initially there are 256 grams, how much remains after 10 hours?**

- (A) 45.26 g
  - (B) 16 g
  - (C) 64 g
  - (D) 8 g
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**9. A fluid flows through a pipe with varying cross-section. If the velocity at the narrow section is 3 m/s and the cross-sectional area is half of the wider section, what is the velocity in the wider section?**

- (A) 1.5 m/s
  - (B) 6 m/s
  - (C) 0.5 m/s
  - (D) 3 m/s
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**10. The escape velocity from the surface of a planet is 11.2 km/s. If the radius of the planet is doubled but the mass remains the same, what will be the new escape velocity?**

- (A) 22.4 km/s

- (B) 7.9 km/s
  - (C) 15.8 km/s
  - (D) 5.6 km/s
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**11. Two identical charges  $q$  are placed 1 m apart. The electrostatic force between them is  $9 \times 10^{-9}$  N. What is the magnitude of each charge? (Take  $k = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$ )**

- (A)  $1 \times 10^{-9}$  C
  - (B)  $3 \times 10^{-9}$  C
  - (C)  $1 \times 10^{-9}$  C
  - (D)  $3 \times 10^{-9}$  C
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**12. A charged particle moves in a magnetic field with velocity  $v$  perpendicular to the field  $B$ . The radius of the circular path is  $r$ . Which of the following expressions gives the charge  $q$  of the particle?**

- A)  $q = \frac{mv}{Br}$
  - B)  $q = \frac{mvB}{r}$
  - C)  $q = \frac{mB}{vr}$
  - D)  $q = \frac{Bvr}{m}$
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**13. How much water must be added to 500 mL of 2 M  $\text{H}_2\text{SO}_4$  solution to make it 0.5 M?**

- (A) 1.5 L
  - (B) 2.0 L
  - (C) 1.0 L
  - (D) 0.75 L
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### Quick Tip

For dilution problems, always use:

$$M_1V_1 = M_2V_2$$

and remember that volume units must be consistent. The volume of water added is the difference between final and initial volumes.

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**14. Question 14** How many grams of  $\text{CO}_2$  are produced when 10 g of  $\text{C}_2\text{H}_6$  (ethane) is completely combusted? Reaction:  $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$

- (A) 29.3 g
- (B) 44.0 g
- (C) 58.6 g
- (D) 88.0 g

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**15.** A 2 L container holds oxygen gas at 300 K and 2 atm pressure. If the temperature is increased to 600 K and the volume is doubled, what is the final pressure?

- (A) 1 atm
- (B) 2 atm
- (C) 0.5 atm
- (D) 4 atm

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**16.** For the reaction  $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ , if initially 1 mole of  $\text{N}_2$  and 3 moles of  $\text{H}_2$  are taken and at equilibrium 0.4 moles of  $\text{NH}_3$  are formed, find the equilibrium concentration of  $\text{H}_2$ .

- (A) 2.4 moles
- (B) 2.8 moles
- (C) 3.4 moles
- (D) 3.0 moles