JEE MAIN 28 JANUARY 2025 SHIFT 1

MATHEMATICS QUESTION PAPER WITH ANSWER KEY

Q.No.	Questions	Answers
1	If $\int_{-\pi/2}^{\pi/2}$ [$96(x^2 + \cos x)/(1 + e^x)$] dx = $\alpha\pi^3 + \beta$ (where α, β are positive integers), then find the value of α + β.	100
2	Number of ways to form 5 digit numbers greater than 50000 with the use of digits 0, 1, 2, 3, 4, 5, 6, 7 such that sum of first and last digit is not more than 8, is equal to	5119
3	If the image of the point P(4, 4, 3) in the line (x - 1)/2 = (y - 2)/1 = (z - 1)/1 is Q (α, β, γ), then find the value of (α + β + γ).	31/3
4	If $\int_0^x t \cdot f(t)dt = x^2 f(x)$ and f(2) = 3, then f(6) equals to	1
5	Let R be a relation such that R = {(x, y): x, y ∈ Z and (x + y) is even), then the relation R is	Equivalence Relation
6	$\cos(\sin^{-1}(3/5) + \sin^{-1}(5/13) + \sin^{-1}(33/65)) = ?$	0
7	The sum of squares of real roots of the equation: $x^2 + \|2x - 3\| - 4 = 0$ is	$6(2 - \sqrt{2})$
8	Area bounded by $0 < y < 2\|x\| + 1$ and $y > x^2 + 1$ is (in sq. units)	8/3
9	There are 2 bad oranges mixed with 7 good oranges and 2 oranges are drawn at random. Ket X be the number of bad oranges. The variance of X is	49/162
10	$2a_{n+2} = 5a_{n+1} - 3a_{n'}$ prime where n = 0, 1, 2 If $a_0 = 3$ and $a_1 = 4$ then the find the value of $\sum a_k$ from k = 1 to 100.	$3a_{100} - 91$
11	Let k_1 and k_2 be two randomly selected natural numbers. The probability that $(i)^{k1} + (i)^{k2}$ is non-zero is (where $i = \sqrt{-1}$)	3/4
12	In ΔABC, A(4sinθ, 4cosθ), B(-2cosθ, 0) and C(2, 2sinθ). If locus of centroid is $(3x - 2)^2 + (3y)^2 = \alpha$, then α is	20
13	Let $E_1 : x^2/9 + y^2/4 = 1$ be an ellipse and a series of ellipses are drawn in that E_{i+1} has the same centre, eccentricity as E_1 and E_{i+1}'s major axis is the minor axis of E_i. If Si be the area of E_i, then ($(5/\pi) \sum S_i$ from i = 1 to ∞) is equal to	54