

JEE (Main) – Mathematics Sample Question Paper

Subject	Mathmatics
Total Number of Questions	25
Maximum Marks	100
Time Allowed	60 Minutes

Marking Scheme (As per JEE Main Pattern)

Each question carries **4 (four) marks**.

1 (one) mark will be deducted for each incorrect answer.

No marks will be deducted for unattempted questions.

Only one option is correct for each question.

Important Instructions

1. This Question Paper consists of **25 Multiple Choice Questions** from **Mathmatics** only.
2. All questions are compulsory.
3. Rough work should be done only in the space provided in the Question Paper.
4. Calculators, mobile phones, smart watches, or any electronic devices are strictly prohibited.

Name of the Candidate (Capital Letters)	
Roll Number	
Examination Centre Name	
Candidate's Signature	Date

Invigilator's Signature

MATHEMATICS

1. Let Ω be the sample space and $A \subseteq \Omega$ be an event .
Given below are two statements :
(S1): If $P(A) = 0$, then $A = \emptyset$
(S2): If $P(A) = 1$, then $A = \Omega$
Then
A) both (S1) and (S2) are true
B) only (S1) is true
C) only (S2) is true
D) both (S1) and (S2) are false
2. A wire of length $20m$ is to be cut into two pieces A piece of length l_1 is bent to make a square of area A_1 and the other piece of length l_2 is made into a circle of area A_2 If $2A_1 + 3A_2$ is minimum then $(\pi l_1) : l_2$ is equal to:
A) 6 : 1
B) 3 : 1
C) 4 : 1
D) 1 : 6
3. The minimum number of elements that must be added to the relation $R = \{(a, b), (b, c)\}$ on the set $\{a, b, c\}$ so that it becomes symmetric and transitive is :
A) 3
B) 7
C) 4
D) 5
4. If an unbiased die, marked with $-2, -1, 0, 1, 2, 3$ on its faces, is thrown five times, then the probability that the product of the outcomes is positive, is:
A) $\frac{440}{2592}$
B) $\frac{881}{2592}$
C) $\frac{27}{288}$
D) $\frac{521}{2592}$
5. Let $f(x) = \int \frac{2x}{(x^2+1)(x^2+3)} dx$ If $f(3) = \frac{1}{2}(\log_e 5 - \log_e 6)$, then $f(4)$ is equal to
A) $\log_e 17 - \log_e 18$
B) $\log_e 19 - \log_e 20$
C) $\frac{1}{2}(\log_e 19 - \log_e 17)$
D) $\frac{1}{2}(\log_e 17 - \log_e 19)$
6. Let the plane P pass through the intersection of the planes $2x + 3y - z = 2$ and $x + 2y + 3z = 6$, and be perpendicular to the plane $2x + y - z + 1 = 0$ If d is the distance of P from the point $(-7, 1, 1)$, then d^2 is equal to :
A) $\frac{25}{83}$
B) $\frac{250}{83}$
C) $\frac{15}{53}$
D) $\frac{250}{82}$
7. Consider the lines L_1 and L_2 given by $L_1 : \frac{x-1}{2} = \frac{y-3}{1} = \frac{z-2}{2}$ $L_2 : \frac{x-2}{1} = \frac{y-2}{2} = \frac{z-3}{3}$ A line L_3 having direction ratios $1, -1, -2$, intersects L_1 and L_2 at the points P and Q respectively Then the length of line segment PQ is
A) $3\sqrt{2}$
B) 4
C) $2\sqrt{6}$
D) $4\sqrt{3}$
8. The value of $\lim_{n \rightarrow \infty} \frac{1 + 2 - 3 + 4 + 5 - 6 + \dots + (3n - 2) + (3n - 1) - 3n}{\sqrt{2n^4 + 4n + 3} - \sqrt{n^4 + 5n + 4}}$ is :
A) $3(\sqrt{2} + 1)$
B) $\frac{3}{2}(\sqrt{2} + 1)$
C) $\frac{\sqrt{2}+1}{2}$
D) $\frac{3}{2\sqrt{2}}$

9. The shortest distance between the lines $x + 1 = 2y = -12z$ and $x = y + 2 = 6z - 6$ is
 A) $\frac{3}{2}$ B) 3
 C) 2 D) $\frac{5}{2}$
10. The minimum value of the function $f(x) = \int_0^2 e^{|x-t|} dt$ is :
 A) 2 B) $2(e - 1)$
 C) $2e - 1$ D) $e(e - 1)$
11. Two dice are thrown independently Let A be the event that the number appeared on the 1st die is less than the number appeared on the 2nd die, B be the event that the number appeared on the 1st die is even and that on the second die is odd, and C be the event that the number appeared on the 1st die is odd and that on the 2nd is even Then :
 A) A and B are mutually exclusive B) the number of favourable cases of the events A , B and C are 15, 6 and 6 respectively
 C) B and C are independent D) the number of favourable cases of $(A \cup B) \cap C$ is 6
12. If A and B are two non-zero $n \times n$ matrices such that $A^2 + B = A^2B$, then
 A) $A^2 = I$ or $B = I$ B) $A^2B = BA^2$
 C) $AB = I$ D) $A^2B = I$
13. The value of $\sum_{r=0}^{22} {}^{22}C_r {}^{23}C_r$ is
 A) ${}^{45}C_{24}$ B) ${}^{45}C_{23}$
 C) ${}^{44}C_{23}$ D) ${}^{44}C_{22}$
14. Let N denote the number that turns up when a fair die is rolled If the probability that the system of equations $x + y + z = 1$ $2x + Ny + 2z = 2$ $3x + 3y + Nz = 3$ has unique solution is $\frac{k}{6}$, then the sum of value of k and all possible values of N is
 A) 18 B) 19
 C) 20 D) 21
15. The shortest distance between the lines $\frac{x-5}{1} = \frac{y-2}{2} = \frac{z-4}{-3}$ and $\frac{x+3}{1} = \frac{y+5}{4} = \frac{z-1}{-5}$ is
 A) $7\sqrt{3}$ B) $6\sqrt{3}$
 C) $4\sqrt{3}$ D) $5\sqrt{3}$
16. The distance of the point $(7, -3, -4)$ from the plane passing through the points $(2, -3, 1)$, $(-1, 1, -2)$ and $(3, -4, 2)$ is :
 A) $5\sqrt{2}$ B) $4\sqrt{2}$
 C) 4 D) 5
17. The area enclosed by the closed curve C given by the differential equation $\frac{dy}{dx} + \frac{x+a}{y-2} = 0$, $y(1) = 0$ is 4π . Let P and Q be the points of intersection of the curve C and the y -axis If normals at P and Q on the curve C intersect x -axis at points R and S respectively, then the length of the line segment RS is
 A) $\frac{4\sqrt{3}}{3}$ B) $\frac{2\sqrt{3}}{3}$
 C) 2 D) $2\sqrt{3}$

JEE MAIN MATHEMATICS ANSWER KEY

1. (A)	2. (A)	3. (B)	4. (D)	5. (D)
6. (B)	7. (C)	8. (B)	9. (C)	10. (B)
11. (D)	12. (B)	13. (B)	14. (C)	15. (B)
16. (A)	17. (A)	18. (D)	19. (B)	20. (C)
21. (C)	22. (B)	23. (D)	24. (B)	25. (A)