Chapter 03

Trigonometric Ratios

JEE-FLASHBACK

JEE MAINS QUESTION

Q.1 The expression $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}$ can be written as : **[JEE MAIN 2013]**

(1) sinA cosA + 1 (2) secA cosecA + 1

(3) tanA + cotA (4) secA + cosecA

Q.2 A bird is sitting at the top a vertical pole 20m high and its elevation from a point O on the ground is 45°. It flies off horizontally straight away from the point O. After 1s, the elevation of the bird from O is reduced to 30°. Then, the speed (in m/s) of the bird is **[JEE MAIN 2014]**

(1) $40\left(\sqrt{2}-1\right)$ (2) $40\left(\sqrt{3}-\sqrt{2}\right)$

(3) $20\sqrt{2}$ (4) $20\left(\sqrt{3}-1\right)$

Q.3 If $\operatorname{cosec}\theta=\frac{p+q}{P-q}$ $(p\neq q\neq 0)$, then $\left|\cot\left(\frac{\pi}{4}+\frac{\theta}{2}\right)\right|$ is equal to **[JEE MAIN 2014]**

(1) $\sqrt{\frac{p}{q}}$ (2) $\sqrt{\frac{q}{p}}$ (3) $\sqrt{pq}$ (4) pq

Q.4 If $2\cos\theta+\sin\theta=1\left(\theta\neq\frac{\pi}{2}\right)$, then $7\cos\theta+6\sin\theta$ is equal to **[Online JEE MAIN 2014]**

(1) $\frac{1}{2}$ (2) 2 (3) $\frac{11}{2}$ (4) $\frac{46}{5}$

Q.5 If the angles of elevation of the top of a tower from three collinear points A, B and C, on a line leading to the foot of the tower are 30°, 45° and 60° respectively, then the ratio AB : BC is : **[JEE MAIN 2015]**

(1) $1:\sqrt{3}$ (2) 2:3

(3) $\sqrt{3}:1$ (4) $\sqrt{3}:\sqrt{2}$

Q.6 If $\cos\alpha+\cos\beta=\frac{3}{2}$ and $\sin\alpha+\sin\beta=\frac{1}{2}$ and θ is the arithmetic mean of α and β, then $\sin 2\theta+\cos 2\theta$ is equal to **[JEE MAIN 2015]**

(1) $\frac{3}{5}$ (2) $\frac{7}{5}$ (3) $\frac{4}{5}$ (4) $\frac{8}{5}$

Q.7 A man is walking towards a vertical pillar in a straight path, at uniform speed. At a certain point A on the path, he observes that the angle of elevation of the top of the pillar is 30°. After walking for 10 minutes from A in the same direction, at a point B he observes that the angle of elevation of the top of the pillar is 60°. Then the time taken (in minutes) by him from B to reach the pillar is **[JEE MAIN 2016]**

(1) 10 (2) 20 (3) 5 (4) 6

Q.8 If m and M are the minimum and the maximum values of $4+\frac{1}{2}\sin^2 2x-2\cos^4 x$, $x\in R$, then M – m is equal to **[Online JEE MAIN 2016]**

(1) $\frac{9}{4}$ (2) $\frac{15}{4}$ (3) $\frac{7}{4}$ (4) $\frac{1}{4}$

Q.9 Let a vertical tower AB have its end A on the level ground. Let C be the mid-point of AB and P be a point on the ground such that AP = 2AB. If $\angle BPC=\beta$, then $\tan\beta$ is equal to : **[JEE MAIN 2017]**

(1) $\frac{4}{9}$ (2) $\frac{6}{7}$ (3) $\frac{1}{4}$ (4) $\frac{2}{9}$

Q.10 If $5(\tan^2 x-\cos^2 x)=2\cos 2x+9$, then the value of cos 4x is : **[JEE MAIN 2017]**

(1) $-\frac{7}{9}$ (2) $-\frac{3}{5}$ (3) $\frac{1}{3}$ (4) $\frac{2}{3}$

Q.11 PQR is a trianglular park with PQ = PR = 200 m. A T.V. tower stands at the mid-point of QR. If the angles of elevation of the top of the tower at P, Q and R are respectively 45°, 30° and 30°, then the height of the tower (in m) is **[JEE MAIN 2018]**

(1) 50 (2) $100\sqrt{3}$

(3) $50\sqrt{2}$ (4) 100

Q.12 The value of sin10° sin30° sin50° sin70° is **[JEE MAIN 2019]**

(1) $\frac{1}{36}$ (2) $\frac{1}{32}$ (3) $\frac{1}{16}$ (4) $\frac{1}{18}$

Q.13 The value of $\cos^2 10° - \cos 10° \cos 50° + \cos^2 50°$ is **[JEE MAIN 2019]**

(1) $\frac{3}{2}(1 + \cos 20°)$ (2) $\frac{3}{4} + \cos 20°$

(3) $\frac{3}{2}$ (4) $\frac{3}{4}$

Q.14 If the length of the sides of a triangle are in AP and the greatest angle is double the smallest, then the ratio of lengths of the sides of the this triangle is **[JEE MAIN 2019]**

(1) 3 : 4 : 5 (2) 4 : 5 : 6

(3) 5 : 9 : 13 (4) 5 : 6 : 7

Q.15 If $\cos(\alpha + \beta) = \frac{3}{5}$, $\sin(\alpha - \beta) = \frac{5}{13}$ and $0 < \alpha, \beta < \frac{\pi}{4}$, then $\tan(2\alpha)$ is equal to **[JEE MAIN 2019]**

(1) $\frac{63}{52}$ (2) $\frac{63}{16}$ (3) $\frac{21}{16}$ (4) $\frac{33}{52}$

Q.16 Let $f_k(x) = \frac{1}{k}(\sin^k x + \cos^k x)$ for k = 1, 2, 3 ..... Then, for all $x \in R$, the value of $f_4(x) - f_6(x)$ is equal to **[JEE MAIN 2014, 2019]**

(1) $\frac{1}{12}$ (2) $\frac{5}{12}$ (3) $\frac{-1}{12}$ (4) $\frac{1}{4}$

Q.17 The value of $\cos\frac{\pi}{2^2}\cdot\cos\frac{\pi}{2^3}.....\cos\frac{\pi}{2^{10}}\cdot\sin\frac{\pi}{2^{10}}$ is **[JEE MAIN 2019]**

(1) $\frac{1}{1024}$ (2) $\frac{1}{2}$ (3) $\frac{1}{512}$ (4) $\frac{1}{256}$

Q.18 For any $\theta \in \left(\frac{\pi}{4}, \frac{\pi}{2}\right)$, the expression $3(\sin\theta - \cos\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4\sin^6\theta$ equals **[JEE MAIN 2019]**

(1) $13 - 4\cos^4\theta + 2\sin^2\theta\cos^2\theta$

(2) $13 - 4\cos^2\theta + 6\cos^4\theta$

(3) $13 - 4\cos^2\theta + 6\sin^2\theta\cos^2\theta$

(4) $13 - 4\cos^6\theta$

Q.19 The maximum value of $3\cos\theta + 5\sin\left(\theta - \frac{\pi}{6}\right)$ for any real value of θ is **[JEE MAIN 2019]**

(1) $\frac{\sqrt{79}}{2}$ (2) $\sqrt{34}$ (3) $\sqrt{31}$ (4) $\sqrt{19}$

Q.20 The angle of elevation of the top of a vertical tower standing on a horizontal plane is observed to be 45° from a point A on the plane. Let B be the point 30 m vertically above the point A. If the angle of elevation of the top of the tower from B be 30°, then the distance (in m) of the foot of the tower from the point A is **[JEE MAIN 2019]**

(1) $15\left(3+\sqrt{3}\right)$ (2) $15\left(5-\sqrt{3}\right)$

(3) $15\left(3-\sqrt{3}\right)$ (4) $15\left(1+\sqrt{3}\right)$

Q.21 If the angle of elevation of a cloud from a point P which is 25 m above a lake is 30° and the angle of depression of reflection of the cloud in the lake from P be 60°, then the height of the cloud (in meters) from the surface of the lake is **[JEE MAIN 2019]**

(1) 50 (2) 60 (3) 45 (4) 42

Q.22 For any $\theta \in \left(\frac{\pi}{4}, \frac{\pi}{2}\right)$, the expression $3(\cos\theta - \sin\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4\sin^6\theta$ equlas: **[JEE MAIN 2019]**

(1) $13 - 4\cos^2\theta + 6\sin^2\theta\cos^2\theta$

(2) $13 - 4\cos^6\theta$

(3) $13 - 4\cos^2\theta$

(4) $13 - 4\cos^4\theta + 2\sin^2\theta\cos^2\theta$

Q.23 ABC is a triangular park with AB = AC = 100 m. A vertical tower is situated at the mid-point of BC. If the angles of elevation of the top of the tower at A and B are $\cot^{-1}\left(3\sqrt{2}\right)$ and $\operatorname{cosec}^{-1}\left(2\sqrt{2}\right)$ respectively, then the height of the tower (in m) is **[JEE MAIN 2019]**

(1) 25 (2) 20 (3) $10\sqrt{5}$ (4) $\frac{100}{3\sqrt{3}}$

Q.24 Two poles standing on a horizontal ground are of heights 5 m and 10m, respectively. The line joining their tops makes an angle of 15° with the ground. Then the distance (in m) between the poles is **[JEE MAIN 2019]**

(1) $5\left(\sqrt{3}+1\right)$ (2) $\frac{5}{2}\left(2+\sqrt{3}\right)$

(3) $10\left(\sqrt{3}-1\right)$ (4) $5\left(2+\sqrt{3}\right)$

Q.25 Two vertical poles of heights 20 m and 80 m stand apart on a horizontal plane. The height (in m) of the point of intersection of the lines joining the top of each pole to the foot of the other from this horizontal plane is **[JEE MAIN 2019]**

(1) 15 (2) 16 (3) 12 (4) 18

Q.26 Consider a triangular plot ABC with sides AB = 7m. BC = 5m and CA = 6m. A vertical lamp-post at the mid-point D of AC subtends an angle 30° at B. The height (in m) of the lamp-post is **[JEE MAIN 2019]**

(1) $\frac{2}{3}\sqrt{21}$ (2) $2\sqrt{21}$

(3) $7\sqrt{3}$ (4) $\frac{3}{2}\sqrt{21}$

Q.27 If $\sin^4\alpha + 4\cos^4\beta + 2 = 4\sqrt{2}\sin\alpha\cos\beta$; $\alpha, \beta \in [0, \pi]$, then $\cos(\alpha+\beta) - \cos(\alpha-\beta)$ is equal to **[JEE MAIN 2019]**

(1) 0 (2) –1 (3) $\sqrt{2}$ (4) $-\sqrt{2}$

Q.28 If $y = \sqrt{\frac{2(\tan\alpha+\cot\alpha)}{1+\tan^2\alpha}+\frac{1}{\sin^2\alpha}}$ when $\alpha \in \left(\frac{3\pi}{4}, \pi\right)$ then find $\frac{dy}{d\alpha}$ at $\alpha = \frac{5\pi}{6}$ **[JEE MAIN 2020]**

(1) 4 (2) 2 (3) 3 (4) –4

Q.29 Let $\frac{\sqrt{2}\sin\alpha}{\sqrt{1+\cos 2\alpha}} = \frac{1}{7}$ and $\sqrt{\frac{1-\cos 2\beta}{2}} = \frac{1}{\sqrt{10}}$ where $\alpha, \beta \in \left(0, \frac{\pi}{2}\right)$. Then $\tan(\alpha + 2\beta)$ is equal to **[JEE MAIN 2020]**

Q.30 Value of $\cos^3\frac{\pi}{8}\cos\frac{3\pi}{8} + \sin^3\frac{\pi}{8}\sin\frac{3\pi}{8}$ is **[JEE MAIN 2020]**

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

Q.31 Let $x = \sum_{n=0}^{\infty}(-1)^n(\tan\theta)^{2n}$ and $y = \sum_{n=0}^{\infty}(\cos\theta)^{2n}$ where $\theta \in (0, \pi/4)$, then **[JEE MAIN 2020]**

(1) x(y + 1) = 1 (2) y(1 – x) = 1

(3) y(x – 1) = 1 (4) y(1 + x)

Q.32 If $L = \sin^2\left(\frac{\pi}{16}\right) - \sin^2\left(\frac{\pi}{8}\right)$ and $M = \cos^2\left(\frac{\pi}{16}\right) - \sin^2\left(\frac{\pi}{8}\right)$, then **[JEE MAIN 2020]**

(1) $L = -\frac{1}{2\sqrt{2}} + \frac{1}{2}\cos\frac{\pi}{8}$ (2) $L = \frac{1}{4\sqrt{2}} - \frac{1}{4}\cos\frac{\pi}{8}$

(3) $M = \frac{1}{4\sqrt{2}} + \frac{1}{4}\cos\frac{\pi}{8}$ (4) $M = \frac{1}{2\sqrt{2}} + \frac{1}{2}\cos\frac{\pi}{8}$

Q.33 The set of all possible values of θ in the interval $(0, \pi)$ for which the points (1, 2) and $(\sin\theta, \cos\theta)$ lie on the same side of the line x + y = 1 is **[JEE MAIN 2020]**

(1) $\left(0, \frac{\pi}{2}\right)$ (2) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

(3) $\left(0,\frac{3\pi}{4}\right)$ (4) $\left(0,\frac{\pi}{4}\right)$

Q.34 The value of $\cot\frac{\pi}{24}$ is : **[JEE MAIN 2021]**

(1) $\sqrt{2}+\sqrt{3}+2-\sqrt{6}$ (2) $3\sqrt{2}-\sqrt{3}-\sqrt{6}$

(3) $\sqrt{2}-\sqrt{3}-2+\sqrt{6}$ (4) $\sqrt{2}+\sqrt{3}+2+\sqrt{6}$

Q.35 If $15\sin^4\alpha + 10\cos^4\alpha = 6$, for some $\alpha \in R$, then the value of $27\sec^6\alpha + 8\operatorname{cosec}^6\alpha$ is equal to: **[JEE MAIN 2021]**

(1) 350 (2) 250

(3) 400 (2) 500

Q.36 The value of

$2\sin\left(\frac{\pi}{8}\right)\sin\left(\frac{2\pi}{8}\right)\sin\left(\frac{3\pi}{8}\right)\sin\left(\frac{5\pi}{8}\right)\sin\left(\frac{6\pi}{8}\right)\sin\left(\frac{7\pi}{8}\right)$ **[JEE MAIN 2021]**

(1) $\frac{1}{4\sqrt{2}}$ (2) $\frac{1}{4}$ (3) $\frac{1}{8}$ (4) $\frac{1}{8\sqrt{2}}$

Q.37 Let $\tan\alpha$, $\tan\beta$ and $\tan\gamma$; $\alpha,\beta,\gamma \neq \frac{(2n-1)\pi}{2}$, $n \in N$ be the slopes of three line segments OA, OB and OC, respectively, where O is origin. If circumcentre of ΔABC coincides with origin and its orthocentre lies on y–axis, then the value of $\left(\frac{\cos3\alpha+\cos3\beta+\cos3\gamma}{\cos\alpha\cos\beta\cos\gamma}\right)^2$ is equal to _____. **[JEE MAIN 2021]**

Q.38 The minimum value of α for which the equation $\frac{4}{\sin x}+\frac{1}{1-\sin x}=\alpha$ has at least one solution in $\left(0,\frac{\pi}{2}\right)$ is _____. **[JEE MAIN 2021]**

Q.39 A tower PQ stands on a horizontal ground with base Q on the ground. The point R divides the tower in two parts such that QR = 15 m. If from point A on the ground the angle of elevation of R is 60° and the part PR of the tower subtends an angle of 15° at A, then the height of the tower is **[JEE MAIN 2022]**

(1) $5\left(2\sqrt{3}+3\right)$m (2) $5\left(\sqrt{3}+3\right)$m

(3) $10\left(\sqrt{3}+1\right)$m (4) $10\left(2\sqrt{3}+1\right)$m

Q.40 $2\sin\left(\frac{\pi}{22}\right)\sin\left(\frac{3\pi}{22}\right)\sin\left(\frac{5\pi}{22}\right)\sin\left(\frac{7\pi}{22}\right)\sin\left(\frac{9\pi}{22}\right)$ is equal to **[JEE MAIN 2022]**

(1) $\frac{3}{16}$ (2) $\frac{1}{16}$ (3) $\frac{1}{32}$ (4) $\frac{9}{32}$

Q.41 Let a vertical tower AB of height 2h stands on a horizontal ground. Let from a point P on the ground a man can see upto height h or the tower with an angle of elevation 2α. When from P, he moves a distance d in the direction of $\overrightarrow{AP}$, he can see the top B of the tower with an angle of elevation α. If $d = \sqrt{7}\,h$ then $\tan\alpha$ is equal to? **[JEE MAIN 2022]**

(1) $\sqrt{5}-2$ (2) $\sqrt{3}-1$

(3) $\sqrt{7}-2$ (4) $\sqrt{7}-\sqrt{3}$

Q.42 Let

$S = \left\{\theta\in\left(0,\frac{\pi}{2}\right):\sum_{m=1}^{9}\sec\left(\theta+(m-1)\frac{\pi}{6}\right)\sec\left(\theta+\frac{mx}{6}\right)=-\frac{8}{\sqrt{3}}\right\}$

Then **[JEE MAIN 2022]**

(1) $S = \left\{\frac{\pi}{12}\right\}$ (2) $\left\{\frac{2\pi}{3}\right\}$

(3) $\sum_{\theta\in S}\theta=\frac{\pi}{2}$ (4) $\sum_{\theta\in S}\theta=\frac{3\pi}{4}$

Q.43 The value of $\tan9° - \tan27° - \tan63° + \tan81°$ is _____. **[JEE MAIN 2023]**

Q.44 The value of $36(4\cos^2 9° - 1)(4\cos^2 27° - 1)(4\cos^2 81° - 1)(4\cos^2 243° - 1)$ is **[JEE MAIN 2023]**

(1) 54 (2) 18 (3) 27 (4) 36

Q.45 $96\cos\frac{\pi}{33}\cos\frac{2\pi}{33}\cos\frac{4\pi}{33}\cos\frac{8\pi}{33}\cos\frac{16\pi}{33}$ is equal to **[JEE MAIN 2023]**

(1) 3 (2) 1 (3) 4 (4) 2

Q.46 Let $S=\left\{x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right):9^{1-\tan^2 x}+9^{\tan^2 x}=10\right\}$ and $\beta=\sum_{x\in S}\tan^2\left(\frac{x}{3}\right)$ then $\frac{1}{6}(\beta-14)^2$ is equal to **[JEE MAIN 2023]**

(1) 16 (2) 8 (3) 64 (4) 32

JEE ADVANCE QUESTION

Q.1 If $\frac{\sin^4 x}{2}+\frac{\cos^4 x}{3}=\frac{1}{5}$, then **[IIT-JEE - 2009]**

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

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

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

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

Q.2 For $0 < \theta < \frac{\pi}{2}$, the solution(s) of

$$\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + \frac{(m-1)\pi}{4}\right) \operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$$ is(are) **[IIT-JEE - 2009]**

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{12}$ (4) $\frac{5\pi}{12}$

Q.3 The maximum value of the expression $\frac{1}{\sin^2\theta + 3\sin\theta\cos\theta + 5\cos^2\theta}$ is **[IIT-JEE-2010]**

Q.4 The positive integer value of n > 3 satisfying the equation

$$\frac{1}{\sin\left(\frac{\pi}{n}\right)} = \frac{1}{\sin\left(\frac{2\pi}{n}\right)} + \frac{1}{\sin\left(\frac{3\pi}{n}\right)}$$ is **[IIT-JEE 2011]**

Q.5 The value of $\sum_{k=1}^{13} \frac{1}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right)\sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}$ is equal to **[JEE (Advanced) 2016]**

(1) $3 - \sqrt{3}$ (2) $2\left(3 - \sqrt{3}\right)$

(3) $2\left(\sqrt{3} - 1\right)$ (4) $2\left(2 + \sqrt{3}\right)$

Q.6 Let α and β be non-zero real numbers such that $2(\cos\beta - \cos\alpha) + \cos\alpha\cos\beta = 1$. Then which of the following is/are true? **[JEE(Advanced) 2017]**

(1) $\sqrt{3}\tan\left(\frac{\alpha}{2}\right) - \tan\left(\frac{\beta}{2}\right) = 0$

(2) $\tan\left(\frac{\alpha}{2}\right) - \sqrt{3}\tan\left(\frac{\beta}{2}\right) = 0$

(3) $\tan\left(\frac{\alpha}{2}\right) + \sqrt{3}\tan\left(\frac{\beta}{2}\right) = 0$

(4) $\sqrt{3}\tan\left(\frac{\alpha}{2}\right) + \tan\left(\frac{\beta}{2}\right) = 0$

Q.7 Let a, b, c be three non-zero real numbers such that the equation

$\sqrt{3}a\cos x + 2b\sin x = c, x \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ has to distinct real roots α and β with $\alpha + \beta = \frac{\pi}{3}$. Then value $\frac{2b}{a}$ is **[JEE(Advanced) 2018]**

Q.8 For non-negative integer n, let

$$f(n) = \frac{\sum_{k=0}^{n} \sin\left(\frac{k+1}{n+2}\pi\right)\sin\left(\frac{k+2}{n+2}\pi\right)}{\sum_{k=0}^{n} \sin^2\left(\frac{k+1}{n+2}\pi\right)}$$

Assuming $\cos^{-1}x$ takes values in $[0, \pi]$, which of the following options is/are correct? **[JEE(Advanced) 2019]**

(1) $f(4) = \sqrt{3}/2$

(2) If $\alpha = \tan\left(\cos^{-1} f(6)\right)$, then $\alpha^2 + 2\alpha - 1 = 0$

(3) $\sin\left(7\cos^{-1} f(5)\right) = 0$

(4) $\lim_{x\to\infty} f(n) = \frac{1}{2}$

Q.9 Let $f : [0, 2] \to R$ be the function defined by

$f(x) = 3 - \sin(2\pi x) - \sin\left(\pi x - \frac{\pi}{4}\right) - \sin\left(3\pi x + \frac{\pi}{4}\right)$.

If $\alpha, \beta \in [0, 2]$ are such that $x \in [0, 2] : f(x) \geq 0 = [\alpha, \beta]$, then the value of $\beta - \alpha$ is ____. **[JEE(Advanced) 2020]**

Q.10 Let α and β be real numbers such that $-\frac{\pi}{4} < \beta < 0 < \alpha < \frac{\pi}{4}$. If $\sin(\alpha + \beta) = \frac{1}{3}$ and $\cos(\alpha - \beta) = \frac{2}{3}$, then the greatest integer less than or equal to $\left(\frac{\sin\alpha}{\cos\beta} + \frac{\cos\beta}{\sin\alpha} + \frac{\cos\alpha}{\sin\beta} + \frac{\sin\beta}{\cos\alpha}\right)^2$ is _____. **[JEE(Advanced) 2022]**

ANSWER KEY

JEE-FLASHBACK

JEE MAINS QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	4	2	2	3	2	3	1	4	1	4	3	4	2	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	3	4	4	1	1	2	2	4	2	1	4	1	1	1
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2	4	1	4	2	3	144	9	1	2	3	3	4	4	1
Que.	46														
Ans.	4														

JEE ADVANCED QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	1,2	3,4	2	7	3	2,3	1	1,2,3	1	1