

## BITSAT 2025 May 28 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. The quadratic equation  $x^2 - 5x + k = 0$  has equal roots. Find the value of  $k$ .**

- (A) 6
  - (B)  $\frac{25}{4}$
  - (C)  $\frac{9}{4}$
  - (D) 0
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**2. If the sum of the first  $n$  terms of an arithmetic progression is given by  $S_n = 3n^2 + 5n$ , find the first term  $a$  and common difference  $d$ .**

- (A)  $a = 8, d = 6$
  - (B)  $a = 8, d = 3$
  - (C)  $a = 5, d = 6$
  - (D)  $a = 3, d = 5$
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**3. If  $\sin \theta = \frac{3}{5}$  and  $\theta$  lies in the first quadrant, find  $\cos \theta$ .**

- (A)  $\frac{4}{5}$
  - (B)  $\frac{3}{4}$
  - (C)  $\frac{5}{3}$
  - (D)  $\frac{5}{4}$
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**4. How many different 4-letter words can be formed from the letters of the word "BINARY" without repetition?**

- (A) 360
  - (B) 720
  - (C) 840
  - (D) 1260
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**5. Find the equation of the circle which passes through the points  $(1, 2)$ ,  $(4, 3)$  and has its center on the line  $x + y = 5$ .**

- (A)  $(x - 2)^2 + (y - 3)^2 = 5$
- (B)  $(x - 3)^2 + (y - 2)^2 = 2$

(C)  $(x - 2.5)^2 + (y - 2.5)^2 = 2.5$

(D)  $(x - 2)^2 + (y - 3)^2 = 2$

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**6. Find the equation of the tangent to the curve  $y = x^3 - 3x + 1$  at the point where  $x = 2$ .**

(A)  $y = 9x - 19$

(B)  $y = 9x - 15$

(C)  $y = 13x - 23$

(D)  $y = 15x - 25$

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**7. Two dice are rolled simultaneously. What is the probability that the sum of the numbers on the two dice is at least 10?**

(A)  $\frac{1}{6}$

(B)  $\frac{1}{9}$

(C)  $\frac{1}{12}$

(D)  $\frac{1}{18}$

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**8. If  $\log_2(x - 1) + \log_2(x - 3) = 3$ , find the value(s) of  $x$ .**

(A) 5

(B) 4

(C) 3 and 5

(D) 4 and 5

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**9. If**

$$A = \begin{pmatrix} 2 & 3 \\ 1 & k \end{pmatrix}$$

**and  $\det(A) = 7$ , find the value of  $k$ .**

(A) 1

(B) 2

(C) 5

(D) 4

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**10. Find the sum of the infinite geometric series:**

$$S = 8 + 4 + 2 + \dots$$

**if it converges.**

- (A) 14
  - (B) 16
  - (C) 18
  - (D) 20
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**11. A particle is projected vertically upward with an initial velocity of  $20 \text{ m/s}$ . Calculate the maximum height reached by the particle.**

- (A)  $20 \text{ m}$
  - (B)  $15 \text{ m}$
  - (C)  $10 \text{ m}$
  - (D)  $25 \text{ m}$
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**12. How much heat is required to raise the temperature of  $2 \text{ kg}$  of water from  $20^\circ\text{C}$  to  $80^\circ\text{C}$ ? (Specific heat capacity of water =  $4200 \text{ J/kg}^\circ\text{C}$ )**

- (A)  $504000 \text{ J}$
  - (B)  $50400 \text{ J}$
  - (C)  $126000 \text{ J}$
  - (D)  $168000 \text{ J}$
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**13. A resistor of resistance  $10 \Omega$  is connected across a  $20 \text{ V}$  battery. Calculate the current flowing through the resistor.**

- (A)  $1 \text{ A}$
- (B)  $2 \text{ A}$
- (C)  $0.5 \text{ A}$
- (D)  $4 \text{ A}$

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**14. An object is placed 30 cm in front of a convex lens of focal length 20 cm. Find the position of the image.**

- (A) 60 cm
- (B) 12 cm
- (C) 15 cm
- (D) 10 cm

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**15. The rate constant  $k$  of a reaction doubles when the temperature is raised from 300 K to 310 K. Calculate the activation energy  $E_a$  of the reaction. (Use  $R = 8.314 \text{ J/mol} \cdot \text{K}$ )**

- (A) 52 kJ/mol
- (B) 55 kJ/mol
- (C) 53 kJ/mol
- (D) 60 kJ/mol

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**16. Calculate the de Broglie wavelength of an electron moving with velocity  $6 \times 10^6 \text{ m/s}$ . (Mass of electron  $m = 9.11 \times 10^{-31} \text{ kg}$ , Planck's constant  $h = 6.626 \times 10^{-34} \text{ Js}$ )**

- (A)  $1.2 \times 10^{-10} \text{ m}$
- (B)  $1.1 \times 10^{-10} \text{ m}$
- (C)  $1.0 \times 10^{-10} \text{ m}$
- (D)  $0.9 \times 10^{-10} \text{ m}$

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**17. Which of the following molecules has a trigonal planar shape?**

- (A)  $\text{CH}_4$
- (B)  $\text{BF}_3$
- (C)  $\text{NH}_3$
- (D)  $\text{H}_2\text{O}$

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**18. Choose the word which is closest in meaning to "Eloquent".**

- (A) Silent

- (B) Fluent
  - (C) Awkward
  - (D) Hesitant
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**19. Identify the part of the sentence that contains an error:**

*"Neither the manager nor the employees \_\_\_ willing to accept the new policy."*

- (A) Neither the manager
  - (B) nor the employees
  - (C) willing
  - (D) to accept the new policy
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**20. Read the passage and answer the question:**

*"Climate change is one of the biggest challenges facing humanity. It affects the environment, economy, and health. Immediate action is required to reduce greenhouse gas emissions."*

**Question: What is the main idea of the passage?**

- (A) The economy is not affected by climate change.
  - (B) Climate change is a minor issue.
  - (C) Immediate action is needed to combat climate change.
  - (D) Health is unrelated to climate change.
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**21. Choose the word which is most opposite in meaning to "Benevolent".**

- (A) Kind
  - (B) Cruel
  - (C) Generous
  - (D) Compassionate
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**22. Choose the best alternative to improve the underlined part:**

*"She gave a beautiful speech, which everyone enjoyed it."*

- (A) which everyone enjoyed
- (B) that everyone enjoyed

- (C) whom everyone enjoyed
  - (D) who everyone enjoyed
- 

**23. Identify the part of the sentence which contains a grammatical error:**

*"Each of the students have submitted their assignments on time."*

- (A) Each of the students
  - (B) have submitted
  - (C) their assignments
  - (D) on time
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