

IIT JAM 2026 Mathematics Question Paper

Time Allowed :3 Hour	Maximum Marks :100	Total Questions :60
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The examination is of 3 hours duration. There are a total of 60 questions carrying 100 marks. The entire paper is divided into three sections, A, B and C. All sections are compulsory. Questions in each section are of different types.
2. Section A contains a total of 30 Multiple Choice Questions (MCQ). Each MCQ type question has four choices out of which only one choice is the correct answer. Questions Q.1 – Q.30 belong to this section and carry a total of 50 marks. Q.1 – Q.10 carry 1 mark each and Questions Q.11 – Q.30 carry 2 marks each.
3. Section B contains a total of 10 Multiple Select Questions (MSQ). Each MSQ type question is similar to MCQ but with a difference that there will be more than one choices that are correct out of the four given choices. The candidate gets full credit if he/she selects all the correct answers only and no wrong answers. Questions Q.31 – Q.40 belong to this section and carry 2 marks each with a total of 20 marks.
4. Section C contains a total of 20 Numerical Answer Type (NAT) questions. For these NAT type questions, the answer is a real number which needs to be entered using the virtual keyboard on the monitor. No choices will be shown for these type of questions. Questions Q.41 – Q.60 belong to this section and carry a total of 30 marks. Q.41 – Q.50 carry 1 mark each and Questions Q.51 – Q.60 carry 2 marks each.
5. In all sections, questions not attempted will result in zero mark. In Section A (MCQ), wrong answer will result in NEGATIVE marks. For all 1-mark questions, 1/3 marks will be deducted for each wrong answer. For all 2-mark questions, 2/3 marks will be deducted for each wrong answer. In Section B (MSQ), there is NO NEGATIVE and NO PARTIAL marking provisions. There is NO NEGATIVE marking in Section C (NAT) as well.
6. Only Virtual Scientific Calculator is allowed. Charts, graph sheets, tables, cellular phone or other electronic gadgets are NOT allowed in the examination hall.
7. A Scribble Pad will be provided for rough work.

1. Find the radius of convergence of the series

$$\sum_{n=0}^{\infty} \frac{(n!)^2}{(2n)!} x^n.$$

2. Determine whether the sequence

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

is convergent or divergent.

3. Let $G = P(N)$, where the operation is

$$A \Delta B = A \cup B - A \cap B$$

Which of the following is true?

- (A) G is abelian but not cyclic
 - (B) G has elements of order 4
 - (C) G has elements of order 8
 - (D) $\emptyset$ is the identity element of G
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4. Solve the system:

$$x + 2y + 2z = 1$$

$$2x + 3y + 2z = 2$$

$$ax + 5y + bz = b$$

Find $a + b$ for infinite solutions.

5. If

$$f(x) = (f(x) - \pi x) + \pi,$$

then the possible value(s) of $f(3) - f(2)$ is/are:

- (A) $\pi + \frac{1}{6}$
 - (B) $\pi - \frac{1}{6}$
 - (C) $\frac{\pi}{2} + 1$
 - (D) $\frac{\pi}{6}$
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6. Evaluate:

$${}^5C_0 + {}^6C_1 + {}^7C_2 + {}^8C_3 + {}^9C_4 + {}^{10}C_5 + {}^{11}C_6.$$

7. Which of the following statements are false?

- (A) S_3 is a subgroup of S_4
- (B) $\mathbb{Z}_3$ is a subgroup of S_4

- (C) S_3 is a quotient group of S_4
(D) $\mathbb{Z}_6$ is a quotient group of S_4
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8. Find the number of automorphisms of the cyclic group $\mathbb{Z}_n$ for $n = 30$.

9. Let P be a 5×5 matrix such that $\det(P) = 2$. If Q is the cofactor matrix of P , then find $\det(Q)$.

10. Given that the solution of

$$\frac{d^2y}{dx^2} + \alpha \frac{dy}{dx} + \beta y = -e^{-x}$$

is

$$y(x) = C_1 e^{-x} + C_2 e^{2x} + x e^{-x},$$

find the values of α and β .

11. There are four different types of bananas. In how many ways can 12 children select bananas so that at least one child selects different types of bananas?

12. If the function $f(x)$ satisfies

$$f'(x) = f(x) - \pi x + \pi,$$

then the possible value of $f(1)$ is

- (A) $\pi + \frac{1}{6}$
(B) $\pi - \frac{1}{6}$
(C) $\frac{\pi}{2} + 1$
(D) $1 - \frac{1}{2}$
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13. There are four different types of bananas. In how many ways can 12 children select bananas so that at least one banana is selected from each type?

14. Find the radius of convergence of the series

$$\sum_{n=0}^{\infty} \frac{\binom{n}{6}^2}{(2n)!} x^n$$

15. Given

$$y = -3x - 3 + me^{2x}$$

Find the Orthogonal Trajectories (O.T.).

16. Let

$$A = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \end{pmatrix}.$$

Which of the following statements is correct?

- (A) A has four distinct eigenvalues in $\mathbb{C}$.
 - (B) A has three distinct eigenvalues in $\mathbb{R}$.
 - (C) $(A - I)$ has nullity 3.
 - (D) A has two real and three complex eigenvalues.
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17. Let P be a 6×4 matrix and Q be a 4×6 matrix such that $PQ = 0$. Which of the following statements is correct?

- (A) $\text{Row space}(P) \subseteq \text{Null space}(Q)$
 - (B) $\text{Column space}(P) \subseteq \text{Null space}(Q)$
 - (C) $r(P) + r(Q) \geq 4$
 - (D) $r(P) + r(Q) = 4$
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