(1) In triangle $P Q R, \angle R=\frac{\pi}{2}$. If $\tan \left(\frac{P}{2}\right)$ and $\tan \left(\frac{Q}{2}\right)$ are the roots of the equation $a x^{2}+b x+c=0, \quad a \neq 0$, then
( $a) a=b+c$
(b) $c=a+b$
(c) $b=c$
(d) $b=a+c$

AIE E 2005]
(2) In triangle $A B C$, let $\angle C=\frac{\pi}{2}$. If $r$ is the inradius and $R$ is the circu rradius of the triangle $A B C$, then $2(r+R)$ equals
(a) b+c
(b) $a+b$
(c) $a+b+c$
(3) If $\cos ^{-1} x-\cos ^{-1} \frac{y}{2}=\alpha$, then $4 x^{2}-4 x y \cos \alpha+y$ is equal to (a) $2 \sin 2 \alpha$
(b) 4
(c) $4 \sin ^{2} \alpha$

[AIEEE 2005]
(c) $4 \sin ^{2} \alpha\left(-4 \sin ^{2} \alpha\right.$
[AIEEE 2005]
(4) If in triangle $A B C$, the altitudes in vertices $A, B, C$ on opposite sides are in H.P., then $\sin A, \sin B, \sin C a n$
(a) G.P.
(b) A.P.
$\left.{ }^{(c / A r}\right)^{\prime}$
( d ) H.P.
[ AIEEE 2005]
that $\tau<\alpha-\beta<3 \pi$. If $\sin \alpha+\sin \beta=-\frac{21}{65}$, then the value of $\cos \frac{\alpha-\beta}{2}$ is
(a)
(b) $\frac{3}{\sqrt{130}}$
(c) $\frac{6}{65}$
(d) $-\frac{6}{65}$
[ AIEEE 2004]

N $=\sin \sqrt{a^{2} \cos ^{2} \theta+b^{2} \sin ^{2} \theta}+\sqrt{a^{2} \sin ^{2} \theta+b^{2} \sin ^{2} \theta}$, then difference between the maximum and minimum values of $u^{2}$ is given by
(a) $2\left(a^{2}+b^{2}\right)$
(b) $2 \sqrt{a^{2}+b^{2}}$
(c) $(a+b)^{2}$
(d) $(a-b)^{2}$
[ AIEEE 2004]
(7) The sides of a triangle are $\sin \alpha, \cos \alpha$ and $\sqrt{1+\sin \alpha \cos \alpha}$ for some $0<\alpha<\frac{\pi}{2}$. Then the greatest angle of the triangle is
(a) $60^{\circ}$
(b) $90^{\circ}$
(c) $120^{\circ}$
(d) $150^{\circ}$
[ AIEEE 2004]
(8) A person standing on the bank of a river observes that the angle of elevation of the top of a tree on the opposite bank of a river is $60^{\circ}$ and when he retires 40 m away from the tree, the angle of elevation becomes $30^{\circ}$. The breadth of the river is
(a) 20 m
(b) 30 m
(c) 40 m
(d) 60 m

IEE
2004 ]
(9) If in a triangle $a \cos ^{2}\left(\frac{c}{2}\right)+c \cos ^{2}\left(\frac{A}{2}\right)=\frac{3 b}{2}$, then the sid $s a, b$ and $c$ are (a) in A. P.
(b) in G. P.
(c) in H. P.
(d) satisfy a
[AIEEE 2003]
(10) The sum of the radii of inscribed and circumscribad
cles for an n sided regular polygon of side $a$, is
(a) a $\cot \left(\frac{\pi}{2 n}\right)$
(b) b $\cot \left(\frac{\pi}{n}\right)$
$\operatorname{cgt}\left(\frac{\pi}{2 n}\right)$
(d) $\frac{a}{4} \cot \left(\frac{\pi}{2 n}\right)$
[AIEEE 2003]
(11) The upper $\frac{3}{4}$ th portion of a portio subtends an angle $\tan ^{-1}\left(\frac{3}{5}\right)$ at a point in the horizontal plane through fo and at a distance 40 m from the foot. The height of the vertical pole is
(a) 20 m
(b) (
(d) 80 m
[ AIEEE 2003]
(12) The value of $\cos ^{2}+\cos ^{2}\left(\alpha+120^{\circ}\right)+\cos ^{2}\left(\alpha-120^{\circ}\right)$ is
(a)
) $\frac{1}{2}$
(c) 1
(d) 0
[ AIEEE 2003]

If trgonometric equation $\sin ^{-1} x=2 \sin ^{-1} a$ has a solution for
(a) lal $<\frac{1}{\sqrt{2}}$
(b) $|a| \geq \frac{1}{\sqrt{2}}$
(c) $\frac{1}{2}<l a \left\lvert\,<\frac{1}{\sqrt{2}}\right.$
(d) all real values of a
[AIEEE 2003]
(14) If $\boldsymbol{\operatorname { s i n }} \theta+\boldsymbol{\operatorname { s i n }} \phi=\mathbf{a}$ and $\boldsymbol{\operatorname { c o s }} \theta+\boldsymbol{\operatorname { c o s }} \phi=\mathbf{b}$, then the value of $\boldsymbol{\operatorname { t a n }}\left(\frac{\theta-\phi}{2}\right)$ is
(a) $\sqrt{\frac{a^{2}+b^{2}}{4-a^{2}-b^{2}}}$
(b) $\sqrt{\frac{4-a^{2}-b^{2}}{a^{2}+b^{2}}}$
(c) $\sqrt{\frac{a^{2}+b^{2}}{4+a^{2}+b^{2}}}$
(d) $\sqrt{\frac{4+a^{2}+b^{2}}{a^{2}+b^{2}}}$
[ AIEEE 2002]
(15) If $\tan ^{-1}(x)+2 \cot ^{-1}(x)=\frac{2 \pi}{3}$, then the value of $x$ is
(a) $\sqrt{2}$
(b) 3
(c) $\sqrt{3}$
(d) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

AIEE 2002 ]
(16) The value of $\tan ^{-1}\left(\frac{1}{3}\right)+\tan ^{-1}\left(\frac{1}{7}\right)+\tan ^{-1}\left(\frac{1}{13}\right)+\cdots+\tan \left(\frac{1}{n}+n+1\right)$ is
(a) $\frac{\pi}{2}$
(b) $\frac{\pi}{4}$
(c) $\frac{2 \pi}{3}$
(d) 0
[ AIEEE 2002]
(17) The angles of elevation of the top of a tower (D) at a building of height a are $30^{\circ}$ and 4 building stand at the same level, then the
(a) a $\sqrt{3}$
(b) $\frac{a \sqrt{3}}{\sqrt{3}-1}$
(c)
$a(3 \sqrt{3})$
(d) $a(\sqrt{3}-1)$
[ AIEEE 2002]
(18) If $\cos (\alpha-\beta)=1$ and $\beta)=\frac{1}{e}, \quad-\pi \leq \alpha, \beta \leq \pi$, then the number of ordered pairs $(\alpha, \beta)$
(a) 0
(b) $1 \rightarrow 2$
(d) 4
[ IIT 2005]
(19) Which of he following is correct for triangle $A B C$ having sides $a, b, c$ opposite to the angles $A, B$, Crespectively

$$
\begin{aligned}
& a \sin \left(\frac{B-C}{2}\right)=(b-c) \cos \frac{A}{2} \\
& (b+c) \sin \left(\frac{B+C}{2}\right)=a \cos \frac{A}{2} \\
& (d) \sin \left(\frac{B+C}{2}\right)=(b+c) \cos \frac{A}{2} \\
& 2
\end{aligned}
$$

[ IIT 2005]
(20) Three circles of unit radii are inscribed in an equilateral triangle touching the sides of the triangle as shown in the figure. Then, the area of the triangle is
(a) $6+4 \sqrt{3}$
(b) $12+8 \sqrt{3}$
(c) $7+4 \sqrt{3}$
(d) $4+\frac{7}{2} \sqrt{3}$
[ IIT 2005]

( Answers at the end of all questions)
(21) If $\theta$ and $\phi$ are acute angles such that $\boldsymbol{\operatorname { s i n }} \theta=\frac{1}{2}$ and $\cos \theta=\frac{1}{3}$, then $\theta$ and $\phi$ lies in
( a ) $\left.] \frac{\pi}{3}, \frac{\pi}{2}\right]$
(b) $] \frac{\pi}{2}, \frac{2 \pi}{3}[$
(c) $] \frac{2 \pi}{3}, \frac{5 \pi}{3}[$
(d) $] \frac{5 \pi}{6}, \pi[$
(22) For which value of $x, \sin \left[\cot ^{-1}(x+1)\right]=\cos \left(\tan ^{-1} x\right)$ ?
(a) $\frac{1}{2}$
(b) 0
(c) 1
(d) $-\frac{1}{2}$
[ IIT 2004]
(23) If $\mathbf{a}, \mathbf{b}, \mathbf{c}$ are the sides of a triangle such that $a: \square=\square \sqrt{3}: 2$, then $A: B: C$ is
(a) $3: 2: 1$
(b) $3: 1: 2$
(c) $1: 3:$
(g) $1: 2: 3$
[ IIT 2004]
(24) Value of $\sqrt{x^{2}+x}+\frac{\tan ^{2} \alpha}{\sqrt{x^{2}+x}}, x>\left(0, \frac{\pi}{2}\right)$ is always greater than or equal to
(a) 2
(b) $\frac{5}{2}$
(d) $\sec \alpha$
[ IIT 2003]
(25) If the angles of a trian mare in the ratio $4: 1: 1$, then the ratio of the largest side to the perimete
(a) $1: 1$
$+$
b) $2: 3$
(c) $\sqrt{3}: 2+\sqrt{3}$
(d) $1: 2+\sqrt{3}$
[ IIT 2003]
(26) Thenat Tan of $\sqrt{\sin ^{-1}(2 x)+\frac{\pi}{6}}$ for all $x \in R$, is
$\left.\frac{1}{4}, \frac{1}{2}\right]$
(b) $\left[-\frac{1}{4}, \frac{1}{4}\right]$
(c) $\left[-\frac{1}{2}, \frac{1}{2}\right]$
(d) $\left[-\frac{1}{2}, \frac{1}{4}\right]$
[ IIT 2003]
7) The length of a longest interval in which the function $3 \sin x-4 \sin ^{3} x$ is increasing is
(a) $\frac{\pi}{3}$
(b) $\frac{\pi}{2}$
(c) $\frac{3 \pi}{2}$
(d) $\pi$
[ IIT 2002]
(28) Which of the following pieces of data does NOT uniquely determine an acute-angled triangle ABC ( $R$ being the radius of the circumcircle) ?
(a) $a \sin A, \sin B$
(b) a, b, c
(c) a, $\sin B, R$
(d) $a, \sin A, R$
[ IIT 2002]
(29) The number of integral values of $k$ for which the equation $7 \cos x+5 \sin x=2 k+1$ has a solution is
(a) 4
(b) 8
(c) 10
(d) 12
(30) Let $0<\alpha<\frac{\pi}{2}$ be a fixed angle. If $P=(\cos \theta, \sin \theta)$ $\sin (\alpha-\theta)]$, then $\mathbf{Q}$ is obtained from $\mathbf{P}$ by
(a) clockwise rotation around origin through an angle $\alpha$
(b) anticlockwise rotation around origin through an angle
(c) reflection in the line through origin with slope
(d) reflection in the line through origin with slono
[ IIT 2002]
(31) Let PQ and RS be tangents at the exire fiti of the diameter PR of a circle of radius $r$. If $P S$ and $R Q$ intersect â a par $X$ on the circumference of the circle, then $2 r$ equals
(a) $\sqrt{P Q \cdot R S}$
(b)

(d) $\sqrt{\frac{P Q^{2}+R S^{2}}{2}}$
[ IIT 2001]
(32) A man from the tom a 100 metres high tower sees a car moving towards the tower at an angle of donress prof $30^{\circ}$. After some time, the angle of depression becomes $60^{\circ}$. The dista ce (hetres) traveled by the car during this time is
(a) $100 \leqslant 3$
(b) $\frac{200 \sqrt{3}}{3}$
(c) $\frac{100 \sqrt{3}}{3}$
(d) $200 \sqrt{3}$
[ IIT 2001]
(a) $2(\tan \beta+\tan \gamma)$
(b) $\tan \beta+\boldsymbol{\operatorname { t a n }} \gamma$
(c) $\tan \beta+2 \tan \gamma$
(d) $2 \tan \beta+\tan \gamma$
[ IIT 2001]
(34) If $\sin ^{-1}\left(x-\frac{x^{2}}{2}+\frac{x^{3}}{4}-\ldots\right)+\cos ^{-1}\left(x^{2}-\frac{x^{4}}{2}+\frac{x^{6}}{4}-\ldots\right)=\frac{\pi}{2}$ for $0<|x|<\sqrt{2}$, then $x$ equals
(a) $\frac{1}{2}$
(b) 1
(c) $-\frac{1}{2}$
(d) - 1
[ IIT 2001]
(35) The maximum value of $\left(\cos \alpha_{1}\right) \cdot\left(\cos \alpha_{2}\right) \ldots \ldots\left(\cos \alpha_{n}\right)$, under the restrictions $0 \leq \alpha_{1}, \alpha_{2}, \ldots . \alpha_{n} \leq \frac{\pi}{2} \quad$ and $\quad\left(\cos \alpha_{1}\right) \cdot\left(\cos \alpha_{2}\right) \ldots \ldots\left(\cos \alpha_{n}\right)=1$ is
(a) $\frac{1}{2 n / 2}$
(b) $\frac{1}{2^{n}}$
(c) $\frac{1}{2 n}$
(d) 1
(IIT 2001 ]
(36) The number of distinct real roots of $\left|\begin{array}{lll}\sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x\end{array}\right|$ int ine interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is
(a) 0
(b) 2
(c) 1
(d) 3
[ IIT 2001]
(37) If $f(\theta)=\boldsymbol{\operatorname { s i n }} \theta(\boldsymbol{\operatorname { s i n }} \theta+\boldsymbol{\operatorname { s i n }} 3 \theta)$, then
(a) $\geq 0$ only when $\theta \geq 0$
$\leq$ for all real $\theta$
(c) $\geq 0$ for all real $\theta$
d) 0 ônly when $\theta \leq 0$
[ IIT 2000]
(38) In a triangle $A B C, 2$ ad $\sin 2(A-B+C)=$
(a) $a^{2}+b^{2}-c^{2}$
(1) $)^{2}+a^{2}-b^{2}$
(c) $b^{2}-c^{2}-a^{2}$
(d) $c^{2}-a^{2}-b^{2}$
[ IIT 2000]
(39)
$a+b$
(b) $b+c$
(c) $\mathrm{c}+\mathrm{a}$
(d) $a+b+c$
[ IIT 2000]

A pole stands vertically inside a triangular park $\triangle A B C$. If the angle of elevation of the top of the pole from each corner of the park is same, then in $\triangle A B C$, the foot of the pole is at the
(a) centroid (b) circumcentre (c) incentre (d) orthocentre
[ IIT 2000]
( Answers at the end of all questions )
(41) In a triangle $P Q R, \angle R=\frac{\pi}{2}$. If $\tan \left(\frac{P}{2}\right)$ and $\tan \left(\frac{Q}{2}\right)$ are the roots of the equation $a x^{2}+b x+c=0(a \neq 0)$, then
(a) $a+b=c$
(b) $b+c=a$
(c) $c+a=b$
(d) $b=c$
[ IITM 999 ]
(42) The number of real solutions of $\tan ^{-1} \sqrt{x(x+1)}+\sin ^{-1} \sqrt{x^{2}} x+=\frac{\pi}{2}$ is
(a) zero
(b) one
(c) two
(d) infinite
[ IIT 1999]
(43) The number of values of $x$ where the function $f(x \leq c) x+\cos (\sqrt{2 x})$ attains its maximum is
(a) 0
(b) 1
(c) 2
(d)
[ IIT 1998]
(44) If, for a positive integer $n$, $f_{n}(\theta)=\left(\tan \frac{\theta}{2}\right)(1+\sec \theta)(1+\sec 2 \theta) \ldots\left(1+\sec 2^{n} \theta\right)$, then
(a) $\left.f_{2}\left(\frac{\pi}{16}\right)=1 \quad(b) \frac{\pi}{32}\right)=1$
(c ) $f_{4}\left(\frac{\pi}{64}\right) \Longrightarrow$ d) $f_{5}\left(\frac{\pi}{128}\right)=1$
[ IIT 1999]
(45) If in a tria gle $Q Q R, \sin P, \sin Q, \sin R$ are in A. P., then
( a due Ititudes are in A. P.
(b) the altitudes are in H. P.
(c) the ledians are in G. P.
(d) the medians are in A.P.
[ IIT 1998]

The number of values of $x$ in the interval [ $0,5 \pi$ ] satisfying the equation $3 \sin ^{2} x-7 \sin x+2=0$ is
(a) 0
(b) 5
(c) 6
(d) 10
[ IIT 1998]
(47) Which of the following number(s) is / are rational?
(a) $\sin 15^{\circ}$
(b) $\cos 15^{\circ}$
( c) $\sin 15^{\circ} \cos 15^{\circ}$
(d) $\sin 15^{\circ} \boldsymbol{\operatorname { c o s }} 75^{\circ}$
[ IIT 1998]
(48) Let $n$ be an odd integer. If $\sin n \theta=\sum_{r=0}^{n} b_{r} \sin ^{r} \theta$, for every value of $\theta$, then $b_{0}$ and $b_{1}$ respectively are
(a) 1, 3
(b) $0, \mathrm{n}$
(c) $-1, n$
(d) $0, n^{2}-3 n+3$
[TT 1998 ]
(49) The parameter, on which the value of the determinant
$\left|\begin{array}{ccc}1 & a & a^{2} \\ \cos (p-d) x & \cos p x & \cos (p+d) x \\ \sin (p-d) x & \sin p x & \sin (p+d) x\end{array}\right|$
(a) a
(b) p
(c) d
(d) $x$
(50) The graph of the function $\cos x \cos (x-2) \cos ^{2}(x+1)$ is
[ IIT 1997]
(a) a straight line passing the ugh the point $\left(\frac{\pi}{2},-\sin ^{2} 1\right)$ and parallel to the X -axis
(b) a straight line passir, toug ( $0,-\sin ^{2} 1$ ) with slope 2
(c) a straight line passing org (0,0)
(d) a parabola with
[ IIT 1997]
(51) If $A_{0} A_{1} \wedge A_{3} A_{4} A_{5}$ be a regular hexagon inscribed in a circle of unit radius, then the proct fthe lengths of the line segments $A_{0} A_{1}, A_{0} A_{2}$ and $A_{0} A_{4}$ is
(a) ${ }^{3}$
(b) $3 \sqrt{3}$
(c) 3
(d) $\frac{3 \sqrt{3}}{2}$
[ IIT 1998]
$\sec ^{2} \theta=\frac{4 x y}{(x+y)^{2}}$ is true if and only if
(a) $x+y \neq 0$
(b) $x=y, x \neq 0$
(c) $x=y$
(d) $x \neq 0, y \neq 0$
[ IIT 1996]
(53) The minimum value of the expression $\boldsymbol{\operatorname { s i n }} \alpha+\boldsymbol{\operatorname { s i n }} \beta+\boldsymbol{\operatorname { s i n }} \gamma$, where $\alpha, \beta, \gamma$ are the real numbers satisfying $\alpha+\beta+\gamma=\pi$ is
(a) positive
(b) zero
(c) negative
(D) - 3
[ IIT 1995]
(54) In a triangle $A B C, \angle B=\frac{\pi}{3}$ and $\angle C=\frac{\pi}{4}$. If $D$ divides $\overline{B C}$ internally in the ratio 1: 3, then $\frac{\sin \angle B A D}{\sin \angle C A D}$ equals
(a) $\frac{1}{\sqrt{6}}$
(b) $\frac{1}{3}$
(c) $\frac{1}{\sqrt{3}}$
(d) $\sqrt{\frac{2}{3}}$
(55) Number of solutions of the equation $\tan x+\sec x=2 \cos$ lying in the interval $[0,2 \pi]$, is
(a) 0
(b) 1
(c) 2
(d) 3
[ IIT 1993]
(56) If $x=\sum_{n=0}^{\infty} \cos ^{2 n} \phi, \quad y=\sum_{n=0}^{\infty} \sin ^{2 n} \phi, \sum_{n=0}^{\infty} \cos ^{2 n} \phi \sin ^{2 n} \phi$, for $0<\phi<\frac{\pi}{2}$, then
(a) $x y z=x z+y$
(c) $x y z=x+y+z$

$$
y z=x y+z
$$

[ IIT 1993]
(57) If $f(x)=\cos \left[\pi^{-1}\right]$ cos $\left[-\pi^{2}\right] x$, where $[x]$ stands for the greatest integer function, then
(a) $f\left(\frac{\pi}{2}\right)=-1(b) f(\pi)=1$
(c) $f(-\pi)=0$
(d) $f\left(\frac{\pi}{4}\right)=2$
[ IIT 1991]
(58) quation $(\cos p-1) x^{2}+(\cos p) x+\sin p=0$ in the variable $x$ has real roots. henp can take any value in the interval
(a) $(0,2 \pi)$
(b) $(-\pi, 0)$
(c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
(d) $(0, \pi)$
[ IIT 1990]
(59) In a triangle $A B C$, angle $A$ is greater than angle $B$. If the measures of angles $A$ and $B$ satisfy the equation $3 \sin x-4 \sin ^{3} x-k=0,0<k<1$, then the measure of angle $C$ is
(a) $\frac{\pi}{3}$
(b) $\frac{\pi}{2}$
(c) $\frac{2 \pi}{3}$
(d) $\frac{5 \pi}{6}$
[ IIT 1990]
(60) The number of real solutions of the equation $\sin \left(e^{x}\right)=5^{x}+5^{-x}$ is
(a) 0
(b) 1
(c) 2
(d) infinitely many

IIT 1990]
(61) The general solution of $\sin x-3 \sin 2 x+\sin 3 x=\cos x-\cos 2 x$
(a) $n \pi+\frac{\pi}{8}$
(b) $\frac{\mathrm{n} \pi}{2}+\frac{\pi}{8}$
(c) (-1) $\frac{\mathrm{n} \pi}{2}+\frac{\pi}{8}$
(d) $2 n \pi+\cos ^{-1} \frac{3}{2}$
[ IIT 1989]
(62) The value of the expression $\sqrt{3} \operatorname{cosec} 20^{\circ}-$ se $20^{\circ}$ is equal to
(a) 2
(b) 4
(c) $\frac{2 \sin 20^{\circ}}{\sin 40^{\circ}}$
$\frac{4 \sin 20^{\circ}}{\sin 40^{\circ}}$
[ IIT 1988]
(63) The values of $\theta$ lying between 0 nd $\theta=\frac{\pi}{2}$ and satisfying the equation

[ IIT 1988]
( 64 )
the lengths of the two larger sides are 10 and 9 respectively. If the A. P., then the lengths of the third side can be
$5-\sqrt{6}$
(b) $3 \sqrt{3}$
(c) 5
(d) $5+\sqrt{6}$
[ IIT 1987]

The smallest positive root of the equation $\tan \mathrm{x}=\mathrm{x}$ lies in
( a ) $\left(0, \frac{\pi}{2}\right)$
(b) $\left(\frac{\pi}{2}, \pi\right)$
(c) $\left(\pi, \frac{3 \pi}{2}\right)$
(d) $\left(\pi, \frac{3 \pi}{2}\right)$
[ IIT 1987]
(66) The number of all triplets ( $a_{1}, a_{2}, a_{3}$ ) such that $a_{1}+a_{2} \cos 2 x+a_{3} \sin ^{2} x=0$ for all $x$ is
(a) 0
(b) 1
(c) 3
(d) infinite
(e) none of these
[ IIT 1987]
(67) The principal value of $\sin ^{-1}\left(\sin \frac{2 \pi}{3}\right)$ is
(a) $-\frac{2 \pi}{3}$
(b) $\frac{2 \pi}{3}$
(c) $\frac{4 \pi}{3}$
(d) $\frac{5 \pi}{3}$
(e) none of these
[ $1+1986$ ]
(68) The expression $3\left[\sin ^{4}\left(\frac{3 \pi}{2}-\alpha\right)+\sin ^{4}(3 \pi+\alpha)\right]-2\left[\sin ^{6}\left(\frac{\pi}{2}+\alpha\right)+\sin ^{6}\left(\sin ^{-\alpha)}\right]\right.$ is equal to
(a) 0
(b) 1
(c) 3
(d) $\sin 4 \alpha+\cos 4 \alpha$

Cone of these
[ IIT 1986]
(69) There exists a triangle $A B C$ satisfying the condit ns
$\begin{array}{ll}\text { ( a ) } b \sin A=a, A<\frac{\pi}{2} & \text { (b) b si } A=(a) A>\frac{\pi}{2}\end{array}$
(c) $b \sin A>a, A<\frac{\pi}{2} \quad\left(d \quad b=A<a, A<\frac{\pi}{2}, b>a\right.$
(e) $\mathrm{b} \sin \mathrm{A}<\mathrm{a}, \mathrm{A}>\frac{\pi}{2}$,
( 70 ) $\left(1+\cos \frac{\pi}{8}\right)\left(1+\cos \frac{\pi}{\pi}\right)\left(\cos \frac{5 \pi}{8}\right)\left(1+\cos \frac{7 \pi}{8}\right)$ is equal to
(a) $\frac{1}{2}$
(b) $\cos \frac{\pi}{8}$
(c) $\frac{1}{8}$
(d) $\frac{1+\sqrt{2}}{2 \sqrt{2}}$
[ IIT 1986]
(71) Fronthe top a light-house 60 m high with its base at the sea-level, the angle of depission a boat is $15^{\circ}$. The distance of the boat from the foot of the lighthouse is
(a) $\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) 60$ metres
(b) $\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)^{2}$ metres
(c) $\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right) 60$ metres
(d) None of these
[ IIT 1983]
(72) The value of $\tan \left[\cos ^{-1}\left(\frac{4}{5}\right)+\tan ^{-1}\left(\frac{2}{3}\right)\right]$ is
(a) $\frac{6}{17}$
(b) $\frac{7}{16}$
(c) $\frac{16}{7}$
(d) None of these
[ IIT 1983]
(73) If $f(x)=\cos (\ln x)$, then $f(x) f(y)-\frac{1}{2}\left[f\left(\frac{x}{y}\right)+f(x y)\right]$ has the value
(a) - 1
(b) $\frac{1}{2}$
(c) - 2
(d) none of these

1983 ]
(74) The general solution of the trigonometric equation $\sin x+\cos x=$ (tisgivn by
(a) $x=2 n \pi, n=0, \pm 1, \pm 2, \ldots$ (b) $x=2 n \pi+\frac{\pi}{2}, n=0, \pm 1 \pm 2, \ldots$
(c) $x+n \pi+(-1)^{n} \frac{\pi}{4}-\frac{\pi}{4}, n=0, \pm 1, \pm 2, \ldots \quad$ (d) none or these
[ IIT 1981]
(75) If $A=\sin ^{2} \theta+\cos ^{4} \theta$, then for all real values
(a) $1 \leq A \leq 2$
(b) $\frac{3}{4} \leq A \leq 1$
(c) $\frac{13}{16} \leq \mathrm{A} \leq 1$
(d) $\frac{3}{4} \leq$
[ IIT 1980]
(76) The equation $2 \cos ^{2}\left(\frac{1}{2} x\right)$ in $=x^{2}+x^{-2}, 0<x \leq \frac{\pi}{2}$ has
(a) no real solution
(c) more than one red
b) Mone real solution
so

- real solution
(77) If $\tan \theta=\frac{-4}{3}$, en $\sin \theta$ is
[ IIT 1980]

(b) $\frac{-4}{5}$ or $\frac{4}{5}$
$\frac{4}{5}$ but not $\frac{-4}{5}$
(d) none of these
[ IIT 1979]

If $\alpha+\beta+\gamma=2 \pi$, then
(a) $\tan \frac{\gamma}{2}+\tan \frac{\beta}{2}+\tan \frac{\alpha}{2}=\tan \frac{\alpha}{2} \tan \frac{\beta}{2} \tan \frac{\gamma}{2}$
(b) $\tan \frac{\alpha}{2} \tan \frac{\beta}{2}+\tan \frac{\beta}{2} \tan \frac{\gamma}{2}+\tan \frac{\gamma}{2} \tan \frac{\alpha}{2}=1$
(c) $\tan \frac{\gamma}{2}+\tan \frac{\beta}{2}+\tan \frac{\alpha}{2}=-\tan \frac{\alpha}{2} \tan \frac{\beta}{2} \tan \frac{\gamma}{2}$
(d) none of these
[ IIT 1979]


