CTQ - 2023

CTQ : Concept Through Questions **Year : 2023**

Topic : Trigonometry I

1. Simplest form of $\frac{2}{\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4x}}}}$

   (a) $\sec\frac{x}{2}$ (b) $\sec x$ (c) $\operatorname{cosec} x$ (d) 1 Video Solution

2. If $\tan^2\theta = 2\tan^2\phi + 1$, then $\cos 2\theta + \sin^2\phi =$

   (a) – 1 (b) 0

   (c) 1 (d) None of these Video Solution

3. $\frac{\tan 80°-\tan 10°}{\tan 70°}$ is equal to

   (a) 0 (b) 1 (c) 2 (d) 3 Video Solution

4. $\frac{\sin 85°-\sin 35°}{\cos 65°}$ is equal to

   (a) 2 (b) - 1 (c) 1 (d) 0 Video Solution

5. If $\cos x = 3\cos y$, then $2\tan\frac{y-x}{2}$ is equal to

   (a) $\cot\left(\frac{y-x}{2}\right)$ (b) $\cot\left(\frac{x-y}{2}\right)$

   (c) $\cot\left(\frac{y-x}{2}\right)$ (d) $\cot\left(\frac{x+y}{2}\right)$ Video Solution

6. The maximum value of $12\sin\theta - 9\sin^2\theta$ is

   (a) 3 (b) 4

   (c) 5 (d) None of these Video Solution

7. If $f(x) = \cos^2 x + \sec^2 x$, its value always

   (a) $f(x) < 1$ (b) $f(x) = 1$

   (c) $2 > f(x) > 1$ (d) None of these Video Solution

8. The equation $\sin x \cos x = 2$ has

   (a) One solution (b) Two solutions

   (c) Infinite solutions (d) No solutions Video Solution

9. If $\sin(x-y) = \cos(x+y) = \frac{1}{2}$, the values of x and y lying between 0° and 90° are given by

   (a) x = 15°, y = 25° (b) x = 65°, y = 15°

   (c) x = 45°, y = 45° (d) x = 45°, y = 15° Video Solution

10. $\tan 10° + \tan 35° + \tan 10°\tan 35°$ is equal to

    (a) 0 (b) $\frac{1}{2}$ (c) -1 (d) 1 Video Solution

11. If α and β satisfying $2\sec 2\alpha = \tan\beta + \cot\beta$, then α+β is equal to

    (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) π Video Solution

12. If $(1+\tan\theta)(1+\tan\phi) = 2$, then $\theta + \phi =$

    (a) 30° (b) 45° (c) 60° (d) 75° Video Solution

13. The number of values of θ in the interval $[-\pi, \pi]$ satisfying the equation $\cos\theta + \sin 2\theta = 0$ is
(a) 1 (b) 2 (c) 3 (d) 4 Video Solution

14. If $\sin A + \cos A = m$ and $\sin^3 A + \cos^3 A = n$, then
(a) $m^3 - 3m + n = 0$ (b) $n^3 - 3n + 2m = 0$
(c) $m^3 - 3m + 2n = 0$ (d) $m^3 + 3m + 2n = 0$ Video Solution

15. $\cos\alpha \ \sin(\beta - \gamma) + \cos\beta \sin(\gamma - \beta) + \cos\gamma \ \sin(\alpha - \beta) =$
(a) 0 (b) $\frac{1}{2}$
(c) 1 (d) $4\cos\alpha\cos\beta\cos\gamma$ Video Solution

16. If $\sin(x + 3\alpha) = 3\sin(\alpha - x)$, then
(a) $\tan x = \tan\alpha$ (b) $\tan x = \tan^2\alpha$
(c) $\tan x = \tan^3\alpha$ (d) $\tan x = 3\tan\alpha$ Video Solution

17. $\sin^4\frac{\pi}{8} + \sin^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8}$ is equal to
(a) 1 (b) $\frac{3}{2}$ (c) 2 (d) $\frac{1}{4}$ Video Solution

18. If $sin\ x + \sin^2 x = 1$, then the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x + 2\cos^4 x + 2\cos^2 x - 2$, is equal to
(a) 0 (b) 1
(c) 2 (d) None Video Solution

19. The function $f\ (x) = 2\sin x + \ sin2x,\ x \in [0,\ 2\pi]$ has absolute maximum and minimum at
(a) $\pi/3,\ 5\pi/3$ (b) $\pi/3, \pi$
(c) $5\pi/3, \pi$ (d) None of these Video Solution
[NIMCET 2008]

20. The value of $\sin12° \sin48° \sin54°$ is:
(a) 1/16 (b) 1/4
(c) 1/32 (d) 1/8 Video Solution
[NIMCET 2008]

21. If $(1 + \tan 1°)(1 + \tan 2°) \ldots \ldots (1 + \tan 45°) = 2^n$, then the value of n is:
(a) 21 (b) 22
(c) 23 (d) 24 Video Solution
[NIMCET 2008]

22. If $cos\alpha + cos\beta = a$, $sin\alpha + sin\beta = b$ and θ is the arithmetic mean between α and β, then $\sin2\theta + \cos 2\theta$ is equal to:
(a) $\frac{(a+b)^2}{(a^2+b^2)}$ (b) $\frac{(a-b)^2}{(a^2+b^2)}$
(c) $\frac{a^2-b^2}{(a^2+b^2)}$ (d) None of these Video Solution
[NIMCET 2008]

23. The maximum value of $(\cos\alpha_1)(\cos\alpha_2) \ldots (\cos\alpha_n)$ Under the restrictions $0 \le \alpha_1, \alpha_2, \ldots\ldots, \alpha_n \le \pi/2$ and $(\cot\alpha_1)(\cot\alpha_2) \ldots (\cot\alpha_n) = 1$ is:
(a) $\frac{1}{2^{\frac{n}{2}}}$ (b) $\frac{1}{2^n}$
(c) $\frac{1}{2n}$ (d) 1 Video Solution
[NIMCET 2008]

24. If $A = \cos^2\theta + \sin^4\theta$, then for all values of θ

(a) $1 \le A \le 2$ (b) $\frac{13}{16} \le A \le 1$

(c) $3/4 \le A \le \frac{13}{16}$ (d) $\frac{3}{4} \le A \le 1$ Video Solution

[NIMCET 2009]

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

(a) $-1/2 \le \alpha \le \frac{1}{2}$ (b) $-3 \le \alpha \le 1$

(c) $-3/2 \le \alpha \le \frac{1}{2}$ (d) $-1 \le \alpha \le 1$ Video Solution

[NIMCET 2009]

26. The value of $\sqrt{3}\cot 20° - 4\cos 20°$ is:

(a) 1 (b) –1

(c) 0 (d) None of these Video Solution

[NIMCET 2010]

27. If $\tan\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2m+1}$ then α+β is equal to

(a) π/3 (b) π/4

(c) π/6 (d) π Video Solution

[NIMCET 2013]

28. If $\sin x + \sin^2 x = 1$, then $\cos^4 x + \cos^2 x$ is equal to

(a) 0 (b) 1

(c) – 1 (d) 2 Video Solution

[NIMCET 2013]

29. The value of $tan\theta + 2tan2\theta + 4tan4\theta + 8cot8\theta$ is

(a) $cot\ \theta$ (b) $tan\ \theta$

(c) $sin\ \theta$ (d) $cos\ \theta$ Video Solution

[NIMCET 2013]

30. If $sin\ x + a\ cos\ x = b$, then what is the expression for $|a\ sin\ x - cos\ x|$ in terms of a and b?

(a) $\sqrt{a^2 - b^2 - 1}$ (b) $\sqrt{a^2 + b^2 - 1}$

(c) $\sqrt{a^2 + b^2 + 1}$ (d) $\sqrt{a^2 - b^2 + 1}$ Video Solution

[NIMCET 2013]

31. The value of $\sin 20°\ \sin 40°\ \sin 80°$ is

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$

(c) $\frac{\sqrt{3}}{8}$ (d) $\frac{1}{8}$ Video Solution

[NIMCET 2014]

32. If $\tan A - \tan B = x$ and $\cot B - \cot A = y$, then $\cot(A - B)$ is equal to

(a) $\frac{1}{x} + y$ (b) $\frac{1}{xy}$

(c) $\frac{1}{x} - \frac{1}{y}$ (d) $\frac{1}{x} + \frac{1}{y}$ Video Solution

[NIMCET 2014]

33. The value of $\tan 1° \tan 2° \tan 3° \ldots \tan 89°$ is

(a) 0 (b) $1/\sqrt{2}$

(c) 1 (d) 2 Video Solution

[NIMCET 2014]

34. If $0<x<\pi$ and $\cos x + \sin x = \frac{1}{2}$, then the value of tan x

(a) $\frac{4-\sqrt{7}}{3}$ (b) $\frac{(-4\pm\sqrt{7})}{3}$

(c) $\frac{1+\sqrt{7}}{4}$ (d) $\frac{1-\sqrt{7}}{4}$ Video Solution

[NIMCET 2015]

35. If $P = \sin^{20}\theta + \cos^{48}\theta$, then the inequality that holds for all values of θ is

(a) $P \geq 1$ (b) $0<P\leq 1$

(c) $1<P<3$ (d) $0\leq P\leq 1$ Video Solution

[NIMCET 2015]

Answer Key

Ques.	1	2	3	4	5	6	7	8	9	10
Ans.	A	B	C	C	D	B	D	D	D	D
Ques.	11	12	13	14	15	16	17	18	19	20
Ans.	C	B	D	C	A	C	B	B	A	D
Ques.	21	22	23	24	25	26	27	28	29	30
Ans.	C	D	A	D	C	A	B	B	A	D
Ques.	31	32	33	34	35					
Ans.	C	D	C	B	B					