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JEE ADVANCED MATHS SOLUTIONS

YEAR 2015

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Ques No.	Question
1	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 1** Suppose that $\vec{p}, \vec{q}$ and $\vec{r}$ are three non-coplanar vectors in R^3. Let the components of a vector $\vec{s}$ along $\vec{p}, \vec{q}$ and $\vec{r}$ be 4, 3 and 5, respectively. If the components of this vector $\vec{s}$ along $\left(-\vec{p}+\vec{q}+\vec{r}\right)$, $\left(\vec{p}-\vec{q}+\vec{r}\right)$ and $\left(-\vec{p}-\vec{q}+\vec{r}\right)$ are x, y and z, respectively, then the value of $2\vec{x}+\vec{y}+\vec{z}$ is Watch Free Video Solution on Doubtnut
2	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Suppose that $\vec{p}, \vec{q}$ and $\vec{r}$ are three non-coplanar vectors in R^3. Let the components of a vector $\vec{s}$ along $\vec{p}, \vec{q}$ and $\vec{r}$ be 4, 3 and 5, respectively. If the components of this vector $\vec{s}$ along $\left(-\vec{p}+\vec{q}+\vec{r}\right)$, $\left(\vec{p}-\vec{q}+\vec{r}\right)$ and $\left(-\vec{p}-\vec{q}+\vec{r}\right)$ are x, y and z, respectively, then the value of $2\vec{x}+\vec{y}+\vec{z}$ is Watch Free Video Solution on Doubtnut
3	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Suppose that all the terms of an arithmetic progression (A.P.) are natural numbers. If the ratio of the sum of the first seven terms to the sum of the first eleven terms is 6: 11 and the seventh term lies in between 130 and 140, then the common difference of this A.P. is Watch Free Video Solution on Doubtnut

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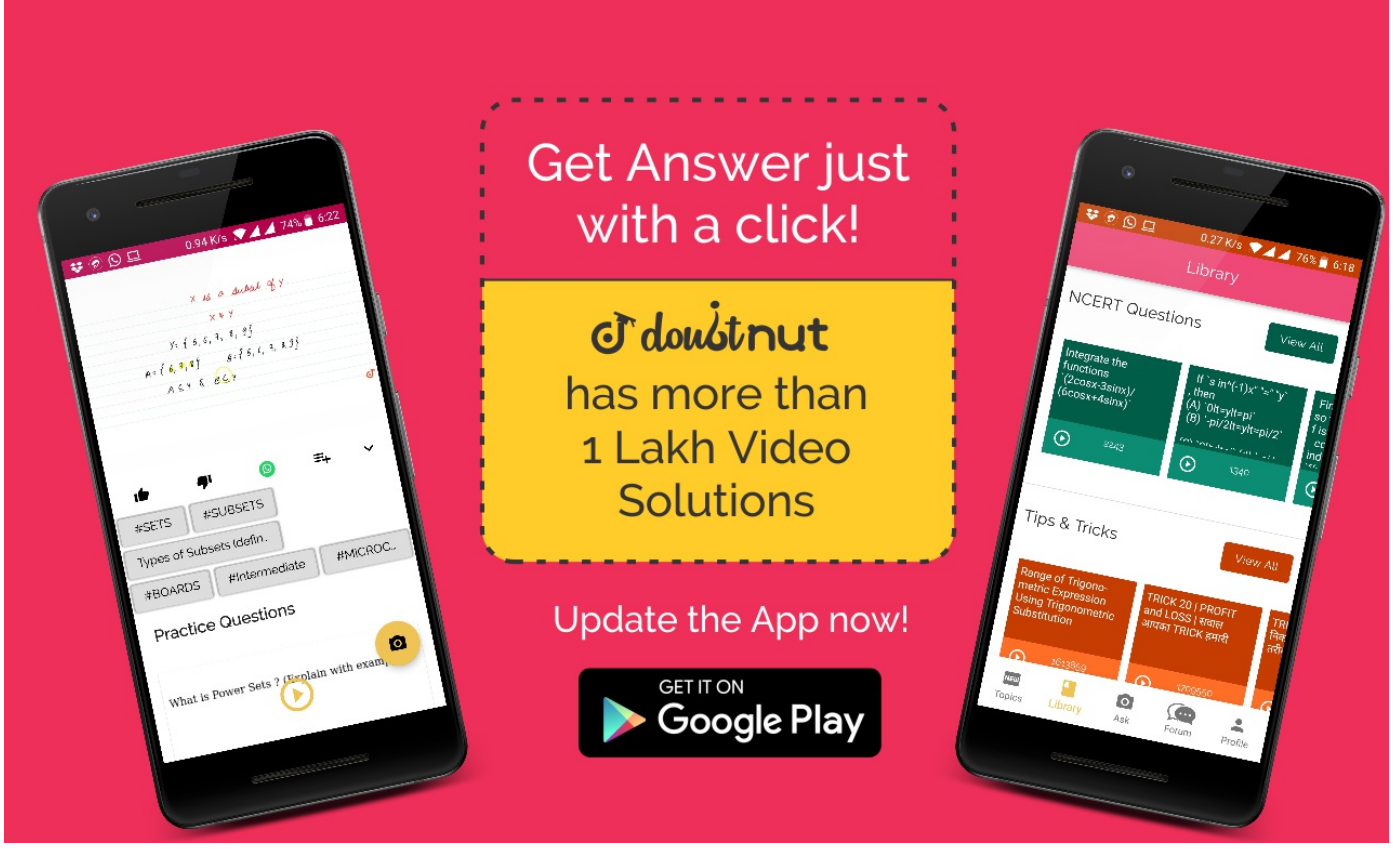

4	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** The coefficient of x^9 in the expansion of $(1+x)\left(16x^2\right)\left(1+x^3\right)\left(1+x^{100}\right)$ is Watch Free Video Solution on Doubtnut
5	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Suppose that the foci of the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ are $(f_1,0) and (f_2,0)$ where $f_1>0 and f_2<0$. Let $P_1 and P_2$ be two parabolas with a common vertex at (0, 0) and with foci at $(f_1.0) and$ (2f_2 , 0), respectively. LetT_1 be a tangent to P_1 which passes through $(2f_2,0)$ and T_2 be a tangents to P_2 which passes through $(f_1,0)$. If m_1 is the slope of T_1 and m_2 is the slope of T_2, then the value of $\left(\frac{1}{m12}+m22\right)$ is Watch Free Video Solution on Doubtnut
6	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Let m and n be two positive integers greater than 1.If $\lim_{\alpha\to 0}\frac{e^{\cos\alpha^n}-e}{\alpha^m}=-\left(\frac{e}{2}\right)$ then the value of $\frac{m}{n}$ is Watch Free Video Solution on Doubtnut
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7	If $\alpha = \int_0^1 \left(e^9 x + 3\tan^{(-1)x}\right) \left(\frac{12+9x^2}{1+x^2}\right) dx$ where ηm^{-1} takes only principal values, then the value of $\left((\log)_e \lvert 1+\alpha \rvert - \frac{3\pi}{4}\right) is$
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	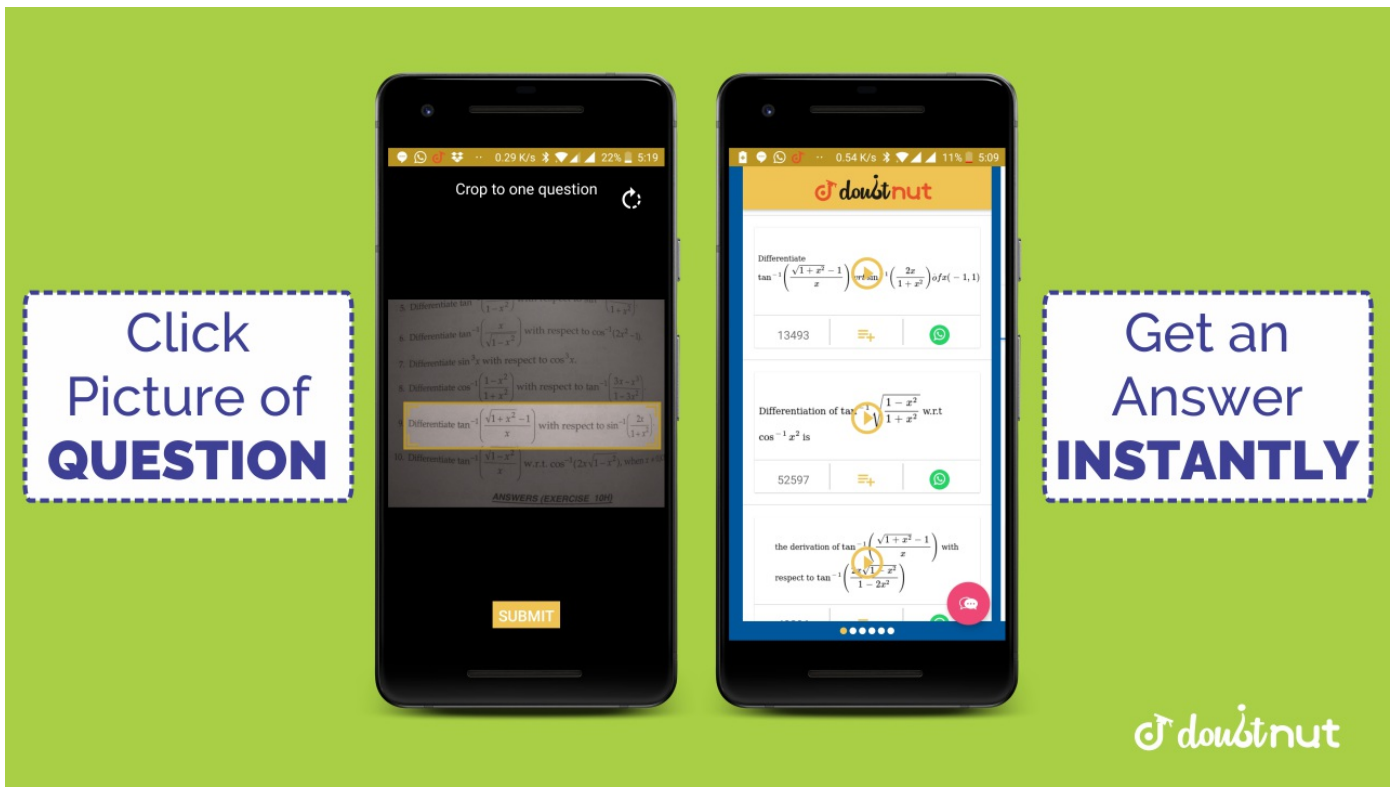
8	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Let $f: R\overrightarrow{R}$ be a continuous odd function, which vanishes exactly at one point and $f(1) = \frac{1}{2}$. Suppose that

	$F(x) = \int_{-1}^{x} f(t)dtf$ or $allx \in [-1, 2]andG(x) = \int_{-1}^{x} t\|f(f(t))\|dtf$ or $allx \in [-1, 2]\dot{I}\frac{f(\lim)_{x\vec{1}}(F(x))}{G(x)} = \frac{1}{14},$ Then the value of $f\left(\frac{1}{2}\right)$ is Watch Free Video Solution on Doubtnut
9	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Let $f'(x) = \frac{192x^3}{2+\sin^4 \pi x}f$ or $allx \in Rwithf\left(\frac{1}{2}\right) = 0.Ifm \leq \int_{\frac{1}{2}}^{1} f(x)dx \leq M,$ then the possible values of $mandM$ are (a)$m = 13, M = 24$ (b) $m = \frac{1}{4}, M = \frac{1}{2}$ (c)$m = -11, M = 0$ (d) $m = 1, M = 12$ Watch Free Video Solution on Doubtnut
10	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Let S be the set of all non-zero real numbers such that the quadratic equation $\alpha x^2 - x + \alpha = 0$ has two distinct real roots $x_1 and x_2$ satisfying the inequality $\|x_1 - x_2\| < 1.$ Which of the following intervals is (are) a subset (s) of S? $\left(\frac{1}{2}, \frac{1}{\sqrt{5}}\right)$ b. $\left(\frac{1}{\sqrt{5}}, 0\right)$ c. $\left(0, \frac{1}{\sqrt{5}}\right)$ d. $\left(\frac{1}{\sqrt{5}}, \frac{1}{2}\right)$ Watch Free Video Solution on Doubtnut

11	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** If $\alpha = 3\sin^{-1}\left(\frac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\frac{4}{9}\right)$, where the inverse trigonometric functions take only the principal values, then the correct option(s) is (are) Watch Free Video Solution on Doubtnut
12	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Let E1 and E2, be two ellipses whose centers are at the origin.The major axes of E1 and E2, lie along the x-axis and the y-axis, respectively. Let S be the circle $x^2 + (y-1)^2 = 2$. The straight line x+ y =3 touches the curves S, E1 and E2 at P,Q and R, respectively. Suppose that $PQ = PR = \frac{2\sqrt{2}}{3}$.If e1 and e2 are the eccentricities of E1 and E2, respectively, then the correct expression(s) is(are): Watch Free Video Solution on Doubtnut
13	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** Consider the hyperbola $H: x^2 - y^2 = 1$ and a circle S with centre $N(x_2, 0)$ Suppose that H and S touch each other at a point $P(x_1, y_1)$ with $x_1 > 1$ and $y_1 > 0$. The common tangent to H and S at P intersects the x-axis at point M. If (l,m) is the centroid of the triangle $\triangle PMN$ then the correct expression is Watch Free Video Solution on Doubtnut
14	**JEE ADVANCED MATHS SOLUTIONS - 2015 || Paper 2** The option(s) with the values of $a and L$ that satisfy the following equation is (are) $\frac{\int_0^{4\pi} e^t\left(\sin^6 at + \cos^4 at\right)dt}{\int_0^{\pi} e^t\left(\sin^6 at + \cos^4 at\right)dt} = L$ (a)$a = 2, L = \frac{e^{4\pi}-1}{e^{\pi}-1}$ (b) $a = 2, L = \frac{e^{4\pi}+1}{e^{\pi}+1}$ (c)

$a = 4, L = \dfrac{e^{4\pi} - 1}{e^{\pi} - 1}$ (d) $a = 4, L = \dfrac{e^{4\pi} + 1}{e^{\pi} + 1}$

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Let
$f(x) = 7\tan^8 x$
$+ 7\tan^6 x$
$- 3\tan^4 x$
$- 3\tan^2 x$
for all $x \in \left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$. Then the correct expression (s) is (are) (a) $\int_0^{\frac{\pi}{4}} xf(x)dx = \dfrac{1}{12}$ (b) $\int_0^{\frac{\pi}{4}} f(x)dx = 0$ (c) $\int_0^{\frac{\pi}{4}} xf(x) = \dfrac{1}{6}$ (d) $\int_0^{\frac{\pi}{4}} f(x)dx = \dfrac{1}{12}$

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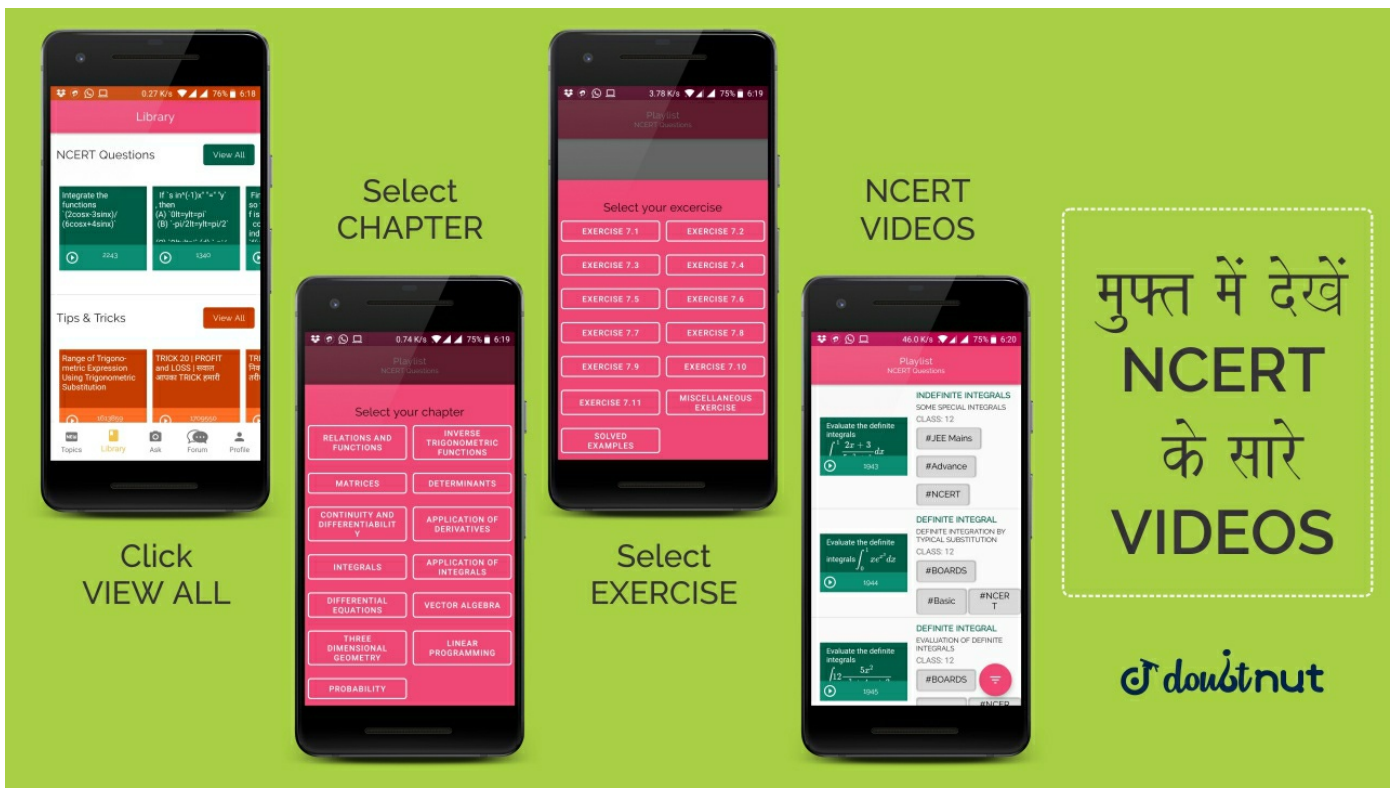

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Let $n_1,$ and n_2, be the number of red and black balls, respectively, in box I. Let n_3 and n_4,be the number one red and b of red and black balls, respectively, in box II. One of the two boxes, box I and box II, was selected at random and a ball was drawn randomly out of this box. The ball was found to be red. If the probablity that this red ball was drawn from box II is $\dfrac{1}{3}$ then the correct option(s) with the possible values of $n_1, n_2, n_3,$ and n_4, is(are)

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Let $n_1,$ and n_2, be the number of red and black balls, respectively, in box I. Let n_3 and n_4,be the number one red and b of red and black balls, respectively, in box II. A ball is drawn at random from box 1 and transferred to box II. If the probability of

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drawing a red ball from box I, after this transfer, is $\frac{1}{3}$ then the correct option(s) with the possible values of n_1 and n_2, is(are)

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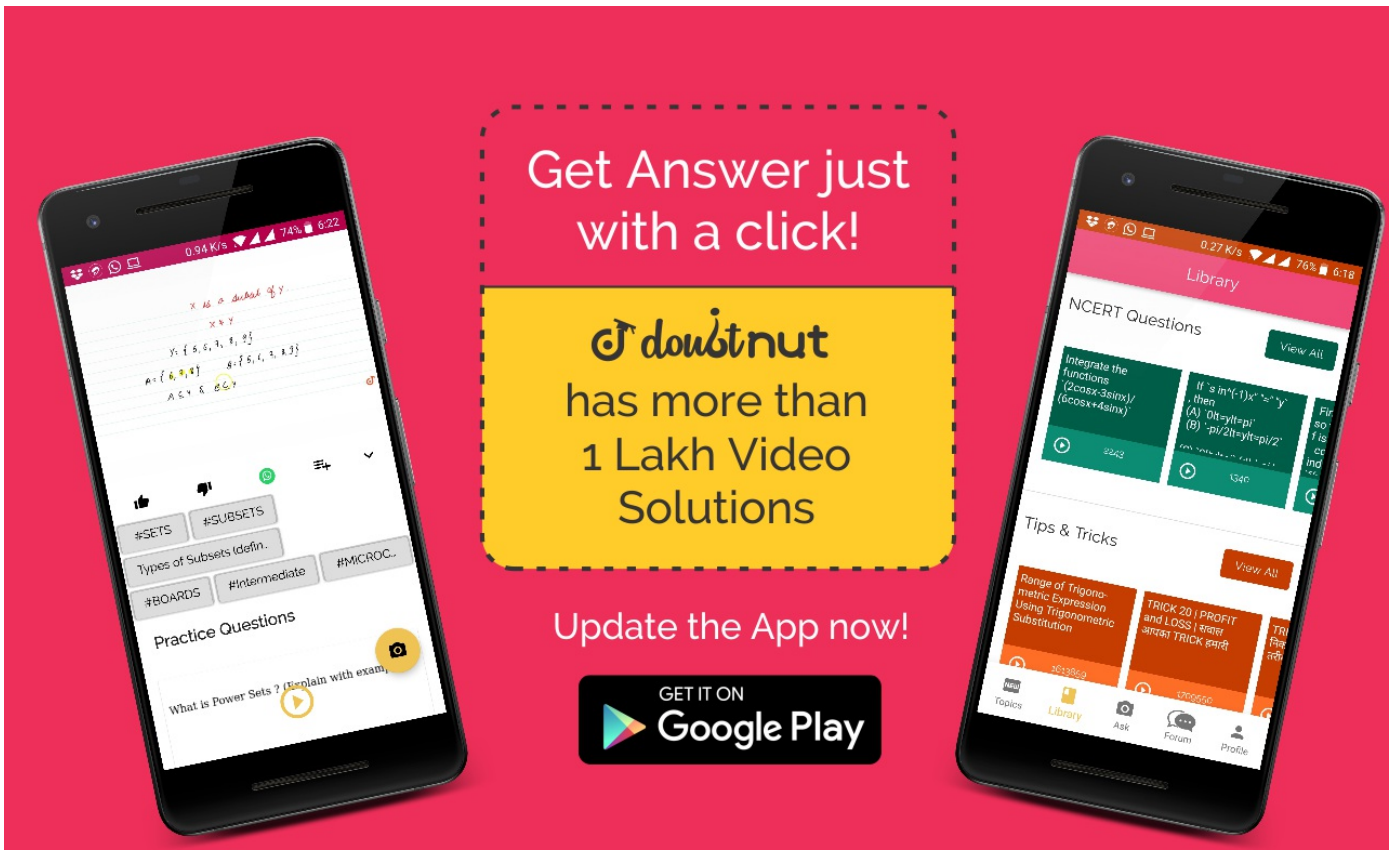
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