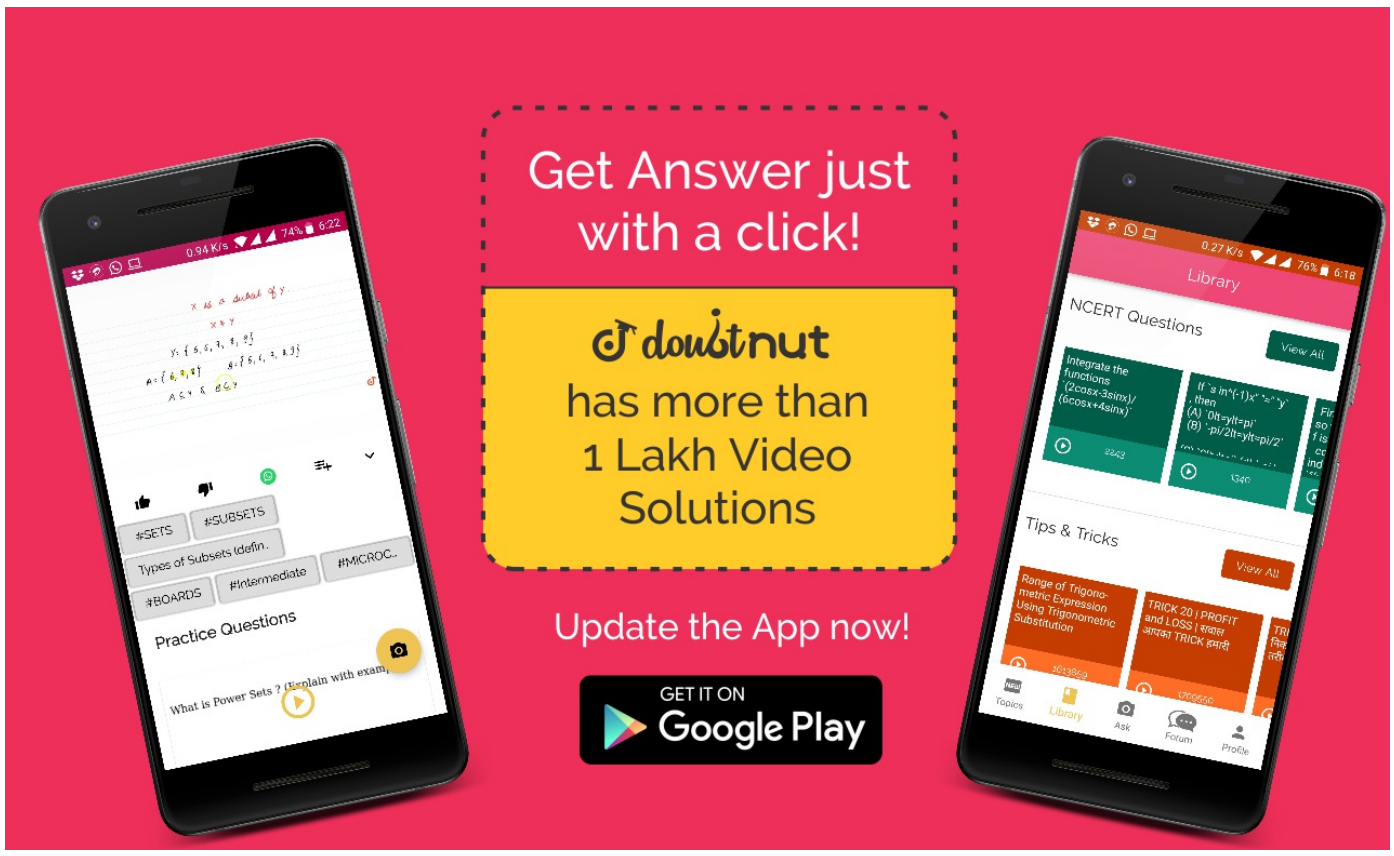
JEE ADVANCED MATHS SOLUTIONS

YEAR 2009

Ques No.	Question
1	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** Let $z = x + iy$ be a complex number where $xandy$ are integers. Then, the area of the rectangle whose vertices are the roots of the equation $zz^3 + zz^3 = 350$ is 48 (b) 32 (c) 40 (d) 80
2	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** Let $z = \cos\theta + i\sin\theta$. Then , the value of $\sum_{m=1}^{15} Im\left(z^{2m-1}\right)$ at $\theta = 2^0$ is $\frac{1}{\sin 2^0}$ (b) $\frac{1}{3\sin 2^0}$ $\frac{1}{2\sin 2^0}$ (d) $\frac{1}{4\sin 2^0}$
3	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** The number of seven digit integers, with sum of the digits equal to 10 and formed by using the digits 1, 2 and 3 only, is



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4	Let f be a non-negative function defined on the interval .[0,1].If $\int_0^x \sqrt{1-(f'(t))^2}$. dt $=\int_0^x f(t).\,dt, 0 \leq x \leq 1$ and f(0)=0,then Watch Free Video Solution on Doubtnut
5	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** Tangents drawn from the point $P(1, 8)$ to the circle $x^2+y^2-6x-4y-11=0$ touch the circle at the points A and B. The equation of the circumcircle of the triangle PAB is (A) $x^2+y^2+4x-6y+19=0$ (B) $x^2+y^2-4x-10y+19=0$ (C) $x^2+y^2-2x+6y-29=0$ (D) $x^2+y^2-6x-4y+19=0$ Watch Free Video Solution on Doubtnut
6	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** a triangle ABC with fixed base BC , the vertex A moves such that $\cos B+\cos C = 4\frac{\sin^2 A}{2}$. If $a, b and c,$ denote the length of the sides of the triangle opposite to the angles $A, B, and C$, respectively, then $b+c=4a$ (b) $b+c=2a$ the locus of point A is an ellipse the locus of point A is a pair of straight lines Watch Free Video Solution on Doubtnut
	JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1 If $\frac{\sin^4 x}{2}+\frac{\cos^4 x}{3} = \frac{1}{5} then$

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$\tan^2 x = \frac{2}{3}$ (b)

$\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$

$\tan^2 x = \frac{1}{3}$ (d)

$\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{2}{125}$

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Let $L = (\lim_{x \to 0} \frac{a - \sqrt{a^2 - x^2} - \frac{x^2}{4}}{x^4},$ $a > 0. If Li \in ite,$ $then$ $a = 2$ (b) $a = 1$ $L = \frac{1}{64}$ (d) $L = \frac{1}{32}$

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9	The area of the region bounded by the curve $y = e^x$ and lines $x = 0 and y = e$ is $e - 1$ (b) $\int_1^e 1n(e + 1 - y)dy$ $e - \int_0^1 e^x dx$ (d) $\int_1^e 1nydy$ Watch Free Video Solution on Doubtnut
10	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** A fair die is tossed repeatedly until a six is obtained Let X denote the number of tosses required The probability that $X = 3$ equals Watch Free Video Solution on Doubtnut
11	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 1** Let A be the set of all 3×3 skew-symmetri matrices whose entries are either $-1, 0, \text{ or } 1.$ If there are exactly three 0s three 1s, and there $(-1)'s$, then the number of such matrices is _____. Watch Free Video Solution on Doubtnut
12	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** The normal at a point P on the ellipse $x^2 + 4y^2 = 16$ meets the x-axis at Q. If M is the midpoint of the line segment PQ, then the locus of M intersects the latus rectums of the given ellipse at points. $\left(\pm \frac{\left(3\sqrt{5}\right)}{2} \pm \frac{2}{7} \right)$ (b) $\left(\pm \frac{\left(3\sqrt{5}\right)}{2} \pm \frac{\sqrt{19}}{7} \right)$

$\left(\pm 2\sqrt{3},\ \pm \frac{1}{7} \right)$ (d) $\left(\pm 2\sqrt{3} \pm \frac{4\sqrt{3}}{7} \right)$

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The locus of the orthocentre of the triangle formed by the lines
$(1+p)x - py$
$+ p(1+p) = 0,$
$(1+q)x - qy$
$+ q(1+q) = 0$

and y = 0, where $p \neq \ \cdot q$, is (A) a hyperbola (B) a parabola (C) an ellipse (D) a straight line

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The line passing through the extremity A of the major exis and extremity B of the minor axis of the ellipse $x^2 + 9y^2 = 9$ meets is auxiliary circle at the point M. Then the area of the triangle with vertices at $A, M,$ and O (the origin) is 31/10 (b) 29/10 (c) 21/10 (d) 27/10

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A line with positive direction cosines passes through the point $P(2,-1,2)$ and makes equal angles with the coordinate axes. The line meets the plane $2x + y + z = 9$ at point Q. The length of the line segment PQ equals

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16	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** If the sum of first n terms of an AP is $cn^2,$ then the sum of squares of these n terms is (2009) $\frac{n\left(4n^2-1\right)c^2}{6}$ (b) $\frac{n\left(4n^2+1\right)c^2}{3}$ $\frac{n\left(4n^2-1\right)c^2}{3}$ (d) $\frac{n\left(4n^2+1\right)c^2}{6}$ Watch Free Video Solution on Doubtnut
17	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** The tangent PT and the normal PN to the parabola $y^2=4ax$ at a point P on it meet its axis at points T and N, respectively. The locus of the centroid of the triangle PTN is a parabola whose: Watch Free Video Solution on Doubtnut
18	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** For the function $f(x)=x\cos x\frac{1}{x}, x$ ≥ 1 (A) for at least one x in the interval [1, c), f(x +2)-fx) 2 (B) lim f(x)= 1 (C) for all x in the interval [1, co), f(x +2)-f(x)> 2 (D) f (x) is strictly decreasing in the interval [1, co) lim fix)= Watch Free Video Solution on Doubtnut
19	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** For `0 Watch Free Video Solution on Doubtnut

20	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** 7. An ellipse intersects the hyperbola 2x2-2y 1 orthogonally. The eccentricity of the ellipse is reciprocal to that of the (2009) hyperbola. If the axes of the ellipse are along the coordinate axes, then (b) the foci of ellipse are (+1, 0) (a) equation of ellipse is x2+ 2y2 2 (d) the foci of ellipse are (t 2, 0) (c) equation of ellipse is x2 2y Watch Free Video Solution on Doubtnut
21	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** Let $f: R\overrightarrow{R}$ be a continuous function which satisfies $f(x) = \int_0^x f(t)dt$. Then the value of $f(1n5)$ is_____ Watch Free Video Solution on Doubtnut
22	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** The centres of two circles C1 and C2 each of unit radius are at a distance of 6 units from each other. Let P be the mid point of the line segment joining the centres of C1 and C2 and C be a circle touching circles C1 and C2 externally. If a common tangent to C1 and C passing through P is also a common tangent to C2 and C, then the radius of the circle C is Watch Free Video Solution on Doubtnut
23	**JEE ADVANCED MATHS SOLUTIONS - 2009 || Paper 2** The centres of two circles C1 and C2 each of unit radius are at a distance of 6 units from each other. Let P be the mid point of the line segment joining the centres of C1 and C2 and C be a circle touching circles C1 and C2 externally. If a common tangent to C1 and C passing through P is also a common tangent to C2 and C, then the radius of the circle C is Watch Free Video Solution on Doubtnut

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The smallest value of k, for which both the roots of the equation, $x^2 - 8kx + 16\left(k^2 - k + 1\right) = 0$ are real, distinct and have values at least 4, is

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The maximum value of the function $f(x) = 2x^3 - 15x^2 + 36x - 48$

on the set $A = \left\{x \middle| x^2 \middle| 20 \leq 9x\right\}$ is_____.

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Let $ABCandABC'$ be two non-congruent triangles with sides $AB = 4$, $AC = AC' = 2\sqrt{2}$ and angle $B = 30^0$. The absolute value of the difference between the areas of these triangles is

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If the function $f(x) = x^3 + e^{\frac{x}{2}}$ and $g(x) = f^{-1}(x)$

, then the value of g'(1) is

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