

BEST Phys., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258. **105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014**

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced
For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 1**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.46. let $P = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$ where $\alpha \in \mathbb{R}, \dots$

Sol. Given $PQ = k.I \rightarrow Q = k.P^{-1}.I \rightarrow Q = \frac{k}{|P|} (\text{adj } P).I$

$|P| = \begin{vmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{vmatrix} \rightarrow Q = \frac{k}{|P|} \times \begin{bmatrix} (3\alpha-4) & 10 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$= -2(-10) + \alpha(-3+15) + 0(\dots)$

$|P| = 20 + 12\alpha$

$q_{23} = \frac{k}{20+12\alpha} (-3\alpha-4) = \frac{-k}{8}$

$2(3\alpha+4) = 5+3\alpha$

$\alpha = -1$

A X option

option C ✓

option D X

Given $|Q| = \frac{k^3 |I|}{|P|}$

$\frac{k^2}{2} = \frac{k^3 \cdot 1}{20+12\alpha}$

$10+6(-1)=k$

$4=k$

option B

$4\alpha - k + 8$
 $4(-1) - 4 + 8$
 $-4 - 4 + 8 = 0$

INDEX

Q.	Page
37	2
38	2
39	3
40	3
41	4
42	5
43	7
44	9

Que	Page
45	16
46	1
47	11
48	8
49	12
50	6

Que	Page
51	10
52	13
53	15
54	14

the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN

2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258. 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla,

100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 2**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Maths Part is of 18 ques. - from Q.37 to Q.54

Q.37 A debate club consists of 6 girls - - - -

Sol.: no. of girls = 6

(A) 1 1 1 1 1 boys = 4
at most one boy means \rightarrow Max. one boy
Two cases.

$$\begin{aligned}
 & \rightarrow 1 \text{ boy} \rightarrow {}^6C_3 \cdot {}^4C_1 \times {}^4C_1 \\
 & \rightarrow 0 \text{ boy} \rightarrow {}^6C_4 \cdot {}^4C_0 \times {}^4C_1 \\
 & = {}^6C_3 * {}^4C_1 \times {}^4C_1 + {}^6C_4 \times {}^4C_0 \times {}^4C_1 \\
 & = \frac{6 \cdot 5 \cdot 4}{6} \times 4 \times 4 + \frac{6 \times 5}{2} * 4^2
 \end{aligned}$$

$$= 320 + 60 = 380 \text{ option (A)}$$

38) Let $\frac{\pi}{6} < \alpha < \frac{\pi}{12}$ - - - - $\alpha_1 + \beta_2$ equals.

Solⁿ:
=

$$x^2 - 2\sec\alpha + 1 = 0 \rightarrow \alpha_1, \beta_1$$

$$x = \frac{2\sec\alpha \pm \sqrt{(2\sec\alpha)^2 - 4}}{2}$$

$$= \sec\alpha \pm |\tan\alpha|$$

$$\alpha_1 = \sec\alpha + |\tan\alpha| \rightarrow \text{bcos } \alpha_1 > \beta_1$$

$$\beta_1 = \sec\alpha - |\tan\alpha|$$

$$x^2 + 2x\tan\alpha - 1 = 0 \rightarrow \alpha_2, \beta_2$$

$$x = \frac{-2\tan\alpha \pm \sqrt{4\tan^2\alpha + 4}}{2}$$

$$\alpha_2 = -\tan\alpha + |\sec\alpha|$$

$$\beta_2 = -\tan\alpha - |\sec\alpha|$$

$$\begin{aligned}
 \alpha_1 + \beta_2 &= \sec\alpha + |\tan\alpha| - \tan\alpha - \sec\alpha \\
 &= \sec\alpha - \tan\alpha - \tan\alpha - \sec\alpha \\
 &= -2\tan\alpha
 \end{aligned}$$

the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN

2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla,

100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 3**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.39 The least value --- $4ax^2 + \frac{1}{x} > 1$ for all $x > 0$

(C) → Similar question done in class

$$\text{Let } f(x) = 4ax^2 + \frac{1}{x}$$

$$\text{so } f'(x) = 8ax - \frac{1}{x^2} = 0 \text{ for max. or min.}$$

$$8ax = \frac{1}{x^2} \Rightarrow x^3 = \frac{1}{8a} \rightarrow x = \frac{1}{2a^{1/3}}$$

$$\text{So min } f(x) = 4a \left(\frac{1}{2a^{1/3}} \right)^2 + \frac{1}{\frac{1}{2a^{1/3}}} = \frac{4a}{4a^{2/3}} + 2a^{1/3}$$

$$= a^{1/3} + 2a^{1/3} = 3a^{1/3} \text{ which should be 1}$$

$$\text{so } 3a^{1/3} = 1 \Rightarrow a^{1/3} = \frac{1}{3}$$

$$a = \frac{1}{27}$$

Q.40. Let $S = \{x \in (-\pi, \pi) : x \neq 0, \pm \frac{\pi}{2}\}$ The sum ---

Sol. Convert into \sin & \cos $\frac{\sqrt{3}}{\cos} + \frac{1}{\sin} + 2 \left(\frac{\sin}{\cos} - \frac{\cos}{\sin} \right) = 0$

$$(C) \quad \frac{2}{2} (\sqrt{3} \sin x + \cos x) + 2 (\sin^2 x - \cos^2 x) = 0$$

$$2 \left\{ \frac{\sqrt{3}}{2} \sin x + \frac{1}{2} \cos x \right\} + 2 (-\cos 2x) = 0$$

$$\cos \left(x - \frac{\pi}{3} \right) = \cos 2x \rightarrow x - \frac{\pi}{3} = 2n\pi \pm 2x$$

$$x = 2n\pi - \frac{\pi}{3} + 2x$$

$$x = \frac{\pi}{3} - \frac{6n\pi}{3}$$

n	-1	0	1
x	$\frac{7\pi}{3}$	$\frac{\pi}{3}$	$-\frac{5\pi}{3}$

$$\text{Any: } \frac{\pi}{3} - \frac{7\pi}{9} - \frac{\pi}{9} + \frac{5\pi}{9} = 0$$

$$x = 2n\pi - \frac{\pi}{3} - 2x$$

$$3x = 2n\pi - \frac{\pi}{3}$$

$$x = \frac{6n\pi}{9} - \frac{\pi}{9}$$

n	-2	-1	0	1	2
x	$-\frac{13\pi}{9}$	$-\frac{7\pi}{9}$	$-\frac{\pi}{9}$	$\frac{5\pi}{9}$	$\frac{11\pi}{9}$

P.T.O.

the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258. 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 4**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.41. A computer producing factory - - - - -

Sol. $T_1 \rightarrow 20\%$; $T_2 \rightarrow 80\%$; 7% def.

$$(C) P(d/T_1) = 10 P(d/T_2) \quad \left| \quad P(T_1 \cap d) + P(T_2 \cap d) = \frac{7}{100} \right.$$

$$\frac{P(d \cap T_1)}{P(T_1)} = 10 \times \frac{P(d \cap T_2)}{P(T_2)}$$

$$\frac{P(d \cap T_1)}{\frac{20}{100}} = 10 \times \frac{P(d \cap T_2)}{\frac{80}{100}}$$

$$\star + \# = \frac{7}{100}$$

$$\frac{5\#}{2} + \# = \frac{7}{100}$$

$$\# = \frac{1}{50}$$

$$\star = \frac{1}{20}$$

$$2 P(d \cap T_1) = 5 P(d \cap T_2)$$

$$2 \star = 5 \#$$

$$\star = \frac{5\#}{2}$$

$$\text{Also } P(T_1 \cap \bar{d}) + P(T_2 \cap \bar{d}) = 1 - \frac{7}{100}$$

$$P(T_2/\bar{d}) = \frac{P(T_2 \cap \bar{d})}{P(T_1 \cap \bar{d}) + P(T_2 \cap \bar{d})} = \frac{P(T_2) - P(T_2 \cap d)}{P(T_2) - P(T_2 \cap d)}$$

$$= \frac{\frac{80}{100} - \frac{1}{50}}{\frac{93}{100}} = \frac{\frac{78}{100}}{\frac{93}{100}}$$

$$= \frac{78}{93}$$

BEST Phys., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced
For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 5**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q. 42.

The Circle $C_1: x^2 + y^2 = 3$

Sol.

$(A, B) \quad x^2 + y^2 = 3 \quad \& \quad x^2 = 2y$

Put

$(A, B, C) \quad y^2 + 2y - 3 = 0$

$P \rightarrow y_1 = 1; x_1 = \sqrt{2}$

Eq of Tangent:

$x \cdot x_1 + y \cdot y_1 = 3$

$x\sqrt{2} + y \cdot 1 = 3$

New Center on Y-axis

$(0, \star), x = 2\sqrt{3}$

$\left| \frac{0 \cdot \sqrt{2} + \star - 3}{\sqrt{2+1}} \right| = 2\sqrt{3}$

$\star - 3 = \pm 6$

$Q_1 \& Q_2 \quad \star \rightarrow 9 \text{ or } -3$

Let Tangent Cuts Y-axis at S

ΔSR_3Q_3 is Right angle Δ .

Pythagoras

$R_3S = R_2S = 2\sqrt{6}$

$R_2R_3 = 4\sqrt{6}$

Area of ΔPQ_2Q_3

$\frac{1}{2} (Q_2Q_3) (PM)$

$\frac{1}{2} (12) \times 1 = 6$

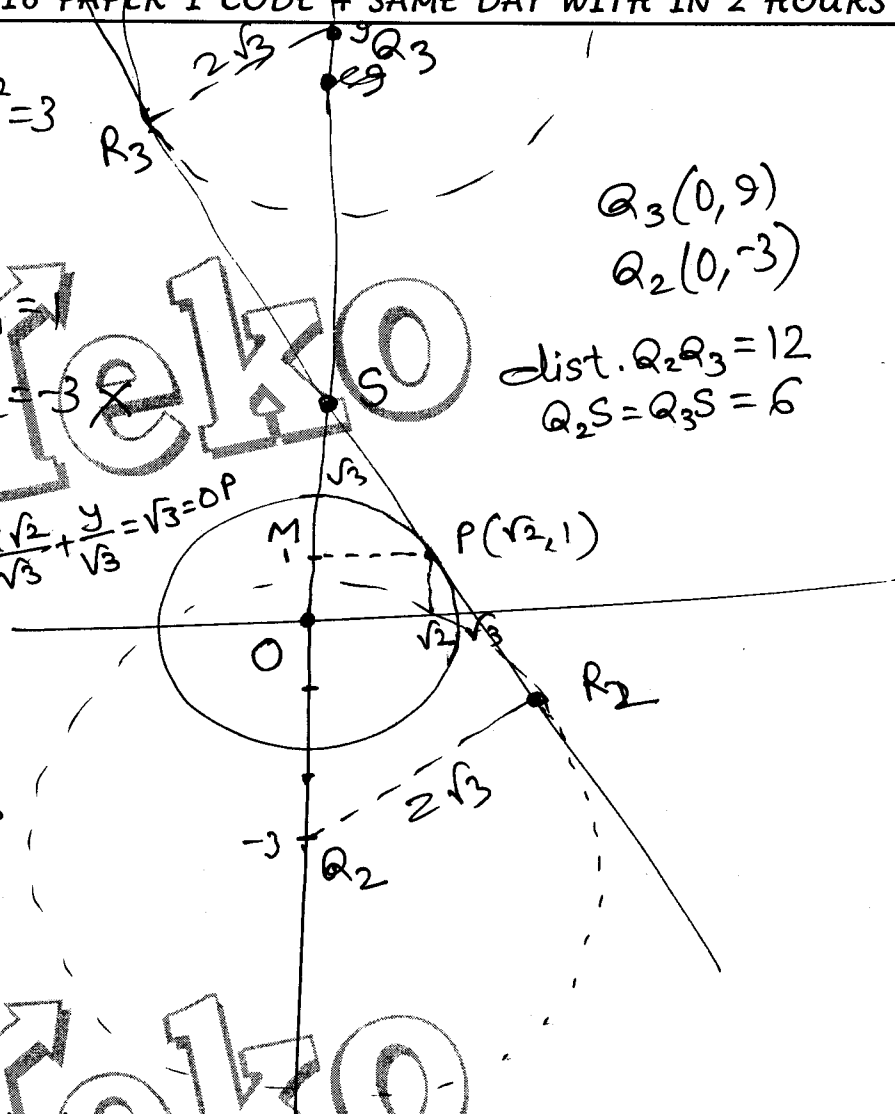
Area of ΔOR_2R_3

$\frac{1}{2} (R_2R_3) (OP)$

$\frac{1}{2} (4\sqrt{6}) (\sqrt{3})$

$\rightarrow \sqrt{2} \cdot 2 \times 3 = 6\sqrt{2}$

(C)



SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.50 Let $z = \frac{-1 + \sqrt{3}i}{2} = \omega$, $M, S \in \{1, 2, 3\}$.

(1)
$$P = \begin{bmatrix} (-\omega)^M & \omega^{2S} \\ \omega^{2S} & \omega^M \end{bmatrix}$$

$$P^2 = \begin{bmatrix} (-\omega)^M & \omega^{2S} \\ \omega^{2S} & \omega^M \end{bmatrix} \begin{bmatrix} (-\omega)^M & \omega^{2S} \\ \omega^{2S} & \omega^M \end{bmatrix}$$

$$= \begin{bmatrix} \omega^{2M} + \omega^{4S} & \omega^{2S}(-\omega^M) + \omega^M \omega^{2S} \\ \omega^{2S}(-\omega^M) + \omega^{2S} \omega^M & \omega^{4S} + \omega^{2M} \end{bmatrix}$$

$$= - \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

So $\omega^{2M} + \omega^{4S} = -1$

$\omega^{2S}(-\omega^M) + \omega^M \omega^{2S} = 0$

It is possible only when $M = 1 \text{ or } 3$

So $M = 1 \rightarrow \omega^2 + \omega^{4S} = -1$

$\omega^{4S} = -1 - \omega^2$

$\omega^{4S} = -(1 + \omega^2)$

$\omega^{4S} = \omega$

So $S = 1, 2 \times 3 \times$

So only one soln

$M = 1$
 $S = 1$

$3 \rightarrow \omega^6 + \omega^{4S} = -1$

$\omega^{4S} = -2 \times$

the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER] www.MathsBySuhag.com
BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 7**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.43. Consider a pyramid OPQRS located —

Sol. dir's of OQ → 3, 3, 0
BCD → OS → $\frac{3}{2}, \frac{3}{2}, 3$

angle $\cos \theta = \frac{9}{2} + \frac{9}{2} + 0 = \frac{1}{3}$ (A)

Eq of Plane OQS is $x - y = 0$ (B)
Simply check

length of \perp from P to the plane containing the $\Delta OQS = \frac{3-0}{\sqrt{1^2+(-1)^2+0}} = \frac{3}{\sqrt{2}}$ (C)

Eq of RS $\frac{x-0}{3/2} = \frac{y-3}{-3/2} = \frac{z-0}{3} \Rightarrow \frac{x}{1/2} = \frac{y-3}{-1/2} = \frac{z}{1} = \lambda$

any point \star on RS $(\frac{\lambda}{2}, -\frac{\lambda}{2}+3, \lambda)$

dir's of O \star → $\frac{\lambda}{2}, -\frac{\lambda}{2}+3, \lambda$ dot product must be zero.

So $\star \rightarrow (\frac{\lambda}{2}, -\frac{\lambda}{2}+3, \lambda)$ with RS

dis O \star → $\frac{1}{4} + \frac{25}{4} + 1$

$$\frac{\lambda}{4} + \frac{\lambda}{4} - \frac{3}{2} + \lambda = 0$$

$$\frac{\lambda}{2} + \lambda = \frac{3}{2}$$

$$\lambda = 1$$

$$= \sqrt{\frac{1+25+4}{4}} = \sqrt{\frac{30}{4}} = \sqrt{\frac{15}{2}} \quad \text{(D)}$$

P.T.O.

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258. 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 8**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

(48) $f'(x) = 2 - \frac{f(x)}{x}$ ---

(Ans). Solⁿ: $\frac{dy}{dx} = 2 - \frac{y}{x}$

$$\frac{dy}{dx} + \frac{y}{x} = 2 \quad \cdot \frac{1}{x} dx = e^{\ln x} = x$$

so I.F. = $e^{\int \frac{1}{x} dx} = e^{\ln x} = x$

so $y \cdot x = \int 2x dx + C$

$(dy/dx) = 1 - \frac{C}{x^2}$ $yx = x^2 + C$ $\rightarrow y = x + \frac{C}{x}$

$f'(x) = 1 - \frac{C}{x^2} \rightarrow f'(\frac{1}{x}) = 1 - Cx^2$ $f(\frac{1}{x}) = \frac{1}{x} + \frac{C}{x^2}$

$\lim_{x \rightarrow 0^+} f'(\frac{1}{x}) = 1$ (A)

$\lim_{x \rightarrow 0^+} x + (\frac{1}{x}) = x(\frac{1}{x} - Cx) = 1 - Cx^2$

$= 1 - Cx^2$

$f'(x) = 1 - \frac{C}{x^2} \rightarrow x^2 f'(x) = x^2 - C$

since $f'(x) = 2 - \frac{f(x)}{x} \rightarrow x^2 f'(x) = 2x^2 - f(x) \cdot x$

so $x^2 f'(x) = 0$

$\lim_{x \rightarrow 0^+} x^2 f'(x) = 0$

Hence $\lim_{x \rightarrow 0^+} x^2 - C = 0$

so $0 - C = 0 \Rightarrow C = 0$

Hence $f(x) = |x|$ & for $(0, 2)$

$0 \leq |f(x)| \leq 2$ (1)

P.T.O.

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258. 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 9**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.44. In a triangle XYZ, let x, y, z, \dots

Sol. $2s = x + y + z$

$\frac{s-x}{4} = \frac{s-y}{3} = \frac{s-z}{2} = \lambda$

$\frac{2s-2x}{4} = \frac{2s-2y}{3} = \frac{2s-2z}{2} = \lambda$

$s = 4\lambda + x$

$s = 3\lambda + y$

add $s = 2\lambda + z$

$3s = 9\lambda + x + y + z$

$3s = 9\lambda + 2s$

$s = 9\lambda \rightarrow \lambda = \frac{s}{9}$

Further solving

$x = 5\lambda/2$

$y = 6\lambda/2$

$z = 7\lambda/2$

Heron's formula

$\Delta^2 = s(s-x)(s-y)(s-z)$

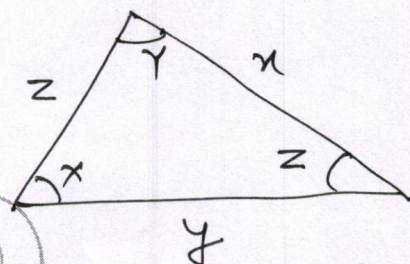
$\Delta^2 = 9\lambda(4\lambda)(3\lambda)(2\lambda)$

$= 9 \times 4 \times 3 \times 2 \lambda^4$

$\sin^2 \frac{\theta}{2} = \frac{1 - \cos \theta}{2} = \frac{1 - \cos(x+y)}{2}$

$\frac{1 + \cos z}{2} = \frac{1 + \left(\frac{x^2 + y^2 - z^2}{2xy} \right)}{2}$

$= \frac{1 + \frac{1}{5}}{2} = \frac{3}{5} \checkmark$



let inradius = r

Area of incircle = $\pi r^2 = \frac{8\pi}{3}$

$r^2 = \frac{8}{3} \Rightarrow r = \frac{2\sqrt{2}}{\sqrt{3}}$

$\left(\frac{\Delta}{s} \right)^2 = \frac{8}{3}$

$\frac{9 \times 4 \times 3 \times 2 \lambda^4}{9 \times 9 \times \lambda^2} = \frac{8}{3}$

$\lambda^2 = 1$

$\lambda = 1$

$r = \frac{\Delta}{s}$

$\Delta = r s = \frac{2\sqrt{2}}{\sqrt{3}} \times 9 = 6\sqrt{6}$

Circum Radius 'R' (A) ✓

$R = \frac{xyz}{4\Delta} = \frac{5 \cdot 6 \cdot 7}{2 \cdot 2 \cdot 2 \cdot 4 \cdot 6\sqrt{6}} = \frac{35\sqrt{6}}{32 \times 6}$

$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

$= \left(\frac{51}{35} - 1 \right) \frac{1}{4} = \frac{16}{35} \times \frac{1}{4}$

(C) ✓ = $\frac{4}{35}$ P.T.O

the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN

2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla,

100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 10**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.51. let $\alpha, \beta \in \mathbb{R}$ be such that

(7)
Ans

$$\lim_{x \rightarrow 0} \frac{x^2 \sin(\beta x)}{\alpha x - \sin x} = 1$$

$$\lim_{x \rightarrow 0} \frac{x^2 (\beta x)}{\alpha x - \sin x} = 1$$

$$\lim_{x \rightarrow 0} \frac{\beta \cdot x^3}{\alpha x - \sin x} = 1$$

$$\lim_{x \rightarrow 0} \frac{3\beta x^2}{\alpha - \cos x} = 1$$

$$\lim_{x \rightarrow 0} \frac{3 \cdot \beta \cdot x^2}{1 - \cos x} = 1$$

$$\lim_{x \rightarrow 0} \frac{6 \cdot \beta \cdot x}{\sin x} = 1$$

$$6\beta x = 1$$

We know that

$$\lim_{x \rightarrow 0} \sin \beta x = \beta x$$

Using L'Hospital

$$N^0 \rightarrow 0$$

$$\text{So } D^0 \rightarrow 0$$

$$\alpha - \cos 0 = 0$$

$$\alpha - 1 = 0$$

$$\alpha = 1$$

$$\beta = \frac{1}{6}$$

$$\text{Finding } 6(\alpha + \beta) = 6\left(1 + \frac{1}{6}\right)$$

$$= 6 + 1 = 7$$

BEST Phys., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 PAGE 11

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.47. let $f: R \rightarrow R, g: R \rightarrow R, h: R \rightarrow R, \dots$

Sol.

(BC)

$$g(x^3 + 3x + 2) = x$$

$$(g'(x^3 + 3x + 2))(3x^2 + 3) = 1$$

$$\left. \begin{array}{l} x=6 \\ g'(236) = \frac{1}{111} \end{array} \right\} \begin{array}{l} x \rightarrow 0 \\ g'(2) = \frac{1}{3} \end{array} \left\{ \begin{array}{l} x \rightarrow 1 \\ g'(6) = \frac{1}{6} \end{array} \right.$$

(A) X

$$x \rightarrow 3$$

$$g(27 + 9 + 2) = 3$$

$$g(38) = 3$$

$$h(g(g(38))) = 38$$

$$h(g(3)) = 38$$

(D) X

$$g(x^3 + 3x + 2) = x$$

$$x \rightarrow 2$$

$$g(16) = 2$$

$$h(g(g(x))) = x$$

$$x \rightarrow 16$$

$$h(g(g(16))) = 16$$

$$h(g(2)) = 16$$

$$h(0) = 16$$

$$x \rightarrow 6$$

$$g(6^3 + 3 \cdot 6 + 2) = 6$$

$$g(236) = 6$$

$$x \rightarrow 1$$

$$g(6) = 1$$

$$\text{also } x \rightarrow 0$$

$$g(2) = 0$$

$$h(g(g(x))) = x$$

$$h'(g(g(x))) \cdot g'(g(x)) \cdot g'(x) = 1$$

$$x \rightarrow 236$$

$$h'(g(g(236))) \cdot g'(g(236)) \cdot g'(236) = 1$$

$$h'(g(6)) \cdot g'(6) \cdot \frac{1}{111} = 1$$

$$h'(1) \cdot \frac{1}{6} \cdot \frac{1}{111} = 1$$

$$h'(1) = 666$$

(B) ✓

P.T.O.

CLASSES the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com
BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, **105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014**

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla,
100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced
For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 12**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.49. let R, S be the diameter of the Circle $x^2 + y^2 = 1$.

Sol. (A) Let $P(h, k)$

So $h^2 + k^2 = 1$

Eq of tangent at $P(h, k)$ on
Circle $x^2 + y^2 = 1$

$$hx + ky = 1$$

Cut by $x=1$

$$h \cdot 1 + k \cdot y = 1$$

$$y = \frac{1-h}{k} \quad \text{Eq. of line}$$

passing through
Q & // to RS

Eq. of Normal
at $P(h, k)$

$$y = \frac{k}{h} x.$$

Now getting cutting point E

$$\left(\frac{(1-h)}{K} \cdot \frac{h}{K}, \frac{1-h}{K} \right)$$

$$\left(\frac{(1-h) \cdot h}{1-h^2}, \frac{1-h}{k} \right)$$

$$\left(\frac{h}{1+h}, \frac{1-k}{k} \right)$$

Check \boxed{E}

$$X = \frac{h}{1+h} = \frac{1}{3}$$

$$3h = 1 + h$$

$$h = \frac{1}{2}$$

$$Y = \frac{1 - \frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}$$

$$k^2 = 1 -$$
$$k = \frac{\pm \sqrt{3}}{2}$$

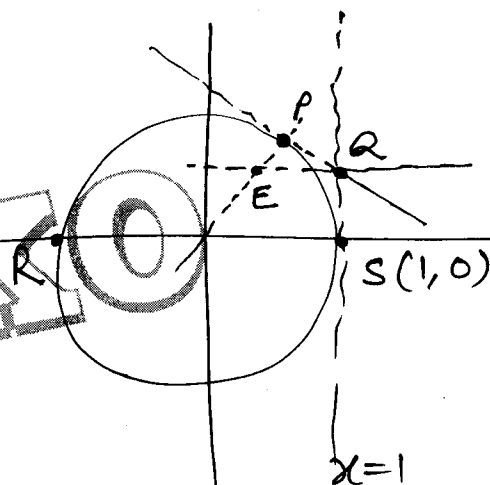
$$\frac{h}{1+h} = \frac{1}{4}$$
$$4h = 1+h$$

$$h = \frac{1}{2}$$

$$K^2 = \sqrt{1 - \frac{1}{3}}$$

$$\frac{1 - \frac{1}{3}}{\frac{\sqrt{2}}{\sqrt{3}}} = \frac{\frac{2}{3}}{\frac{\sqrt{2}}{\sqrt{3}}} = \sqrt{\frac{2}{3}}$$

A & C are Image in x axis



the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN

2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 13**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.52. The total number of distinct $x \in [0, 1]$ for which

Sol.
1

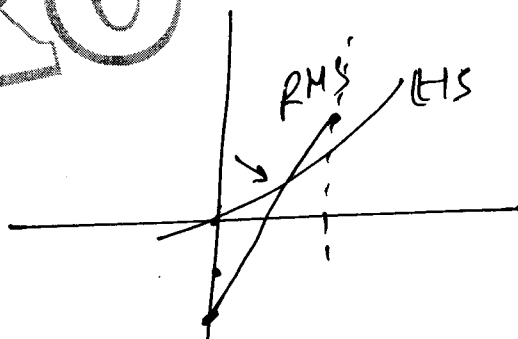
$$\int_0^x \frac{t^2 dt}{1+t^4} = 2x-1$$

check slope
of

$$\frac{LHS}{M} = \frac{x^2}{1+x^4}$$

M lies to
0 to $\frac{1}{2}$
if $x \rightarrow 0$ to 1

is +ve in 0 to 1



So LHS is
increasing.
with ~~min~~ value
zero
& ~~max~~

& RHS is
also
increasing
function
with slope = 2

Only One
Solution.

P.T.O.

Teko

the support IIT JEE Main & Advance with class 9th, 10th, 11th, 12th & DROPPER www.MathsBySuhag.com

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN

2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla,

100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 14**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

(54)
(2)

$$\begin{vmatrix} x & x^2 & 1+x^3 \\ 2x & 4x^2 & 1+8x^3 \\ 3x & 9x^2 & 1+27x^3 \end{vmatrix} = 10$$

$$x^3 \begin{vmatrix} 1 & 1 & 1 \\ 2 & 4 & 1 \\ 3 & 9 & 1 \end{vmatrix} + x^6 \begin{vmatrix} 1 & 1 & 1 \\ 2 & 4 & 8 \\ 3 & 9 & 27 \end{vmatrix} = 10$$

$x^3 (2) + x^6 (12) = 10$
 $6x^6 + x^3 = 10$

$x = -1$ substituting
 so $6x^6 + x^3 - 5 = 0$. Has -1 as root
 $6x^6 + x^3 - 5 = (x+1)(6x^5 - 6x^4 + 6x^3 - 5x^2 + 5x - 5)$
 at $x = 0$ $f(x) = -5 = -ve$
 $x = 1$ $f(x) = 2 = +ve$
 so total 2 solns.
 so it has 1 root b/w 0 & 1.

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com
To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN 2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258. 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced
For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 15**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q.53 let m be the smallest positive ---

Sol. ${}^2C_2 + {}^3C_2 + {}^4C_2 + \dots + {}^{48}C_2 + {}^{50}C_2 \cdot m^2 = (3n+1) \cdot {}^{51}C_3$

$$\frac{1 \cdot 2}{2} + \frac{2 \cdot 3}{2} + \frac{3 \cdot 4}{2} + \dots + \frac{48 \cdot 49}{2} + {}^{50}C_2 m^2 = (3n+1) {}^{51}C_3$$

$$\frac{1}{2} \sum_{r=1}^{48} r(r+1) + {}^{50}C_2 m^2 = \frac{1}{2} \sum_{r=1}^{48} r^2 + \frac{1}{2} \sum_{r=1}^{48} r + {}^{50}C_2 m^2 = (3n+1) {}^{51}C_3$$

$$\frac{1}{2} \left(\frac{48(48+1)(2 \times 48+1)}{6} \right) + \frac{1}{2} \left(\frac{48(48+1)}{2} \right) + \dots$$

$$19600 + \frac{50 \times 49}{2} m^2 = (3n+1) \frac{51 \times 50 \times 49}{6}$$

$$8 + \frac{m^2}{2} = (3n+1) \left(\frac{17}{2} \right)$$

$$m^2 = 51n + 1$$

$$m^2 - 1 = 51n$$

$$(m-1)(m+1) = 51 \times n$$

let $m=16$

$$LHS (16-1)(16+1) \\ (15)(17)$$

$$5 \times 3 \times 17 = 5 \times 51 = 51 \times n$$

$$n=5$$

BEST Phy., Chem., Maths TEAM FOR IITJEE, Down Load Free Study Package From Website www.TekoClasses.com

To know teaching style (demo) search "IIT MATHS BY SUHAG SIR" on www.youtube.com

GET SAME DAY SOLUTION OF JEE MAIN & JEE ADVANCED ON WEBSITE www.TekoClasses.com EVERY YEAR

OUR STUDENT "PRATHAM NAIK" SCORED 115 OUT OF 120 (96%) IN MATHS & TOTAL MARKS 282 OUT OF 360 (79%) IN JEE MAIN

2013 & IN JEE ADVANCE 2013 HIS ALL INDIA RANK 258, 105 Selections in JEE Main 2014 & 22 Selections in JEE Advanced 2014

96 Selections in JEE Main 2015 & 21 Selections in JEE Advanced 2015 Also Available Online www.MathsBySuhag.com

Result of JEE Main 2016 : Our Students Maths Marks 115/120 Siddharth Agrawal, 100/120 Himanshu Shukla, 100/120 Nikhil Jaiswal, 93/120 Swastik Sharma, 93/120 Shashwat Rangnekar & Our 112+ Students Selected for Advanced

For Doubt Discussion on Maths : WhatsApp Number of Suhag Kariya : 9009 260 559 **PAGE 16**

SOLUTIONS OF JEE ADVANCED 2016 PAPER 1 CODE 4 SAME DAY WITH IN 2 HOURS

Q. 45. A solution curve of differ. eq.

(A) $(x^2 + xy + 4x + 2y + 4) \frac{dy}{dx} - y^2 = 0 \quad x > 0$ Pass through (1, 3)

Sol.

Let $y = (x+2) \cdot t$

Put $(x+2)(x+2)t + (x+2)t \left((x+2) \frac{dt}{dx} + t \right)$

$\frac{dy}{dx} = (x+2) \cdot \frac{dt}{dx} + t$

$= (x+2)^2 t^2$

$(x+2)^2 = 0$ (or)

$(1+t) \left((x+2) \frac{dt}{dx} + t \right) - t^2 = 0$

$(x+2)(1+t) \frac{dt}{dx} + t = 0$

$\left(\frac{1+t}{t} \right) dt = - \frac{dx}{x+2}$

$\left(\frac{1}{t} + 1 \right) dt = - \frac{dx}{x+2}$

$\ln t + t = - \ln(x+2) + C$

Put $t = \frac{y}{x+2}$

$\ln y - \ln(x+2) + \frac{y}{x+2} = - \ln(x+2) + C \Rightarrow \ln y + \frac{y}{x+2} = C$

$x \rightarrow 1, y \rightarrow 3$

$C = \ln 3 + 1 = \ln 3e$

$\ln y + \frac{y}{x+2} = \ln 3e$

for option (A) Put $y = x+2$

$\ln(x+2) + 1 = \ln 3 + 1 \rightarrow x = 1$

(A) ✓
(B) X

(C) No Sol \rightarrow X

(D) No Sol \rightarrow ✓

P.T.O.