MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

TRIGONOMETRIC EQUATIONS AND INEQUATIONS

Examples

1. If $\sin\alpha, 1, \cos 2\alpha$ are in GP, then find the general solution for α

Watch Video Solution

2. If $\frac{1}{6}\sin\theta, \cos\theta$ and $\tan\theta$ are in G.P. then the general solution for θ is

Watch Video Solution

3. Solve $\sin^2\theta - \cos\theta = \frac{1}{4}$ for θ and write the value of theta in the interval $0 \leq \theta \leq 2\pi$

Watch Video Solution

4. Solve $\cos\theta + \cos 7\theta + \cos 3\theta + \cos 5\theta = 0$,

Watch Video Solution

5. Find the number of solution for , $\sin 5\theta \cdot \cos 3\theta = \sin 9\theta \cdot \cos 7\theta$ in $\left[0, \frac{\pi}{2}\right]$

Watch Video Solution

6. Solve $\frac{\sin x + \mathrm{i}\cos x}{1+i}, i = \sqrt{-1}$ when it is purely imaginary .

Watch Video Solution

7. Find the most general solution of $2^{1}|\cos x| + \cos^{2} x + |\cos x|^{3+\infty} = 4$

Watch Video Solution

8. If $x \neq \frac{n\pi}{2}$, $n \in I$ and $(\cos x)^{\sin} \hat{} (2x - 3\sin x + 2) = 1$, then find the general solution of x.

Watch Video Solution

9. Solve $\frac{\tan 3x - \tan 2x}{1 + \tan 3x \tan 2x} = 1.$

Watch Video Solution

10. Solve $\sin x = 0$ and $\frac{\sin x}{\cos \frac{x}{2} \cos \frac{3x}{2}} = 0$ and show their solutions are different .

Watch Video Solution

11. Find the number of solution of $\tan x + \sec x = 2\cos x$ in $[0, 2\pi]$

Watch Video Solution

12. Solve $\sec x - 1 = \left(\sqrt{2} - 1\right)\tan x$

Watch Video Solution

13. Solve $\tan\theta + \tan 2\theta + \tan\theta \cdot \tan 2\theta \cdot \tan 3\theta = 1$

Watch Video Solution

14. Find the number of solutions of $|\cos x| = \sin x, 0 \leq x \leq 4\pi$

Watch Video Solution

15. Solve $\cot\theta = \sin 2\theta$ by substituting $\sin 2\theta = \dfrac{2\tan\theta}{1+\tan^2\theta}$ and again by substituting $\sin 2\theta = 2\sin\theta\cdot\cos\theta$ and check whether the two answer are same or not .

Watch Video Solution

16. Prove that the equation $p\cos x - q\sin x = r$ admits solutin for x only if $-\sqrt{p^2+q^2} < r < \sqrt{p^2+q^2}$

Watch Video Solution

17. Solve the equation $\sqrt{3}\cos x + \sin x = \sqrt{2}$.

Watch Video Solution

18. Find the number of distinct solution of $\sec x + \tan x = \sqrt{3}$, where $0 \le x \le 3\pi$

Watch Video Solution

19. Prot that the equation $k\cos x - 3s \in x = k + 1$ possess a solution if $k \in (-\infty, 4]\cdot$

Watch Video Solution

20. Let [x] = the greatest integer less than or equal to x and let $f(x) = \sin x + \cos x.$ Then the most general solution of $f(x) = \left[f\left(\frac{\pi}{10}\right)\right]$ is

Watch Video Solution

21. Find the number of solutions of $\cos x = |1 + \sin x|, 0 \leq x \leq 3\pi$

Watch Video Solution

22. Solve the following equation:

$3\cos^2\theta - 2\sqrt{3}\sin\theta\cos\theta - 3\sin^2\theta = 0$

Watch Video Solution

23. Solve the equation $5\sin^2 x - 7\sin x\cos x + 16\cos^2 x = 4$

Watch Video Solution

24. Solve the equation $(\cos x - \sin x)\left(2\tan x + \frac{1}{\cos x}\right) + 2 = 0$

Watch Video Solution

25. $\sin^{10} x + \cos^{10} x = \frac{29}{16}\cos^4 2x$

Watch Video Solution

26. Solve the equation $\sin x + \cos x - 2\sqrt{2}\sin x \cos x = 0$

Watch Video Solution

27. Find the most general value of θ which satisfies the equation $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$

Watch Video Solution

28. If $\tan(A-B) = 1$, and $\sec(A+B) = \frac{2}{\sqrt{3}}$, find the smallest positive values of A and B and also their most general values.

Watch Video Solution

29. If $x + y = 2\pi/3$ and $\sin x / \sin y = 2$, then the

Watch Video Solution

30. If $r > 0, -\pi \leq \theta \leq \pi$ and r, θ satisfy $r \sin\theta = 3$ and $r = 4(1 + \sin\theta)$, then find the possible solutions of the pair (r, θ)

Watch Video Solution

31. The equation $2\cos^2\left(\frac{x}{2}\right)\sin^2 x = x^2 + \frac{1}{x^2}, 0 \leq x \leq \frac{\pi}{2}$ has

Watch Video Solution

32. General solution of equation $\sin^6 x = 1 + \cos^4 3x$

Watch Video Solution

33. solve $\sin^4 x = 1 + \tan^8 x$

Watch Video Solution

34. Solve $\sin^2 x + \cos^2 y = 2\sec^2 z$

Watch Video Solution

35. The number of real solution of the equation $\sqrt{1+\cos 2x} = \sqrt{2}\sin^{-1}(\sin x),\ -\pi \leq x \leq \pi$, is

Watch Video Solution

36. Find the most general solution for $2^{\sin x} + 2^{\cos x} = 2^{1\left(-1/\sqrt{2}\right)}$

Watch Video Solution

37. Solve $\left|\sqrt{3}\cos x - \sin x\right| \geq 2$ for $x \in [0, 4\pi]$.

Watch Video Solution

38. Show that the equation , $\sin x = [1 + \sin x] + [1 - \cos x]$ has no solution for $x \in R$. (where [.] represents greatest integers functions).

Watch Video Solution

39. Find the solution set of the inequality $\sin x > \frac{1}{2}$.

Watch Video Solution

40. Find the solution set of the inequality $\cos x \geq \frac{-1}{2}$.

Watch Video Solution

41. Find the solution set for , $4\sin^2 x - 8\sin x + 3 \leq 0$ where $x \in [0, 2\pi]$

Watch Video Solution

42. Solve : $2\cos^2\theta + \sin\theta \leq 2$, where $\pi/2 \leq \theta \leq 3\pi/2$.

Watch Video Solution

43. Solve $\sin^2\theta > \cos^2\theta$.

Watch Video Solution

44. Find the solution set for , $|\tan x| \leq 1$ when $x \in [-\pi, \pi]$

Watch Video Solution

45. Solve the inequality $\sin 2x > \sqrt{2}\sin^2 x + (2-\sqrt{2})\cos^2 x$

Watch Video Solution

46. Solve $\tan^3 x + 3 > 3\tan x + \tan^2 x$.

Watch Video Solution

47. The number of solution of equation $8\left[x^2-x\right]+4[x]=13+12[\sin x]$, $[.]$ denotes GIF is

A. 0

B. 2

C. 4

D. 6

Answer: A

Watch Video Solution

48. The total number of ordered pairs (x, y) satisfying $|x|+|y|=2, \sin\left(\frac{\pi x^2}{3}\right)=1,$ is equal to 2 (b) 3 (c) 4 (d) 6

A. 1

B. 2

C. 4

D. 3

Answer: D

Watch Video Solution

49. Solve the equation:

$$\cos^2\left[\frac{\pi}{4}\left(\sin x+\sqrt{2}\cos^2 x\right)\right]-\tan^2\left[x+\frac{\pi}{4}\tan^2 x\right]=1$$

A. 1

B. 2

C. 4

D. 8

Answer: B

Watch Video Solution

50. the general solution of $\sin^2\theta\sec\theta+\sqrt{3}\tan\theta=0$ is

A. $\theta=n\pi+(-1)^{n+1}\frac{\pi}{3},\theta=n\pi,n\in I$

B. $\theta=n\pi,n\in I$

C. $\theta=\frac{n\pi}{2},n\in I$

D. $\theta=n\pi+(-1)^{n+1}\frac{\pi}{3},n\in I$

Answer: B

Watch Video Solution

51. The number of solutions of the equation $\sin\left(\frac{\pi x}{2\sqrt{3}}\right)=x^2-2\sqrt{3}x+4$

A. 0

B. 2

C. more than 2

D. 1

Answer: D

Watch Video Solution

52. x_1 and x_2 are two solutions of the equation $e^x \cos x = 1$, The minimum number of the solution of the equation $e^x \sin x = 1$, lying between x_1 and x_2 can be

A. 0

B. 1

C. 3

D. None of these

Answer: B

Watch Video Solution

53. The product of common differences of all possible AP which are made from values of 'x' satisfying $\cos^2\left(\frac{1}{2}\lambda x\right)+\cos^2\left(\frac{1}{2}\mu x\right)=1$

A. $\frac{4\pi^2}{\lambda^2-\mu^2}$

B. $\frac{4\pi}{\lambda-\mu}$

C. $\frac{2\pi^2}{\lambda^2-\mu^2}$

D. None of these

Answer: A

View Text Solution

54. Number of solutions of the equation $\cos^4 2x+2\sin^2 2x=17(\cos x+\sin x)^8, 0<x<2\pi$ is

A. 4

B. 8

C. 10

D. 16

Answer: A

Watch Video Solution

55. The number of values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying the equation $\left(\sqrt{3}\right)^{\sec \hat{}}(2\theta) = \tan^4\theta + 2\tan^2\theta$ is 2 (b) 4 (c) 0 (d) 1

A. 2

B. 4

C. 0

D. 1

Answer: A

Watch Video Solution

56. Number of solutions of the equation $\cot(\theta) + \cot\left(\theta + \frac{\pi}{3}\right) + \cos\left(\theta - \frac{\pi}{3}\right) + \cot(3\theta) = 0$, where $\theta \in \left(0, \frac{\pi}{2}\right)$

A. Infinite

B. 0

C. 1

D. None of these

Answer: C

Watch Video Solution

57. $0 < a < 2\pi, \sin^{-1}(\sin a) < x^2 - 2x$ for all $x \in I$ then $a \in$

A. $(0, \pi + 1)$

B. $\left(\pi + 1, \frac{3\pi}{2}\right)$

C. $\left(\frac{3\pi}{2}, 2\pi - 1\right)$

D. $(2\pi - 1, 2\pi)$

Answer: B::C

Watch Video Solution

58. If $\left(\cos^2 x + \frac{1}{\cos^2 x}\right)(1 + \tan^2 2y)(3 + \sin 3z) = 4$, then

A. x may be a multiple of pi

B. x cannot be an even number of π

C. z can be a multiple of π

D. y can be a multiple of $\frac{\pi}{2}$

Answer: A::D

Watch Video Solution

59. Solve $\frac{\sqrt{5} - 1}{\sin x} + \frac{\sqrt{10 + 2\sqrt{5}}}{\cos x} = 8, x \in \left(0, \frac{\pi}{2}\right)$

A. $\frac{\pi}{10}$

B. $\frac{3\pi}{10}$

C. $\frac{9\pi}{10}$

D. $\frac{7\pi}{10}$

Answer: A::B

Watch Video Solution

60. find the range of values of t for which $2\sin t = \frac{1-2x+5x^2}{3x^2-2x-1}$

A. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B. $\left[\frac{3\pi}{10}, \frac{\pi}{2}\right]$

C. $\left[-\frac{\pi}{2}, \frac{\pi}{10}\right] \cup \left[\frac{3\pi}{10}, \frac{\pi}{2}\right]$

D. All of these

Answer: A::B::C::D

Watch Video Solution

61. The system of equations $\tan x = a \cot x, \tan 2x = b \cos y$

A. Cannot have a solution if a=0

B. Cannot have a solution if a=1

C. Cannot have a solution if $2\sqrt{a} > |b(1-a)|$

D. has a solution of all a and b

Answer: B::C

Watch Video Solution

62. If $\frac{y+3}{2y+5} = \sin^2 x + 2\cos x + 1,$ then the value of y lies in

A. $\left(-\infty, -\frac{8}{3}\right]$

B. $\left[-\frac{12}{5}, \infty\right)$

C. $\left[-\frac{8}{3}, -\frac{12}{5}\right]$

D. $\left(-\infty, -\frac{8}{3}\right] \cup \left[-\frac{12}{5}, \infty\right)$

Answer: A::B::D

Watch Video Solution

63. Which of the following set of values of x satisfies the equation $2^{(2\sin^2 x - 3 + 1)} + 2^{(2 - 2\sin^2 x + 3\sin x)} = 9$?

A. $x = n\pi \pm \frac{\pi}{6}, n \in I$

B. $x = n\pi \pm \frac{\pi}{3}, n \in I$

C. $x = n\pi, n \in I$

D. $x = 2n\pi + \frac{\pi}{2}, n \in I$

Answer: A::D

Watch Video Solution

64. For $0 < \theta < \frac{\pi}{2}$, the solutions of $\sigma_{m-1}^{6} \operatorname{cosec}\left(\theta + \frac{(m-1)\pi}{4}\right) \operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$ is (are):

A. $\frac{\pi}{4}$

B. $\frac{\pi}{6}$

C. $\frac{\pi}{12}$

D. $\frac{5\pi}{12}$

Answer: C::D

Watch Video Solution

65. If $\frac{1+\sin^{\circ}}{\cos 6^{\circ}} = \tan A = \sqrt{\frac{1+\sin B}{1-\sin B}}$, where A and $B \in (0.90^{\circ})$, then

A. A=8B

B. 8A=B

C. A=7B=6°

D. $A + B = 54^\circ$

Answer: A::C::D

View Text Solution

66. If $\sqrt{1+\sin A} - \sqrt{1-\sin A} = 2\cos\frac{A}{2}$, then value of A can be

A. 110°

B. 260°

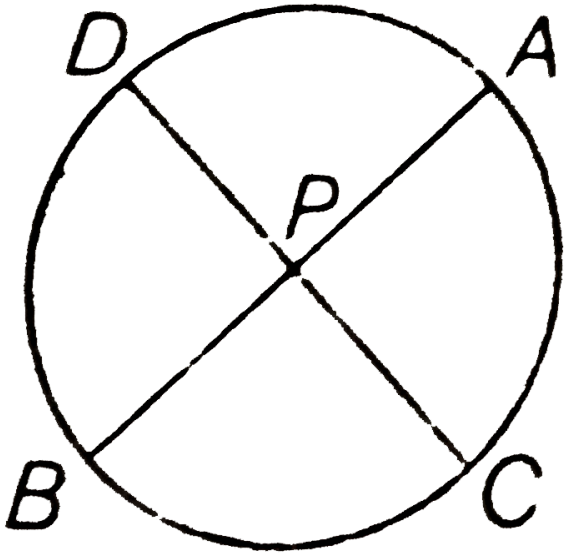
C. 300°

D. 190°

Answer: A::B::D

Watch Video Solution

67. Consider a circle , in which a point P is lying inside the circle such that $(PA)(PB) = (PC)(PD)$ (as shown in figure) .



On the basis of above information , answer the questions

Let PA=4 , PB=3 cm and CD is diameter of the circle having the length 8. If $PC > CD$, then $\frac{PC}{PD}$ is equal to

A. 3

B. 4

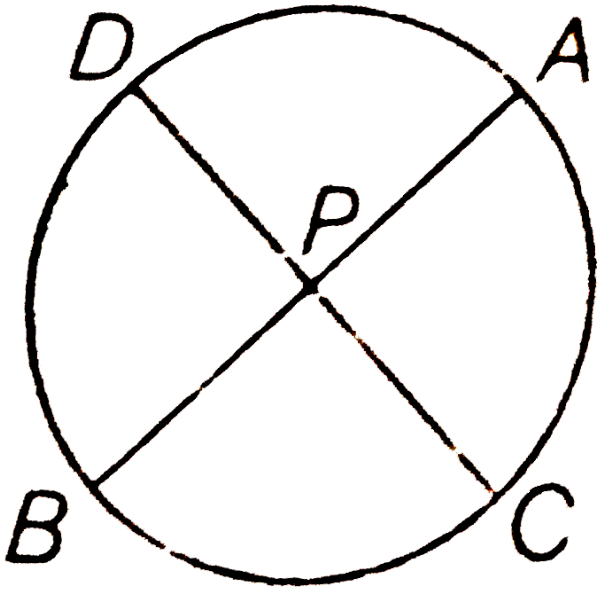
C. 5

D. 6

Answer: A

Watch Video Solution

68. Consider a circle , in which a point P is lying inside the circle such that $(PA)(PB) = (PC)(PD)$ (as shown in figure) .



On the basis of above information , answer the questions

If $PA = |\cos\theta + \sin\theta|$ and $PB = |\cos\theta - \sin\theta|$, then maximum value of (PC)(PD) , is equal to

A. 1

B. $2\sqrt{2}$

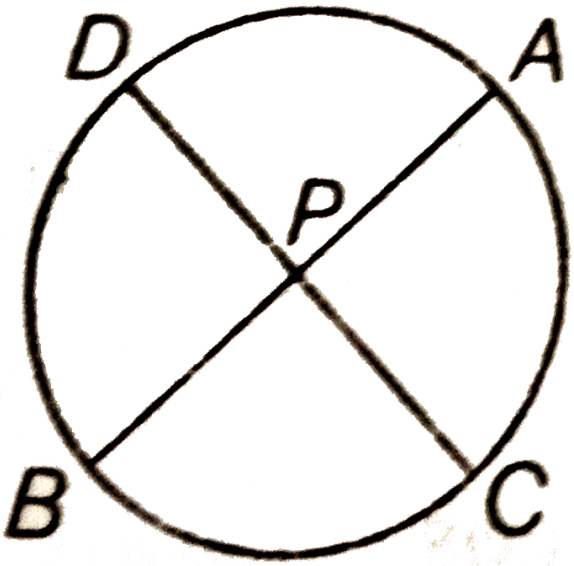
C. $\sqrt{2}$

D. 2

Answer: A

Watch Video Solution

69. Consider a circle , in which a point P is lying inside the circle such that $(PA)(PB) = (PC)(PD)$ (as shown in figure) .



On the basis of above information , answer the questions

If $\log_{PA} x = 2, \log_{PB} x = 3, \log_x PC = 4,$ then $\log_{PD}$ x is equal to

A. $\frac{7}{12}$

B. $\frac{12}{7}$

C. $-\frac{7}{12}$

D. $-\frac{6}{19}$

Answer: D

Watch Video Solution

70. PA and PB are two tangents drawn from point P to circle of radius 5 . A line is drawn from point P which cuts at C and D such that PC=5 and PD=15 and $\angle APB = \theta$.

On the basis of above information answer the questions .

Area of ΔAPB is

A. $\frac{25\sqrt{3}}{2}$

B. $25\sqrt{3}$

C. $\frac{75\sqrt{3}}{2}$

D. $\frac{75\sqrt{3}}{4}$

Answer: D

Watch Video Solution

71. PA and PB are two tangents drawn from point P to circle of radius 5 . A line is drawn from point P which cuts at C and D such that PC=5 and PD=15 and $\angle APB = \theta$.

On the basis of above information answer the questions .

Value of $\sin 2\theta + \cos 4\theta + \sin 5\theta + \tan 7\theta + \cot 8\theta$ is equal to

A. $\frac{4\sqrt{3}-1}{2}$

B. $\frac{4\sqrt{3}-1}{2\sqrt{3}}$

C. $\frac{4\sqrt{3}+1}{2\sqrt{3}}$

D. $\frac{4\sqrt{3}+1}{2}$

Answer: B

Watch Video Solution

72. PA and PB are two tangents drawn from point P to circle of radius 5 . A line is drawn from point P which cuts at C and D such that PC=5 and PD=15 and $\angle APB = \theta$.

On the basis of above information answer the questions .

Number of solution(s) of the equation $\log_{\cos\theta}(x+2) = 2 + 3\log_{(x+2)} \sin\left(\frac{5\theta}{2}\right)$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

73. If $3\sin^2 x - 7\sin x + 2 = 0, x \in \left[0\frac{\pi}{2}\right]$ and $f_n(\theta) = \sin^n \theta + \cos^n \theta$

.

On the basis of above information , answer the questions

The value of $f_4(x)$ is

A. $\frac{97}{81}$

B. $\frac{57}{81}$

C. $\frac{65}{81}$

D. $\frac{73}{81}$

Answer: C

Watch Video Solution

74. If $3\sin^2 x - 7\sin x + 2 = 0, x \in \left[0\frac{\pi}{2}\right]$ and $f_n(\theta) = \sin^n \theta + \cos^n \theta$

.

On the basis of above information , answer the questions

The value of $\frac{\sin 5x + \sin 4x}{1 + 2\cos 3x}$ is

A. $\frac{3 + 2\sqrt{2}}{9}$

B. $\frac{3 + 4\sqrt{2}}{9}$

C. $\frac{4\sqrt{2} - 2}{9}$

D. $\frac{4\sqrt{2} - 3}{9}$

Answer: B

Watch Video Solution

75. Number of integral solution of the equation $\log_{\sin x} \sqrt{\sin^2 x} + \log_{\cos x} \sqrt{\cos^2 x} =$, where $x \in [0, 6\pi]$ is

Watch Video Solution

76. If $x_k = (\sec\theta)^{\frac{1}{2^k}} + (\tan\theta)^{\frac{1}{2^k}}$ and $y_k = (\sec\theta)^{\frac{1}{2^k}} - (\tan\theta)^{\frac{1}{2^k}}$, then value of $3y_n \prod_{k=0}^{n} (x_k)$ is equal to

Watch Video Solution

77. The number of ordered pairs (α, β), where $\alpha, \beta \in [0, 2\pi]$ satisfying $\log_{2\sec x}(\beta^2 - 6\beta + 10) = \log_3|\cos\alpha|$ is

View Text Solution

78. If $\frac{\cos^3\theta}{(1-\sin\theta)} + \frac{\sin^3\theta}{(1+\cos\theta)} = 1 + \cos\theta$, then number of possible values of θ is (where $\theta \in [0, 2\pi]$)

Watch Video Solution

79. If the sum of all value of x satisfying the system of equations

$\tan x + \tan y + \tan x \cdot \tan y = 5$

$\sin(x+y) = 4\cos x \cdot \cos y$

is $\frac{k\pi}{2}$, where $x \in \left(0, \frac{\pi}{2}\right)$ then find the values of k.

Watch Video Solution

80. Statement I $x = \frac{k\pi}{13}, k \in I$ does not represent the general solution of trigonometric equation.

$\sin 13x - \sin 13x \cos 2x = 0$

Statement II Both $x = r\pi, r \in I$ and $x = \frac{k\pi}{13}, k \in I$ satisfies the trigonometric equation.

$\sin 13x - \sin 13x \cos 2x = 0$

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: D

Watch Video Solution

81. Statement I Common value(s) of 'x' satisfying the equation . $\log_{\sin x}(\sec x + 8) > o$ and $\log_{\sin x} \cos x + \log_{\cos x} \sin x = 2\text{in} \quad (0, 4\pi)$ does not exist.

Statement II On solving above trigonometric equations we have to take intersection of trigonometric chains given by $\sec x > 1$ and $x = n\pi + \frac{\pi}{4}, n \in I$

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: C

Watch Video Solution

82. If $0 \leq x \leq 3\pi, 0 \leq y \leq 3\pi$ and $\cos x \cdot \sin y = 1$, then find the possible number of values of the orederd pair (x,y) .

Watch Video Solution

83. If $\theta \in [0, 3\pi]$ and $r \in R$. Then , find the pair of (r, θ) satisfying $2\sin\theta = r^4 - 2r^2 + 3$.

Watch Video Solution

84. Find all the value of θ satisfying the equation , $\sin 7\theta = \sin\theta + \sin 3\theta$ such that $0 \leq \theta \leq \pi$

Watch Video Solution

85. Solve $\sin 3x + \cos 2x = -2$

Watch Video Solution

86. $\sin(3\theta + \alpha) + \sin(3\theta - \alpha) + \sin(\alpha - \theta) - \sin(\alpha + \theta) = \cos\alpha$

Watch Video Solution

87. Solve the equation $\sin^4 x + \cos^4 x = \frac{7}{2}$ $s \in x\dot{\cos} x$.

Watch Video Solution

88. Find all the solution of $4\cos^2 x \sin x - 2\sin^2 x = 3\sin x$

Watch Video Solution

89. Solve the equation: $1 + 2\cos ecx = -\frac{\sec^2\left(\frac{x}{2}\right)}{2}$

Watch Video Solution

90. Find all values of θ lying between 0 and 2π satisfying the equation $r\sin\theta = \sqrt{3}$ and $r + 4\sin\theta = 2\left(\sqrt{3}+1\right)$

Watch Video Solution

91. Solve the following system of equations. $\sin x + \cos y = 1, \cos 2x - \cos 2y = 1$

Watch Video Solution

92. Find the coodinates of the point of intersection of the curves $y = \cos x, y = \sin 3x$ if $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

Watch Video Solution

93. Find the range of y such that the equation in x , $y + \cos x = \sin x$ has a real solutions . For $y = 1$, find x such that $0 < x < 2\pi$

Watch Video Solution

94. A triangle ABC is such that $\sin(2A + B) = \frac{1}{2}$ and If A, B and C are in $A.P.$, then find the value of A and C

Watch Video Solution

95. Find the values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying the equation $(1 - \tan\theta)(1 + \tan\theta)\sec^2\theta + 2^{\tan\theta} \hat{} (2\theta) = 0$

Watch Video Solution

96. Find the general solutions of the equation $\left(\cos\frac{x}{4}-2\sin x\right)\sin+\left(1+\sin\frac{x}{4}-2\cos x\right)\cos x=0$

Watch Video Solution

97. Find all possible triplets (x,y,z) such that $(x+y)+(y+2z)\cos 2\theta+(z-x)\sin^2\theta=0$, for all θ.

Watch Video Solution

98. For every real number find all the real solutions to equation $\sin x+\cos(a+x)+\cos(a-x)=2$

Watch Video Solution

99. Solve the equation $(\tan x)^{\cos^2 x}=(\cot x)^{\sin x}$

Watch Video Solution

100. Solve the equation $a\cos x + \cot x + 1 = \text{cosec}\ \ x$

Watch Video Solution

101. Find the value of 'a' which the system of equation $\sin x \cdot \cos y = a^2$ and $\sin y \cdot \cos x = a$ have a solution

Watch Video Solution

102. Find all the number 'a' for which any root of the equation $\sin 3x = a\sin x + (4 - 2|a|)\sin^2 x$ is a root of the equation $\sin 3x + \cos 2x = 1 + 2\sin x \cos 2x$ and any root of the latter equation is a root of the former .

View Text Solution

103. Solve the inequality $\frac{5}{4}\sin^2 x + \sin^2 x \cdot \cos^2 > \cos 2x.$

Watch Video Solution

104. Solve the inequality . $\sin x \cos x + \frac{1}{2}\tan x \geq 1$

Watch Video Solution

105. If $0 \leq x \leq 2\pi$, then $2^{\cos ec^2 x}\sqrt{\frac{1}{2}y^2 - y + 1} \leq \sqrt{2}$

Watch Video Solution

106. Solve the inequality $5 + 2\cos 2x \leq 3|2\sin x - 1|$

Watch Video Solution

107. Prove that the equation $2\sin x = |x| + a$ has no solution for $a \in \left(\frac{3\sqrt{3}-\pi}{3}, \infty\right)$.

Watch Video Solution

108. In ΔABC, prove that $\operatorname{cosec}\frac{A}{2} + \operatorname{cosec}\frac{B}{2} + \operatorname{cosec}\frac{C}{2} \geq 6$.

Watch Video Solution

109. If $\frac{1}{\cos\alpha \cdot \cos\beta} + \tan\alpha \cdot \tan\beta = \tan\gamma$, where $0 < \gamma < \frac{\pi}{2}$ and α, β are positive acute angles, show that $\frac{\pi}{4} < \gamma < \frac{\pi}{2}$

Watch Video Solution

110. Find the quadrants of the coordinate planes such that for each point (x, y) on these quadrants (where $x \neq 0, y \neq 0$) , the equation, $\frac{\sin^4\theta}{x} + \frac{\cos^4\theta}{y} = \frac{1}{x+y}$ is soluble for θ.

View Text Solution

111. Let $\frac{b\cos x}{2\cos 2x-1}=\frac{b+\sin x}{\left(\cos^2 x-3\sin^2 x\right)\tan x}, b\in R.$

Equation has solutions if

Watch Video Solution

Exercise For Session 1

1. Solve $\sin 5x=\cos 2x.$

Watch Video Solution

2. Find the number of value of x in $[0,5\pi]$ satisying the equation $3\cos^2 x-10\cos x+7=0$

Watch Video Solution

3. If $2\tan^2 x - 5\sec x = 1$ for exactly seven distinct value of $x \in \left[0, \frac{n\pi}{2}\right], n \in N$ then find the greatest value of n.

Watch Video Solution

4. Find the general solution of equation $\sec^2 x = \sqrt{2}(1 - \tan^2 x)$

Watch Video Solution

5. Solve $7\cos^2\theta + 3\sin^2\theta = 4$.

Watch Video Solution

6. The general solution of equation $\tan^2\alpha + 2\sqrt{3}\tan\alpha = 1$

Watch Video Solution

7. Find the number of solutions of $\sin^2 x - \sin x - 1 = 0 \in [-2\pi, 2\pi]$

Watch Video Solution

8. The most general of θ satisfying $\tan\theta + \tan\left(\frac{3\pi}{4}\theta\right) = 2$ are given by

Watch Video Solution

9. Find the general solution of $\sin x + \sin 5x = \sin 2x + \sin 4x$.

Watch Video Solution

10. Solve $\cos\theta \cos 2\theta \cos 3\theta = \frac{1}{4}$

Watch Video Solution

11. Solve $2\cot 2x - 3\cot 3x = \tan 2x$.

Watch Video Solution

12. Find the roots of the equation $\cot x - \cos x = 1 - \cot x \cos x$

Watch Video Solution

13. If the equation $x^2 + 4x \sin\theta + \tan\theta = 0 \left(0 < \theta < \frac{\pi}{2}\right)$ has repeated roots, then θ equals (i) $\frac{\pi}{12}$ (ii) $\frac{\pi}{6}$ (iii) $\frac{\pi}{12}$ or $\frac{5\pi}{12}$ (iv) $\frac{\pi}{6}$ or $\frac{\pi}{12}$

Watch Video Solution

14. Number of solutions of the equation $2\sin^3 x + 6\sin^2 x - \sin x - 3 = 0$ in $(0, 2\pi)$, are

Watch Video Solution

15. Find the number of roots of the equation $16\sec^3\theta - 12\tan^2\theta - 4\sec\theta = 9$ in interval $(-\pi, \pi)$

Watch Video Solution

Exercise For Session 2

1. Solve the equation $\sin x + \cos x = 1$

Watch Video Solution

2. Solve $\sqrt{3}\cos\theta - 3\sin\theta = 4\sin 2\theta\cos 3\theta$.

Watch Video Solution

3. Solve $\cot\theta + \text{cosec}\theta = \sqrt{3}$

Watch Video Solution

4. Solve $\sqrt{2}\sec\theta + \tan\theta = 1$.

Watch Video Solution

5. Find the general solution of the equation $\left(\sqrt{3}-1\right)\sin\theta + \left(\sqrt{3}+1\right)\cos\theta = 2$

Watch Video Solution

6. Find the number of integral values of k for which the equation $7\cos x + 5\sin x = 2k + 1$ has at least one solution.

Watch Video Solution

7. Solve $2\sin^2 x - 5\sin x\cos x - 8\cos^2 x = -2$.

Watch Video Solution

8. Solve the equation $(1-\tan\theta)(1+\sin 2\theta)=1+\tan\theta$

Watch Video Solution

Exercise For Session 3

1. Find the general values of θ which satisfies the equation $\tan\theta=-1$ and $\cos\theta=\frac{1}{\sqrt{2}}$

Watch Video Solution

2. Find the general solution of $\operatorname{cosec}x=-2$ and $\cot x=\sqrt{3}$

Watch Video Solution

3. Find the common roots of the equation $2\sin^2 x + \sin^2 x = 2$ and $\sin 2x + \cos 2x = \tan x$.

Watch Video Solution

4. Solve the equation , $\sqrt{3}\sin 2A = \sin 2B$ and $\sqrt{3}\sin^2 A + \sin^2 B = \frac{1}{2}(\sqrt{3}-1)$.

Watch Video Solution

5. Find the number of solutions of $\sin^2 x \cos^2 x = 1 + \cos^2 x + \sin^4 x$ in the interval $[0, \pi]$

Watch Video Solution

6. Solve $1 + \sin x \frac{\sin^2 x}{2} = 0$

Watch Video Solution

7. Solve $\cos^{50} x - \sin^{50} x = 1$

Watch Video Solution

8. Find the number of real solutions of the equation $(\cos x)^5 + (\sin x)^3 = 1$ in the interval $[0, 2\pi]$

Watch Video Solution

9. Find the number of solution of the equation $1 + e^{\cot \hat{} (2x)} = \sqrt{2|\sin x| - 1} + \frac{1 - \cos 2x}{1 + \sin^4 x} f$ or $x \in (0, 5\pi)$.

Watch Video Solution

10. Find the number solution are ordered pair (x, y) of the equation $2^{\sec^2 x} + 2^{\operatorname{cosec}^2 y} = 2\cos^2 x\left(1 - \cos^2 y\right)$ in $[0, 2\pi]$

Watch Video Solution

Exercise For Session 4

1. If $2\cos x < \sqrt{3}$ and $x \in [-\pi, \pi]$, then find the solution set for x.

Watch Video Solution

2. The set of all x in the interval $[0, \pi]$ for which $2\sin^2 x - 3\sin x + 1 \geq 0$ is_____

Watch Video Solution

3. If $\cos x - \sin x \geq 1$ and $0 \leq x \leq 2\pi$, then find the solution set for x.

Watch Video Solution

4. Solve `sintheta+sqrt(3)costhetageq1,-pi

Watch Video Solution

5. Find the set of values of x , which satisfy $\sin x \cdot \cos^3 x > \cos \cdot \sin^3 x, 0 \leq x \leq 2\pi$.

Watch Video Solution

6. Find the set of all x in $\left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$ which satisfy $|4 \sin x - 1| < \sqrt{5}$

Watch Video Solution

7. Solve $\sin^4\left(\frac{x}{3}\right) + \cos^4\left(\frac{x}{3}\right) > \frac{1}{2}$

Watch Video Solution

8. Solve $\tan x - \tan^2 x > 0$ and $|2\sin x| < 1$.

Watch Video Solution

Exercise Single Option Correct Type Questions

1. The equation $2\sin\frac{x}{2}\cos^2 x - 2\sin\frac{x}{2}\sin^2 x = \cos^2 x - \sin^2 x$ has a root for which the false statement is

A. sin 2x =1

B. $\cos x = \frac{1}{2}$

C. $\cos 2x = -\frac{1}{2}$

D. $\cos x = 1$

Answer: D

Watch Video Solution

2. Let the smallest positive value of x for which the function $f(x) = \sin\frac{x}{3} + \sin\frac{x}{11}, (x \in R)$ achieves its maximum value be x_0. Express x_0 in degree i.e. $x_0 = \alpha^0$. Then , the sum of the digits in α is

A. 15

B. 17

C. 16

D. 18

Answer: D

View Text Solution

3. The number of solutions of the equation $16\left(\sin^5 x + \cos^5 x\right) = 11(\sin x + \cos x)$ in the interval $[0, 2\pi]$ is

A. 6

B. 7

C. 8

D. 9

Answer: A

Watch Video Solution

4. If $x \sin a + y \sin 2a + z \sin 3a = \sin 4a$ $x \sin b + y \sin 2b + z \sin 3b = \sin 4b$ $x \sin c + y \sin 2c + z \sin 3c = \sin 4c$ then the roots of the equation $t^3 - \left(\frac{z}{2}\right)t^2 - \left(\frac{y+2}{4}\right)t + \left(\frac{z-x}{8}\right) = 0, a, b, c, \neq n\pi,$ are $\sin a, \sin b, \sin c$ (b) $\cos a, \cos b, \cos c$ $\sin 2a, \sin 2b, \sin 2c$ (d) $\cos 2a, \cos 2b \cos 2c$

A. sin a , sin b , sin c

B. cos a, cos b , cos c

C. sin 2a , sin 2b , sin 2c

D. cos 2a , cos 2b , cos 2c

Answer: B

Watch Video Solution

5. Find the least positive value of x satisfying $\frac{\sin^2 2x + 4\sin^4 x - 4\sin^2 x \cos^2 x}{4} = \frac{1}{9}$

A. $\pi/3$

B. $\pi/6$

C. $2\pi/3$

D. $5\pi/6$

Answer: B

Watch Video Solution

6. The maximum value of the expression $\left|\sqrt{\sin^2 x + 2a^2} - \sqrt{2a^2 - 1 - \cos^2 x}\right|$, where $aandx$ are real numbers,

is $\sqrt{3}$ (b) $\sqrt{2}$ (c) 1 (d) $\sqrt{5}$

A. 1

B. 2

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C

Watch Video Solution

7. The general solution of $8\tan^2\frac{x}{2} = 1 + \sec x$ is

A. $x = 2n\pi \pm \cos^{-1}\left(\frac{-1}{3}\right)$

B. $x = 2n\pi \pm \frac{\pi}{6}$

C. $x = 2n\pi \pm \cos^{-1}\left(\frac{1}{3}\right)$

D. None of these

Answer: C

Watch Video Solution

8. General solution of $\tan\theta + \tan 4\theta + \tan 7\theta = \tan\theta \tan 4\theta \tan 7\theta$ is

A. $\theta = \frac{n\pi}{4}$

B. $\theta = \frac{n\pi}{12}$

C. $\theta = \frac{n\pi}{12}$

D. None of these

Answer: B

Watch Video Solution

9. Find the number of solution of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$

A. x=0

B. $x = \sin^{-1}\left[\log\left(2 - \sqrt{5}\right)\right]$

C. no real solution

D. None of the above

Answer: C

Watch Video Solution

10. The -number of solutions of the equation $\cos\left(\pi\sqrt{x-4}\cos\left(\pi\sqrt{x}\right)\right)=1$ is

A. >2

B. 2

C. 1

D. 0

Answer: C

Watch Video Solution

11. The number of real solution of equation $\sin(e^x) = 5^x + 5^{-x}$ is :

A. 0

B. 1

C. 2

D. Infinitely many

Answer: A

Watch Video Solution

12. ABC is a triangle such that $\sin(2A + B) = \sin(C - A) = -\sin(B + 2C) = \frac{1}{2}$. If A,B, and C are in AP. then the value of A,B and C are..

A. $45^\circ, 60^\circ, 75^\circ$

B. $30^\circ, 60^\circ, 90^\circ$

C. $20^\circ, 60^\circ, 100^\circ$

D. None of these

Answer: A

Watch Video Solution

13. Let $2\sin^2 x + 3\sin x - 2 > 0$ and $x^2 - x - 2 < 0$ (x is measured in radian) . Then 'x' lies in the internal .

A. $\left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$

B. $\left(-1, \frac{5\pi}{6}\right)$

C. $(-1, 2)$

D. $\left(\frac{\pi}{6}, 2\right)$

Answer: D

Watch Video Solution

14. The number of points of intersection of the two curves $y = 2\sin x$ and $y = 5x^2 + 2x + 3$ is

A. 0

B. 1

C. 2

D. ∞

Answer: A

Watch Video Solution

15. The number of all the possible triplets (a_1, a_2, a_3) such that $a_1 + a_2\cos(2x) + a_2\sin^2(x) = 0$ for all x is 0 (b) 1 (c) 3 (d) infinite

A. 0

B. 1

C. 3

D. Infinite

Answer: D

Watch Video Solution

16. If the equation $\sin^4 x - (k+2)s \in^2 x - (k+3) = 0$ has a solution then k must lie in the interval $(-4, -2)$ (b) $[-3, 2)$ $(-4, -3)$ (d) $[-3, -2]$

A. $k > -3$

B. $k < -2$

C. $-3 \leq k \leq -2$

D. k is any (+ve) value

Answer: C

Watch Video Solution

17. In the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ the equation $\log_{\sin\theta}(\cos 2\theta) = 2$ has

A. no solution

B. a unique solution

C. two solution

D. infinitely many solution

Answer: B

Watch Video Solution

18. $\sum_{i=1}^{n} \cos\theta_i = n$ then $\sum_{i=1}^{n} \sin\theta_i$

A. n-1

B. 0

C. n

D. n+1

Answer: B

Watch Video Solution

19. If $(\sin\alpha)^x + (\cos\alpha)^x \geq 1, 0 < a < \frac{\pi}{2}$ then

A. $n \in [2, \infty)$

B. $(-\infty, 2]$

C. $n \in [-1, 1]$

D. None of these

Answer: B

Watch Video Solution

20. The most general values of 'x' for which $\sin x + \cos x = \min_{a \in R}\left[1, a^2 - 4a + 6\right]$ are given by

A. $2n\pi$

B. $2n\pi + \frac{\pi}{2}$

C. $n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}$

D. None of these

Answer: C

Watch Video Solution

21. Value of ^(6)x' and 'y' satisfying the equation sin^(7)y=|x^(3)-x^(2)-9x+9|+|x^(3)-4x-x^(2)+4+sec^(2)2y+cos^(4)y are

A. x=1,y=nx

B. $x = 1, y = 2n\pi, \frac{\pi}{2}$

C. $x = 1, y = 2n\pi$

D. None of these

Answer: B

Watch Video Solution

22. If $\max\{5\sin\theta + 3\sin(\theta - \alpha)\} = 7$ then the set of possible vaues of α is $\theta \in R$

A. $\left\{x : x = 2n\pi \pm \frac{\pi}{3}, n \in I\right\}$

B. $\left\{x : x = 2n\pi \pm \frac{2\pi}{3}, n \in I\right\}$

C. $\left[\frac{\pi}{3}, \frac{2\pi}{3}\right]$

D. None of these

Answer: A

Watch Video Solution

23. Find the number of integral value of n so that $\sin x(\sin x + \cos x) = n$ has at least one solution.

A. 2

B. 1

C. 3

D. zero

Answer: A

Watch Video Solution

24. The total number of solution of $\sin\{x\} = \cos\{x\}$ (where {.} denotes the fractional part) in $[0, 2\pi]$ is equal to

A. 5

B. 6

C. 7

D. None of these

Answer: B

Watch Video Solution

25. If $a, b \in [0, 2\pi]$ and the equation $x^2 + 4 + 3\sin(ax + b) - 2x = 0$ has at least one solution, then the value of $(a + b)$ can be $\frac{7\pi}{2}$ (b) $\frac{5\pi}{2}$ (c) $\frac{9\pi}{2}$ (d) none of these

A. $\frac{7\pi}{2}$

B. $\frac{3\pi}{2}$

C. $\frac{9\pi}{2}$

D. None of these

Answer: B

Watch Video Solution

26. The value of 'a' for which the equation $4\cos ec^2\pi(a + x) + a^2 - 4a = 0$ has a real solution is

A. a=1

B. a=2

C. a=10

D. None of these

Answer: B

Watch Video Solution

27. If the equation $2\cos x + \cos 2\lambda x = 3$ has only one solution , then λ is

A. 1

B. A rational number

C. An irrational number

D. None of these

Answer: C

Watch Video Solution

28. Let n be a positive integer such that $\frac{\sin\pi}{2n}+\frac{\cos\pi}{2n}=\frac{\sqrt{n}}{2}$. Then

A. $6 \leq n \leq 8$

B. $4 < n \leq 8$

C. $4 \leq n \leq 8$

D. $6 < n < 8$

Answer: c

Watch Video Solution

29. The number of solution of the equation $5\sec\theta - 13 = 12\tan\theta$ in $[0, 2\pi]$ is

A. 2

B. 1

C. 4

D. 0

Answer: D

Watch Video Solution

30. The number of solutions of the equation $x^3 + x^2 + 4x + 2\sin x = 0$ in $0 \leq x \leq 2\pi$ is

A. Zero

B. One

C. Two

D. Four

Answer: B

Watch Video Solution

31. If $\tan\left(\frac{\pi}{2}\sin\theta\right) = \cot\left(\frac{\pi}{2}\cos\theta\right)$, then $\sin\theta + \cos\theta$ is equal to

A. 0

B. 1

C. -1

D. 1 or -1

Answer: D

Watch Video Solution

32. The equation $\sin x + \sin y + \sin z = -3$ for $0 \leq x \leq 2\pi, 0 \leq y \leq 2\pi, 0 \leq z \leq 2\pi$ has

A. one solution

B. two sets of solutions

C. four sets of solutions

D. no solutions

Answer: A

Watch Video Solution

33. If $x = n\pi + (-1)^n \alpha, n \in I$ and $x = n\pi + (-1)^n \beta$ are the roots of $4\cos x - 3\sec x = \tan x$, then $4(\sin\alpha + \sin\beta)$ is

A. -1

B. 1

C. 2

D. None of these

Answer: A

Watch Video Solution

34. If $\tan m\theta = \tan n\theta$ and general value of θ are in AP, then common difference is

A. $\frac{1}{m-n}$

B. $\frac{\pi}{m+n}$

C. $\frac{\pi}{m-n}$

D. None of these

Answer: C

Watch Video Solution

35. If $\sin 3\alpha = 4\sin\alpha\sin(x+\alpha)\sin(x-\alpha)$, then

A. $x = n\pi \pm \frac{\pi}{3}, n \in I$

B. $x = n\pi \pm \frac{\pi}{6}, n \in I$

C. $x = n\pi \pm \frac{\pi}{2}, n \in I$

D. None of the above

Answer: A

Watch Video Solution

36. $\lambda \cos x - 3 \sin x = \lambda + 1$ is solvabel onlyl ,if

A. $\lambda \in [0, 5]$

B. $\lambda \in [4, 5]$

C. λ in $(-\infty, 4]$

D. None of these

Answer: C

Watch Video Solution

37. $\cos 2x - 3 \cos x + 1 = \dfrac{1}{(\cot 2x - \cot x)\sin(x - \pi)}$ holds , if

A. cos x =0

B. cos x =1

C. $\cos x = \dfrac{5}{2}$

D. for no value of x

Answer: A

View Text Solution

38. If $\sec x \cos 5x = -1$ and $0 < x < \frac{\pi}{4}$, then x is equal to

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. None of these

Answer: A

Watch Video Solution

39. If $\sin^{100}\theta - \cos^{100}\theta = 1$, then θ is

A. $2n\pi + \frac{\pi}{3}, n \in I$

B. $n\pi + \frac{\pi}{2}, n \in I$

C. $n\pi + \frac{\pi}{4}, n \in I$

D. $2n\pi - \frac{\pi}{3}, n \in I$

Answer: B

Watch Video Solution

40. If $\sqrt{3}\sin x - \cos x = \min_{\alpha \in R}\{2, e^2, \pi, \alpha^2 - 4\alpha + 7\}$, then

A. $x = 2n\pi, n \in I$

B. $x = 2n\pi + \frac{2\pi}{3}, n \in I$

C. $x = n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{6}, n \in I$

D. $x = n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{3}, n \in I$

Answer: B

Watch Video Solution

41. The number of solutions of the equation $\cos 4x + 6 = 7\cos 2x$, when $x \in [315^\circ, 317^\circ]$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

Watch Video Solution

42. The number of solutions of $\cot(5\pi \sin\theta) = \tan(5\pi \cos\theta),\ \forall\theta \in (0, 2\pi)$ is

A. 7

B. 14

C. 21

D. 28

Answer: B

Watch Video Solution

43. If $\exp\left[\left(\sin^2 x + \sin^4 x + \sin^6 x + ... \infty\right) \ \text{In} 2\right]$ satisfies the equation $y^2 - 9y + 8 = 0$, then the value of $\frac{\cos x}{\cos x + \sin x}, 0 < x < \frac{\pi}{2}$, is

A. $\sqrt{3} + 1$

B. $\frac{\sqrt{3} - 1}{2}$

C. $\sqrt{3} - 1$

D. None of these

Answer: B

Watch Video Solution

44. The total number of solutions of $\cos x = \sqrt{1 - \sin 2x}$ in $[0, 2\pi]$ is equal to

A. 2

B. 3

C. 5

D. None of these

Answer: B

Watch Video Solution

45. If the equation $\cos 3x \cos^3 x + \sin 3x \sin^3 x = 0$, then x is equal to

A. $(2n + 1)\frac{\pi}{4}$

B. $(2n - 1)\frac{\pi}{4}$

C. $\frac{n\pi}{4}$

D. None of these

Answer: A

Watch Video Solution

46. Total number of solutions of $\sin x = \frac{|x|}{10}$ is equal to

A. 4

B. 6

C. 7

D. None of these

Answer: B

Watch Video Solution

47. The number of all possible 5-tuples $(a_1, a_2, a_3, a_4, a_5)$ such that $a_1 + a_2 \sin x + a_3 \cos x + a_4 \sin 2x + a_5 \cos 2x = 0$ hold for all x is

A. zero

B. 1

C. 2

D. infinite

Answer: B

Watch Video Solution

48. x_1 and x_2 are two positive value of x for which $2\cos x, |\cos x|$ and $3\sin^2 x - 2$ are in GP. The minimum value of $|x_1 - x_2|$ is equal to

A. $\frac{4\pi}{3}$

B. $\frac{\pi}{3}$

C. $2\cos^{-1}\left(\frac{2}{3}\right)$

D. $\cos^{-1}\left(\frac{2}{3}\right)$

Answer: C

Watch Video Solution

49. If $\cos x - \frac{\cot\beta \sin x}{2} = \frac{\sqrt{3}}{2}$, then the value of $\tan\frac{x}{2}$ is

A. $\tan\frac{\beta}{2}\tan 15^\circ$

B. $\tan\frac{\beta}{2}$

C. $\tan 15^\circ$

D. None of the above

Answer: A

Watch Video Solution

50. The expression $n\sin^2\theta + 2n\cos(\theta+\alpha)\sin\alpha\sin\theta + \cos 2(\alpha+\theta)$ is independent of θ, the value of n is

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

51. The value of the determinants $\begin{vmatrix} 1 & a & a^2 \\ \cos(n-1)x & \cos nx & \cos(n+1)x \\ \sin(n-1)x & \sin nx & \sin(n+1)x \end{vmatrix}$ is zero if

A. $x = n\pi$

B. $x = n\pi/2$

C. $x = (2n+1)\pi/2$

D. $x = \frac{1+a^2}{2a} n \in I$

Answer: A

Watch Video Solution

52. If $\frac{\sin(2\alpha)}{\cos(2\alpha)} < 0$ If α lies in

A. $(13\pi/48, 14\pi/48)$

B. $(14\pi/48, 18\pi/48)$

C. $(18\pi/48, 23\pi/48)$

D. any of these intervals

Answer: A

Watch Video Solution

53. If $f(x) = \begin{vmatrix} \sin^2\theta & \cos^2\theta & x \\ \cos^2\theta & x & \sin^2\theta \\ x & \sin^2\theta & \cos^2\theta \end{vmatrix} \theta \in (0, \pi/2)$, then roots of f(x)=0 are

A. 1/2,-1

B. 1/2,-1,0

C. $-1/2, 1, 0$

D. $-1/2, \ -1, 0$

Answer: A

Watch Video Solution

54. The equation $\sin x + \sin y + \sin z = -3$ for $0 \leq x \leq 2\pi$, $0 \leq y \leq 2\pi$, $o \leq z \leq 2\pi$, has

A. one solution

B. two sets of solutions

C. four sets of solutions

D. no solutions

Answer: A

Watch Video Solution

55. If $\sec x \cos 5x + 1 = 0$, where $0 < x < 2\pi$, then x=

A. $\frac{\pi}{5}, \frac{\pi}{4}$

B. $\frac{\pi}{5}$

C. $\frac{\pi}{4}$

D. None of these

Answer: C

Watch Video Solution

56. If $|k| = 5$ and $0^\circ \leq \theta \leq 360^\circ$, then the number of different solution of $3\cos\theta + 4\sin\theta = k$ is

A. Zero

B. Two

C. One

D. Infinite

Answer: B

Watch Video Solution

57. If $\cot(\alpha+\beta)=0$, then $\sin(\alpha+2\beta)$=

A. $\cos\beta$

B. $\cos\alpha$

C. $\sin\beta$

D. $\cos 2\beta$

Answer: A

Watch Video Solution

58. If $: \cot\theta + \cot\left(\frac{\pi}{4} + \theta\right) = 2$, then $: \theta =$

A. $2n\pi \pm \frac{\pi}{6}$

B. $2n\pi \pm \frac{\pi}{3}$

C. $n\pi \pm \frac{\pi}{3}$

D. $n\pi \pm \frac{\pi}{6}$

Answer: D

Watch Video Solution

59. If $\cos 2\theta = \left(\sqrt{2}+1\right)\left(\cos\theta - \frac{1}{\sqrt{2}}\right)$, then the value of θ is

A. $2n\pi + \frac{\pi}{4}$

B. $2n\pi \pm \frac{\pi}{4}$

C. $2n\pi - \frac{\pi}{4}$

D. None of these

Answer: B

Watch Video Solution

60. If $\left|1-\frac{|\sin x|}{1+\sin x}\right| \geq \frac{2}{3}$, then sin x lies in

A. $\left(-\infty, \frac{-1}{2}\right] \cup \left[\frac{1}{2}, \infty\right)$

B. $\left(-\frac{1}{2}, \frac{1}{2}\right)$

C. $\left[-\frac{1}{4}, \frac{1}{2}\right]$

D. None of the above

Answer: C

Watch Video Solution

Exercise More Than One Correct Option Type Questions

1. Find the value of t which satisfies $(t - [|s \in x|]) \neq 3!5!7! where[.]$ denotes he greatest integer function.

A. 9

B. 10

C. 11

D. 12

Answer: B::C

Watch Video Solution

2. Let $f(x) = \cos(a_1 + x) + \frac{1}{2}\cos(a_2 + x) + \frac{1}{2^2}\cos(a_1 + x) + + \frac{1}{2^{n-1}}\cos(a_n$ where $a)1, a_2 a_n \in R\cdot$ If $f(x_1) = f(x_2) = 0, then|x_2 - x_1|$ may be equal to π (b) 2π (c) 3π (d) $\frac{\pi}{2}$

A. π

B. 2π

C. 3π

D. $\frac{\pi}{2}$

Answer: A::B::C

Watch Video Solution

3. Let α, β, γ parametric angles of 3 points P,Q and R respectively lying on $x^2 + y^2 = 1$. If the length of chords AP, PQ and AR are in GP where A is (-1,0), then $[Given, \alpha, \beta, \gamma \in (0, 2\pi)]$.

A. $\sin\frac{\alpha+\gamma}{4}\cos\frac{\alpha-\gamma}{4} \geq \sin\frac{\beta}{2}$

B. $\sin\left(\frac{\alpha+\gamma}{4}\right)\cos\left(\frac{\alpha-\gamma}{4}\right) \leq \frac{\sin(\beta)}{2}$

C. $\sin\frac{\alpha}{2}\sin\frac{\gamma}{2} \geq \sin\frac{\beta}{2}$

D. $\sin\frac{\alpha}{2}\sin\frac{\gamma}{2} \leq \sin\frac{\beta}{2}$

Answer: A::D

Watch Video Solution

4. Let x, y, z be elements from interval $[0, 2\pi]$ satisfying the inequality $(4 + \sin 4x)\left(2 + \cot^2 y\right)\left(1 + \sin^4 z\right) \leq 12 \sin^2 z$, then

A. the number of ordered pairs (x,y) is 5

B. the number of ordered pairs (y,z) is 8

C. the number of ordered pairs (z,x) is 8

D. the number of pairs (y,z) such that z=y is 2

Answer: C::D

Watch Video Solution

5. The number of integral values of a for which the system of linear equations $x \sin\theta - 2y\cos\theta - az = 0$, $x + 2y + z = 0$, $-x + y + z = 0$ may have non-trivial solutions, then

A. at a=2 the given system will have finite solutions for $\theta \in R$

B. number of possible integral values of a is 3

C. for a=1 the sytem will have finite solutions

D. for a=3 the sytem will have unique solution

Answer: B::C::D

Watch Video Solution

6. The equation $2\sin^3\theta + (2\lambda - 3)\sin^2\theta - (3\lambda + 2)\sin\theta - 2\lambda = 0$ has exactly three roots in $(0, 2\pi)$, then λ can be equal to 0 (b) 2 (c) 1 (d) -1

A. 0

B. $\frac{1}{2}$

C. 1

D. -1

Answer: A::C::D

Watch Video Solution

7. If $x + y = 2\pi/3$ and $\sin x / \sin y = 2$, then the

A. number of value of $x \in [0, 4\pi]$ are 4

B. number of value of $x \in [0, 4\pi]$ are 2

C. number of value of $y \in [0, 4\pi]$ are 2

D. number of value of $y \in [0, 4\pi]$ are 8

Answer: A

Watch Video Solution

8. If $0 \leq x \leq 2\pi$ and $|\cos x| \leq \sin x$, the

A. the set of all values of x is $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

B. the number of solutions that are integral multiple of $\frac{\pi}{4}$ is four

C. the sum of the largest and the smallest solution is π

D. the set of all value of x is $x \in \left[\frac{\pi}{2}, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \frac{3\pi}{4}\right]$

Answer: A::C

Watch Video Solution

9. If x and y are positive acute angles such that $(x+y)$ and $(x-y) satiy the equation$ tan^(2) theta - 4 tan theta +1=0` , then

A. $x = \frac{\pi}{6}$

B. $y = \frac{\pi}{4}$

C. $y = \frac{\pi}{6}$

D. $x = \frac{\pi}{4}$

Answer: C::D

Watch Video Solution

10. If $x + y = \frac{4\pi}{3}$ and $\sin x = 2\sin y$, then

A. $x = n\pi + \frac{\pi}{2}, n \in I$

B. $y = \frac{5\pi}{6} - n\pi, n \in I$

C. Both (a) and (b)

D. None of the above

Answer: C

Watch Video Solution

11. The number of solutions of the equations $y = \frac{1}{3}[\sin\theta + [\sin\theta + [\sin\theta]]]$ and $[y + [y]] = 2\cos\theta$ [where , [.] denote the greatest integer function] is/are

A. 0

B. 1

C. 2

D. infinte

Answer: A

Watch Video Solution

12. If $[\sin x] + [\sqrt{2}\cos x] = -3, x \in [0, 2\pi]$, (where ,[.] denotes th greatest integer function), then

A. $x \in \left(\pi, \frac{5\pi}{4}\right)$

B. $x \in \left(\pi, \frac{7\pi}{6}\right)$

C. $x \in \left[\pi, \frac{5\pi}{4}\right]$

D. None of these

Answer: A

Watch Video Solution

13. If $\alpha \in [-2\pi, 2\pi]$ and $\cos.\frac{\alpha}{2} + \sin.\frac{\alpha}{2} = \sqrt{2}(\cos 36^\circ - \sin 18^\circ)$, then a value of α

A. $\frac{7\pi}{6}$

B. $\frac{\pi}{6}$

C. $-\frac{5\pi}{6}$

D. $-\frac{\pi}{6}$

Answer: A::D

Watch Video Solution

14. The number of value of α in the interval $[-\pi, 0]$ satisfying $\sin\alpha + \int_{\alpha}^{2\alpha} \cos 2x dx = 0$, then

A. $\alpha = 0$

B. $\alpha = 0, -\pi, -\frac{\pi}{3}$

C. $\alpha = \frac{\pi}{6}, \frac{5\pi}{6}$

D. None of the above

Answer: A::B

Watch Video Solution

15. Find the number of solution of $\theta \in [0, 2\pi]$ satisfying the equation $\left((\log)_{\sqrt{3}} \tan\theta\left(\sqrt{(\log)_{\tan\theta} 3 + (\log)_{\sqrt{3}} 3\sqrt{3} = -1}\right.\right.$

A. $\theta = \frac{\pi}{6}$

B. $\frac{\pi}{3}, \frac{5\pi}{3}$

C. has sum $\frac{4\pi}{3}$

D. > 2

Answer: A::C

Watch Video Solution

16. If α and β are the solution of $a\cos\theta + b\sin\theta = c$, then

A. $\sin\alpha + \sin\beta = \dfrac{2bc}{a^2+b^2}$

B. $\sin\alpha + \sin\beta = \dfrac{c^2-a^2}{a^2+b^2}$

C. $\sin\alpha + \sin\beta = \dfrac{2ac}{b^2+c^2}$

D. $\sin\alpha + \sin\beta = \dfrac{c}{a^2+b^2}$

Answer: A::B

Watch Video Solution

17. The solution of the equation $\sin 2x + \sin 4x = 2\sin 3x$ is

A. $x = \dfrac{n\pi}{3}$

B. $x = n\pi$

C. $x = 2n\pi$

D. None of the above

Answer: A::C

Watch Video Solution

18. The general solution of $4\sin^4 x + \cos^4 x = 1$ is

A. $(2n+1)\frac{\pi}{2}$

B. $n\pi$

C. $n\pi \pm \sin^{-1}\sqrt{\frac{2}{5}}$

D. None of these

Answer: B::C

Watch Video Solution

19. The value of x $, 0 \leq x \leq \frac{\pi}{2}$ which satisfy the equation $81^{\sin^2 x} + 81^{\cos^2 x} = 30$ are

A. $\frac{\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$

D. $\frac{7\pi}{18}$

Answer: A::C

Watch Video Solution

20. The value of x in $\left(0, \frac{\pi}{2}\right)$ satisfying $\frac{\sqrt{3}-1}{\sin x}+\frac{\sqrt{3}+1}{\cos x}=4\sqrt{2} is/are \frac{\pi}{12}$ (b) $\frac{5\pi}{12}$ (c) $\frac{7\pi}{24}$ (d) $\frac{11\pi}{36}$

A. $\frac{\pi}{15}$

B. $\frac{\pi}{12}$

C. $\frac{11\pi}{36}$

D. $\frac{3\pi}{10}$

Answer: B::C

Watch Video Solution

21. The values of α for which the equation $\frac{\alpha^2}{1-\tan^2 x} = \frac{\sin^2 + x\alpha^2 - 2}{\cos 2x}$ has solution can be

A. $\alpha \leq -1$

B. $\alpha \geq 1$

C. $\alpha = 1/2$

D. α in any real number

Answer: A::B

Watch Video Solution

22. For which values of a does the equation $4\sin\left(x+\frac{\pi}{3}\right)\cos\left(x-\frac{\pi}{6}\right) = a^2 + \sqrt{3}\sin 2x - \cos 2x$ have solution? Find the solution for $a-0, anye\xi sts\cdot$

A. -2

B. 0

C. 2

D. $a, a \in]-2, 2[$

Answer: A::B::C::D

Watch Video Solution

23. Which of the following is/are correct .

A. $(\tan x)^{In(\sin x)} > (\cot x)^{In \sin x}, \forall x \in (0, \pi/4)$

B. $4^{In \operatorname{cosec} x} < 5^{In \operatorname{cosec} x}, \forall x \in (0, \pi/2)$

C. $(1/2)^{In(\cos x)} < (1/3)^{In(\cos x)}, \forall x \in (0, \pi/2)$

D. $2^{In(\tan x)} > 2^{In(\tan x)}, \forall x \in (0, \pi/2)$

Answer: A::B::C::D

View Text Solution

24. The value of θ , lying between $\theta = 0$ and $\theta = \frac{\pi}{2}$ and satisfying the equation . $\begin{vmatrix} 1+\cos^2\theta & \sin^2\theta & 4\sin 4\theta \\ \cos^2\theta & 1+\sin^2\theta & 4\sin 4\theta \\ \cos^2\theta & \sin^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0, is$

A. $\frac{11\pi}{24}$

B. $\frac{7\pi}{24}$

C. $\frac{5\pi}{24}$

D. None of these

Answer: A::B

Watch Video Solution

25. If [x] dnote the greatest integer less than or equal to x then the equation $\sin x = [1+\sin x] + [1-\cos x][$ has no solution in

A. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B. $\left[\frac{\pi}{2}, \pi\right]$

C. $\left[\pi, \frac{3\pi}{2}\right]$

D. R

Answer: A::B::C::D

Watch Video Solution

Exercise Passage Based Questions

1. If number of solution and sum of solution of the equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$ are respectively N and S and $f_n(\theta) = \sin^n \theta + \cos^n \theta$. On the basis of above information , answer the following questions.

Value of N is

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

2. If number of solution and sum of solution of the equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$ are respectively N and S and $f_n(\theta) = \sin^n \theta + \cos^n \theta$. On the basis of above information , answer the following questions.

Value of S is

A. $\frac{5\pi}{6}$

B. $\frac{7\pi}{6}$

C. 2π

D. π

Answer: D

Watch Video Solution

3. If number of solution and sum of solution of the equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$ are respectively N and S and $f_n(\theta) = \sin^n \theta + \cos^n \theta$. On the basis of above information , answer the following questions.

If α is solution of equation $3\sin^2 x - 7\sin x + 2 = 0, x \in [0, 2\pi]$, then the value of $f_4(\alpha)$ is

A. $\frac{97}{81}$

B. $\frac{57}{81}$

C. $\frac{65}{81}$

D. 0

Answer: C

Watch Video Solution

4. Let $\log_a N = \alpha + \beta$ where α is integer and $\beta = [0, 1)$. Then , On the basis of above information , answer the following questions.

The difference of largest and smallest integral value of N satisfying $\alpha = 3$ and $a = 5$, is

A. 499

B. 500

C. 501

D. 502

Answer: A

Watch Video Solution

5. Let $\log_a N = \alpha + \beta$ where α is integer and $\beta = [0, 1)$. Then , On the basis of above information , answer the following questions.

If N_1 is number of integers when a=2 and $\alpha = 2$ and N_2 is number of

integers when $\alpha = 1$ and $a = 3$, then the minimum value of `(N_1 sec^(2) theta +N_(2) "cosec"^2 theta)

A. $10 + 4\sqrt{6}$

B. $10 + \sqrt{6}$

C. 10

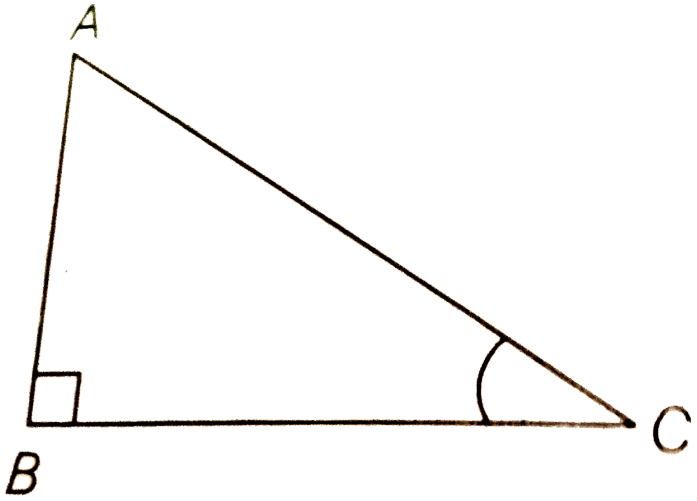
D. 100

Answer: A

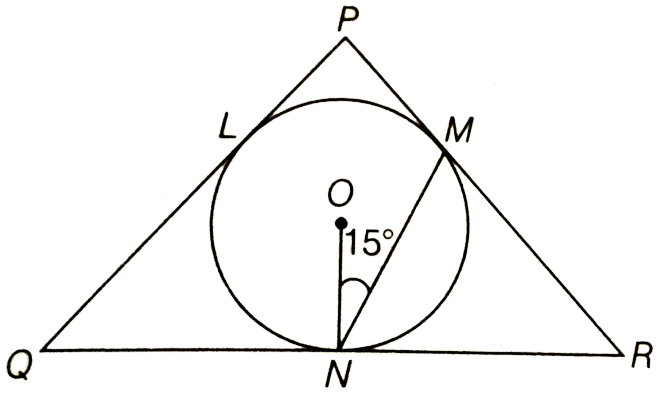
View Text Solution

6. If an angle and a side of a right angle triangle is known , then rest of the sides and angles can be found as follows

In ΔABC(figure), if $\angle B = 90^\circ, \angle C = \theta$ and $BC = x$, then $AB = x\tan\theta$ and $AC = x\sec\theta$.



Now, consider in isosceles triangle PQR (Figure 2),



Where PQ=PR and $20N = \sqrt{3}$

On the basis of the above information answer the question

The angle of triangle PQR are

A. $150^\circ, 15^\circ, 15^\circ$

B. $60^\circ, 60^\circ, 60^\circ$

C. $120^\circ, 30^\circ, 30^\circ$

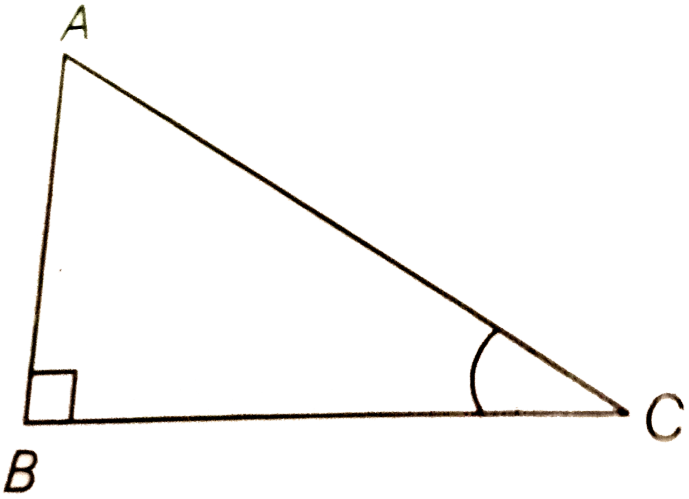
D. $75^\circ, 52.5^\circ, 52.5^\circ$

Answer: C

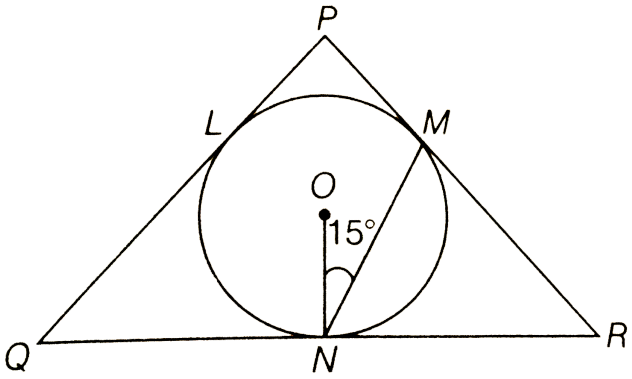
Watch Video Solution

7. If an angle and a side of a right angle triangle is known , then rest of the sides and angles can be found as follows

In ΔABC(figure), if $\angle B = 90^\circ, \angle C = \theta$ and $BC = x$, then $AB = x\tan\theta$ and $AC = x\sec\theta$.



Now, consider in isosceles triangle PQR (Figure 2),



Where PQ=PR and $20N = \sqrt{3}$

On the basis of the above information answer the question

Length of the side QR is

A. $\tan 15^\circ$

B. $\sqrt{3}\tan 15^\circ$

C. $\cot 15^\circ$

D. $\sqrt{3}\cot 15^\circ$

Answer: D

Watch Video Solution

8. α is a root of equation $(2\sin x - \cos x)(1+\cos x) = \sin^2 x, \beta$ is a root of the equation $3\cos 2x - 10\cos x + 3 = 0$ and γ is a root of the equation $1 - \sin 2x = \cos x - \sin x : 0 \leq \alpha, \beta, \gamma, \leq \pi/2$

$\cos\alpha + \cos\beta + \cos\gamma$ can be equal to

A. $\dfrac{3\sqrt{6}+2\sqrt{2}+6}{6\sqrt{2}}$

B. $\dfrac{3\sqrt{3}-8}{6}$

C. $\dfrac{3\sqrt{3}+2}{6}$

D. None of these

Answer: A

Watch Video Solution

9. α is a root of equation $(2\sin x - \cos x)(1+\cos x) = \sin^2 x, \beta$ is a root of the equation $3\cos^2 x - 10\cos x + 3 = 0$ and γ is a root of the equation $1 - \sin 2x = \cos x - \sin x : 0 \leq \alpha, \beta, \gamma, \leq \pi/2$

$\sin\alpha + \sin\beta + \sin\gamma$ can be equal to

A. $\frac{14-3\sqrt{2}}{6\sqrt{2}}$

B. $5/6$

C. $\frac{3+4\sqrt{2}}{6}$

D. $\frac{1+\sqrt{2}}{2}$

Answer: C

Watch Video Solution

10. α is a root of equation $(2\sin x-\cos x)(1+\cos x)=\sin^2 x, \beta$ is a root of the equation $3\cos 2x-10\cos x+3=0$ and γ is a root of the equation $1-\sin 2x=\cos x-\sin x: 0\leq \alpha, \beta, \gamma, \leq \pi/2$

$\sin(\alpha-\beta)$ is equal to

A. 1

B. 0

C. $\frac{1-2\sqrt{6}}{6}$

D. $\frac{\sqrt{3}-2\sqrt{2}}{6}$

Answer: C

Watch Video Solution

11. Consider the equation $5\sin^2 x + 3\sin x \cos x - 3\cos^2 x = 2$..... (i)

$\sin^2 x - \cos 2x = 2 - \sin 2x$..... (ii)

If α is a root (i) and β is a root of (ii), then $\tan\alpha + \tan\beta$ can be equal to

A. $\left(1 + \sqrt{69}/6\right.$

B. $-1 - \sqrt{69}/6$

C. $\dfrac{-3 + \sqrt{69}}{6}$

D. $\dfrac{3 - \sqrt{69}}{3}$

Answer: A

Watch Video Solution

12. Consider the equation $5\sin^2 x + 3\sin x\cos x - 3\cos^2 x = 2$..... (i)

$\sin^2 x - \cos 2x = 2 - \sin 2x$..... (ii)

If $\tan\alpha, \tan\beta$ satisfy (i) and $\cos\gamma, \cos\delta$ satisfy (ii), then $\tan\alpha \cdot \tan\beta + \cos\gamma + \cos\delta$ can be equal to

A. -1

B. $-\frac{5}{3} + \frac{2}{\sqrt{13}}$

C. $\frac{5}{3} - \frac{2}{\sqrt{13}}$

D. $\frac{5}{3} + \frac{2}{\sqrt{13}}$

Answer: B

Watch Video Solution

13. Consider the equation $5\sin^2 x + 3\sin x\cos x - 3\cos^2 x = 2$..... (i)

$\sin^2 x - \cos 2x = 2 - \sin 2x$..... (ii)

The number of solutions common to (i) and (ii) is

A. 0

B. 1

C. finite

D. infinite

Answer: A

Watch Video Solution

Exercise Single Integer Answer Type Questions

1. Let Δ_k be the area of triangle AP_kB which is inscribed in a circle or radius 2 units. If AB diameter of circle , $\angle ABP_k = \frac{l\pi}{2n}$ and $\sum_{k=1}^{n+1} = 4\cot\frac{\pi}{32}$, then $\frac{n}{2}$ is equal to

View Text Solution

2. If the sum of the root of the equation $\cos 4x + 6 + 7\cos 2x$ in the interval [0,314] is $k\pi$, $k \in R$ Find (k-1248)

Watch Video Solution

3. If equation $x^2 \tan^2\theta - (2\tan\theta)x + 1 = 0$ and $\left(\frac{1}{1+\log_b ac}\right)x^2 + \left(\frac{1}{a+\log_c ab}\right)x + \left(\frac{1}{1+\log_a bc} - 1\right) = 0$ (where a,b,c , $>$) have a common root and than 2nd equation has equal roots , then number of possible value of θ in $(0, \pi)$ is

Watch Video Solution

4. Number of ordered pair (x,y) which satisfies the relation $\frac{x^4+1}{8x^2} = \sin^2 y \cdot \cos^2 y$, where $y \in [0, 2\pi]$

Watch Video Solution

5. The number of solution for ,

$$\left.\begin{array}{l}\sin\left(x-\frac{\pi}{4}\right)-\cos\left(x+\frac{3}{4}\right)=1 \\ \frac{2\cos 7x}{\cos 3+\sin 3}>2^{\cos 2x}\end{array}\right\} \text{ in}(0,2\pi) \text{ is}$$

View Text Solution

6. If $\cos A \sin\left(A-\frac{\pi}{6}\right)$ is maximum , when the value of A is equal to $\frac{\pi}{\lambda}$, then the value of λ is

Watch Video Solution

7. Let $p, q \in N$ and $q > p$, the number of solutions of the equation $q|\sin\theta| = p|\cos\theta|$ in the interval $[0, 2\pi]$ is

Watch Video Solution

8. If $\theta_1, \theta_2, \theta_3$ are the three values of $\theta \in [0, 2\pi]$ for which $\tan\theta = \lambda$ then the value of $\frac{\tan(\theta_1)}{3}\frac{\tan(\theta_2)}{3} + \frac{\tan(\theta_2)}{3}\frac{\tan(\theta_3)}{3} + \frac{\tan(\theta_3)}{3}\frac{\tan(\theta_1)}{3}$ is

equal to

Watch Video Solution

9. If α be the smallest positive root of the equation $\sqrt{\sin(1-x)} = \sqrt{\cos x}$, then the approximate integeral value of α must be .

Watch Video Solution

10. If x and y are the real numbers satisfying the equation $12\sin x + 5\cos x = 2y^2 - 8y + 21$, then the value of $12\cot\left(\frac{xy}{2}\right)$ is:

Watch Video Solution

11. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$,then $\cos^2(\theta - \pi/4)$ is equal to

Watch Video Solution

12. If $3\sin x + 4\cos x = 5$, then the value of $90\tan^2\left(\frac{x}{2}\right) - 60\tan\left(\frac{x}{2}\right) + 110$ is equal to

Watch Video Solution

Exercise Statement I And Ii Type Questions

1. Statement I $\sin x = a$, where $-1 < a < 0$, then for $x \in [0, n\pi]$ has $2(n-1)$ solution $\forall n \in N$.

Statement II sin x takes value a exactly two times when we take one complete rotation covering all the quadrants starting from x=0 .

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: d

Watch Video Solution

2. Statement I The number of solution of the equation $|\sin x| = |x|$ is only one.

Statement II $|\sin x| \geq 0 \forall x \in R$.

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: B

Watch Video Solution

3. Statement -1: If $2\sin 2x - \cos 2x = 1, x \neq (2n+1)\frac{\pi}{2}, n \in Z$, then $\sin 2x + \cos 2x = 5$

Statement-2: $\sin 2x + \cos 2x = \frac{1 + 2\tan x - \tan^2 x}{1 + \tan^2 x}$

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: D

Watch Video Solution

4. Statement I The system of linear equations

$x + (\sin\alpha)y + (\cos\alpha)z = 0$

$x + (\cos\alpha)y + (\sin\alpha)z = 0$

$-x + (\sin\alpha)y - (\cos\alpha)z = 0$

has a not trivial solution for only one value of α lying between 0 and π.

Statement II $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$

has no solution in the interval $-\pi/4 < x < \pi/4$.

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: B

View Text Solution

5. Let $\theta \in (\pi/4, \pi/2)$, then

Statement I $(\cos\theta)^{\sin\theta} < (\cos\theta)^{\cos\theta} < (\sin\theta)^{\cos\theta}$

Statement II The equation $e^{\sin\theta} - e^{-\sin\theta} = 4$ ha a unique solution.

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: C

Watch Video Solution

6. If exp. $\left\{\left(\sin^2 x + \sin^4 x + \sin^6 x + \ldots \in f.\right) In 2\right\}$ satisfies the equation $x^2 - 9x + 8 = 0$ find the value off $\frac{\cos x}{\cos x + \sin x}, 0 < x < \frac{\pi}{2}$

A. Statement I is true , Statement II is true , Statement II is a correct explanation for Statement I.

B. Statement I is true , Statement II is true , Statement II is not a correct explanation for Statement II.

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II true .

Answer: C

Watch Video Solution

Exercise Matching Type Questions

	Column I		Column II
(A)	If α, β are the solutions of $\sin x = -\frac{1}{2}$ in $[0, 2\pi]$ and α, γ are the solutions of $\cos x = \frac{-\sqrt{3}}{2}$ in $[0, 2\pi]$, then	(p)	$\alpha - \beta = \pi$
(B)	If α, β are the solutions of $\cot x = -\sqrt{3}$ in $[0, 2\pi]$ and α, γ are the solutions of $\operatorname{cosec} x = -2$ in $[0, 2\pi]$, then	(q)	$\beta - \gamma = \pi$
(C)	If α, β are the solutions of $\sin x = -\frac{1}{2}$ in $[0, 2\pi]$ and α, γ are the solutions of $\tan x = \frac{1}{\sqrt{3}}$ in $[0, 2\pi]$, then	(r)	$\alpha - \gamma = \pi$
		(s)	$\alpha + \beta = 3\pi$
		(t)	$\beta + \gamma = 2\pi$

1.

A. A-(q,s), B-(p,t), C-(r,s,t)

B. A-(q), B-(t), C-(p,q)

C. A-(r,t), B-(t), C-(p,q)

D. A-(p,q), B-(q,r),C-(r,s,t)

Answer: A

Watch Video Solution

2.

	Column I		Column II
(A)	$2\sin\theta\cos\theta=\frac{1}{\sqrt{2}}$	(p)	$\theta=3\pi/8$
(B)	$2\cos 2\theta\cos 4\theta+2\cos^2 2\theta-1=0$	(q)	$\theta=7\pi/8$
(C)	$8\cos^2\theta\sin\theta-4\cos^2\theta-2\sin\theta+1=0$	(r)	$\theta=2\pi/3$
(D)	$\sin 4\theta=\pm 1$	(s)	$\theta=\pi/6$

A. A-(p,q), B-(p,q,r), C-(r,s), D-(p,q)

B. A-(r,s), B-(q,r), C-(r), D-(p,s)

C. A-(p),B-(q),C-(r),D-(s)

D. A-(s),B-(q,r),C-(r,s),D-(p,q)

Answer: A

Watch Video Solution

Exercise Subjective Type Questions

1. Find the number of solution of the equations

$|\cot x| = \cot x + \frac{1}{\sin x}$, when $\in [0, 2\pi]$

Watch Video Solution

2. Find the number of solution of the equations

$\sin^3 x \cos x + \sin^2 x \cdot \cos^2 x + \sin x \cdot \cos^3 x = 1$, when $x \in [0, 2\pi]$

Watch Video Solution

3. Find the number of solution of the equations

$2^{\cos x} = |\sin x|$, when $x \in [-2\pi, 2\pi]$

Watch Video Solution

4. Find the number of solution of the equations

$|\cos x| = [x]$, (where [.] denotes the greatest integer function).

Watch Video Solution

5. Find the number of solution of the equations

$x + 2\tan x = \frac{\pi}{2}$, when $x \in [0, 2\pi]$

Watch Video Solution

6. The equation $\sin^4 x + \cos^4 x + \sin 2x + \alpha = 0$ is solvable for

Watch Video Solution

7. If $32\tan^3\theta = 2\cos^2\alpha - 3\cos\alpha$ and $3\cos 2\theta = 1$ then the general value of α is

Watch Video Solution

8. Solve the following system of simultaneous equation for $x and y$.

$4^{\sin x} + 3^{1/\cos y} = 11\ 5x16^{\sin x} - 2x3^{1/\cos y} = 2$

Watch Video Solution

9. Find all number x , y that satisfy the equation

$$\left(\sin^2 x + \frac{1}{\sin^2 x}\right)^2 + \left(\cos^2 x + \frac{1}{\cos^2 x}\right)^2 = 12 + \frac{1}{2}\sin y.$$

View Text Solution

10. Find all the solution of x,y in the equation

$$4\left(3\sqrt{4x - x^2}\sin^2\left(\frac{x+y}{2}\right) + 2\cos(x+y)\right) = 13 + 4\cos^2(x+y)$$

View Text Solution

11. Solve for x and y , $1 - 2x - x^2 = \tan^2(x+y) + \cot^2(x+y).$

Watch Video Solution

12. Solve the system of equations

$\tan^2 x + \cot^2 x = 2\cos^2 y$

$\cos^2 y + \sin^2 z = 1$

Watch Video Solution

13. Find all the pairs of x,y that satisfy the equation $\cos x + \cos y + \cos(x + y) = -\frac{3}{2}$

Watch Video Solution

14. Solve the equation $\cot\left(\frac{\theta}{2}\right) - \operatorname{cosec}\left(\frac{\theta}{2}\right) = \cot\theta$

Watch Video Solution

15. Find the general solution of $1 + \sin^3 x + \cos^3 x = \frac{3}{2}\sin 2x$

Watch Video Solution

16. Solve $\log_{(\sin x)} 2 \log_{(\sin^2 x)} a = -1$ stating any condition on a' that may be required for the existence of the solution.

Watch Video Solution

17. Cosider the equation $\int_0^x (t^2 - 8t + 13)dt = x \sin(a/x)$

If x takes the values for which the equation has a solution, then the number of values of $a \in [0, 100]$ is

Watch Video Solution

18. If $\tan x = \frac{b}{a}$, find the value of $(a \cos 2x + b \sin 2x)$.

Watch Video Solution

19. Find all number of pairs x,y that satisfy the equation $\tan^4)x + \tan^4 y + 2\cot^2 x \cdot \cot^2 y = 3 + \sin^2(x + y)$.

Watch Video Solution

20. Determine all value of 'a' for which the equation $\cos^4 x - (a+2)\cos^2 x - (a+3) = 0$, possess solution. Find the solutions.

View Text Solution

21. For $x \in (-\pi, \pi)$ find the value of x for which the given equation $\left(\sqrt{3}\sin x + \cos x\right)^{\sqrt{\sqrt{3}\sin 2x - \cos 2x + 2}} = 4$ is satisfied.

Watch Video Solution

22. Show that the equation , $\sec\theta + \operatorname{cosec}\theta = c$ has two roots between 0 and 2π , if $c^2 < 8$ and four root if $c^2 > 8$.

Watch Video Solution

23. Solve the equation for x and y , $|\sin x + \cos x|^{\sin^2 x - 1/4} = 1 + |\sin y|$ and $\cos^2 y = 1 + \sin^2 y$.

Watch Video Solution

Exercise Questions Asked In Previous 13 Years Exam

1. Let $S = \left\{x\varepsilon(-\pi, \pi) : x \neq 0, +\frac{\pi}{2}\right\}$ The sum of all distinct solutions of the equation $\sqrt{3}\sec x + \operatorname{cosec} x + 2(\tan x - \cot x) = 0$ in the set S is equal to

A. $-\frac{7\pi}{9}$

B. $-\frac{2\pi}{9}$

C. 0

D. $\frac{5\pi}{9}$

Answer: C

Watch Video Solution

2. The number of distinct solutions of the equation $\frac{5}{4}\cos^2 2x + \cos^4 x + \sin^4 x + \cos^6 x + \sin^6 x = 2$ in the interval $[0, 2\pi]$ is

Watch Video Solution

3. For $x \in (0, \pi)$ the equation $\sin x + 2\sin 2x - \sin 3x = 3$ has

A. infinitely many solutions

B. three solutions

C. one solutions

D. no solutions

Answer: D

Watch Video Solution

4. Let $\theta, \phi \in [0, 2\pi]$ be such that $2\cos\theta(1-\sin\phi) = \sin^2\theta\left((\tan)\frac{\theta}{2} + (\cot)\frac{\theta}{2}\right)\cos\phi - 1, \tan(2\pi-\theta) > 0$

Then ϕ cannot satisfy

A. $0 < \phi < \frac{\pi}{2}$

B. $\frac{\pi}{2} < \phi < \frac{4\pi}{3}$

C. $\frac{4\pi}{3} < \phi < \frac{3\pi}{2}$

D. $\frac{3\pi}{2} < \phi < 2\pi$

Answer: A::C::D

Watch Video Solution

5. Q. Let $P = \{\theta : \sin\theta - \cos\theta = \sqrt{2}\cos\theta\}$ and $Q = \{\theta : \sin\theta + \cos\theta = \sqrt{2}\sin\theta\}$ be two sets. then

A. $P \subset Q$ and $Q - P \neq \phi$

B. $Q \not\subset P$

C. $P \not\subset Q$

D. $P = Q$

Answer: D

Watch Video Solution

6. The positive integer value of $n > 3$ satisfying the equation $\frac{1}{\sin\left(\frac{\pi}{n}\right)} = \frac{1}{\sin\left(\frac{2\pi}{n}\right)} + \frac{1}{\sin\left(\frac{3\pi}{n}\right)} is$

Watch Video Solution

7. The number of values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ such that $\theta \neq n\frac{\pi}{5}$ for $n \in N$ and $\tan\theta = \cot 5\theta$ as well as $\sin 2\theta = \cos 4\theta$ is

Watch Video Solution

8. The number of solutions of the pair of equations $2s \in^2 \theta - \cos 2\theta = 0$ $2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is 0 (b) 1 (c) 2 (d) 4

A. 0

B. 1

C. 2

D. 4

Answer: C

Watch Video Solution

9. The set of values of θ satisfying the inequatioin $2\sin^2\theta - 5\sin\theta + 2 > 0$, where $o < \theta < 2\pi$, is

A. $\left(0, \frac{\pi}{6}\right) \cup \left(\frac{5\pi}{6}, 2\pi\right)$

B. $\left[0, \frac{\pi}{6}\right] \cup \left[\frac{5\pi}{6}, 2\pi\right]$

C. $\left[0, \frac{\pi}{3}\right] \cup \left[\frac{2\pi}{3}, 2\pi\right]$

D. None of the above

Answer: A

Watch Video Solution

10. If $0 \leq x \leq 2\pi$, then the number of real values of x, which satisfy the equation $\cos x + \cos 2x + \cos 3x + \cos 4x = 0$, is

A. 3

B. 5

C. 7

D. 9

Answer: C

Watch Video Solution

11. The possible values of $\theta \in (0, \pi)$ such that $\sin(\theta) + \sin(4\theta) + \sin(7\theta) = 0$ are (1) $\frac{2\pi}{9}, \frac{i}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$ (2) $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$ (3) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$ (4) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$

A. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$

B. $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

C. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$

D. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

Answer: A

Watch Video Solution

12. The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is

A. 6

B. 1

C. 2

D. 4

Answer: D

Watch Video Solution