

MISSION NDA MATHEMATICS

COMPLETE TOPICWISE QUESTIONS

INVERSE TRIGONOMETRIC FUNCTION

- $\sin^{-1}(3x - 2 - x^2) + \cos^{-1}(x^2 - 4x + 3) = \frac{\pi}{4}$ can have a solution for $x \in$
 - $[1, 2]$
 - $\left(\frac{3+\sqrt{5}}{2}, 2 + \sqrt{2}\right)$
 - $\left(\frac{3-\sqrt{5}}{2}, 2 - \sqrt{2}\right)$
 - none of these
- If $a \sin^{-1} x - b \cos^{-1} x = c$, then $a \sin^{-1} x + b \cos^{-1} x$ is equal to
 - 0
 - $\frac{\pi ab + c(b-a)}{a+b}$
 - $\pi/2$
 - $\frac{\pi ab + c(a-b)}{a+b}$
- The value of $\cot^{-1} \frac{3}{4} + \sin^{-1} \frac{5}{13}$ is
 - $\sin^{-1} \frac{63}{65}$
 - $\sin^{-1} \frac{12}{13}$
 - $\sin^{-1} \frac{65}{68}$
 - $\sin^{-1} \frac{5}{12}$
- $\tan^{-1} \left[\cos \left(2 \tan^{-1} \frac{3}{4} \right) + \sin \left(2 \cot^{-1} \frac{1}{2} \right) \right]$ is
 - not real
 - equal to $\pi/4$
 - greater than $\pi/4$
 - less than $\pi/4$
- If $\frac{1}{2} \sin^{-1} \left[\frac{3 \sin 2\theta}{5+4c} \right] = \tan^{-1} x$, then $x =$
 - $\tan 3\theta$
 - $3 \tan \theta$
 - $(1/3) \tan \theta$
 - $3 \cot \theta$
- If $\theta = \tan^{-1} a$, $\phi = \tan^{-1} b$ and $ab = -1$, then $(\theta - \phi)$ is equal to
 - 0
 - $\pi/4$
 - $\pi/2$
 - none of these
- The value of $\tan^{-1} \sqrt{\frac{a(a+b+c)}{bc}} + \tan^{-1} \sqrt{\frac{b(a+b+c)}{ca}} + \tan^{-1} \sqrt{\frac{c(a+b+c)}{ab}}$ is
 - $\pi/4$
 - $\pi/2$
 - π
 - 0
- If $\tan^{-1} \frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}} = \alpha$, then x^2 is equal to
 - $\sin \alpha$
 - $\cos 2\alpha$
 - $\cos \alpha$
 - $\sin 2\alpha$
- The value of $\cot^{-1} \frac{xy+1}{x-y} + \cot^{-1} \frac{yz+1}{y-z} + \cot^{-1} \frac{zx+1}{z-x}$ is
 - 0
 - 1
 - $\cot^{-1} x + \cot^{-1} y + \cot^{-1} z$
 - none of these



10. If $\cot^{-1} \sqrt{\cos \alpha} - \tan^{-1} \sqrt{\cos \alpha} = u$, then $\sin u =$
 (a) $\tan^2 \alpha$ (b) $\tan 2\alpha$
 (c) $\tan^2 (\alpha/2)$ (d) $\cot^2 (\alpha/2)$
11. If $\tan^{-1} \frac{a}{x} + \tan^{-1} \frac{b}{x} + \tan^{-1} \frac{c}{x} + \tan^{-1} \frac{d}{x} = \frac{\pi}{2}$, then $x^4 - x^2 \sum ab + abcd$ is equal to
 (a) -1 (b) 0
 (c) 1 (d) 2
12. If $x^2 + y^2 + z^2 = r^2$, then $\tan^{-1} \left(\frac{xy}{zr} \right) + \tan^{-1} \left(\frac{yz}{xr} \right) + \tan^{-1} \left(\frac{xz}{yr} \right)$ is equal to
 (a) π (b) $\pi/2$
 (c) 0 (d) none of these
13. If $\alpha = \sin^{-1} \frac{4}{5} + \sin^{-1} \frac{1}{3}$ and $\beta = \cos^{-1} \frac{4}{5} + \cos^{-1} \frac{1}{3}$, then
 (a) $\alpha < \beta$ (b) $\alpha = \beta$
 (c) $\alpha > \beta$ (d) none of these
14. $\sin^{-1} x + \sin^{-1} \frac{1}{x} + \cos^{-1} x + \cos^{-1} \frac{1}{x}$ is equal to
 (a) π (b) $\pi/2$
 (c) $3\pi/2$ (d) none of these
15. The number of the positive integral solutions of $\tan^{-1} x + \cos^{-1} \frac{y}{\sqrt{1+y^2}} = \sin^{-1} \frac{3}{\sqrt{10}}$ is
 (a) 1 (b) 2
 (c) 3 (d) 4
16. $\cos^{-1} \left(\frac{1}{2} \right) + 2\sin^{-1} \left(\frac{1}{2} \right)$ is equal to
 (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$
 (c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{4}$
17. Let $f: \left[\frac{1}{2}, 1 \right] \rightarrow [-1, 1]$ be given by $f(x) = 4x^3 - 3x$, then $f^{-1}(x)$ is given by
 (a) $\cos \left(\frac{1}{3} \cos^{-1} x \right)$ (b) $3\cos (\sin^{-1} x)$
 (c) $3\sin^{-1} (\cos x)$ (d) none of these
18. If $\sin^{-1} \alpha + \sin^{-1} \beta + \sin^{-1} \gamma = \frac{3\pi}{2}$, then $\alpha\beta + \alpha\gamma + \beta\gamma$ is equal to
 (a) 1 (b) 0
 (c) 3 (d) -3
19. The value of $\sin (\cot^{-1} x)$ is
 (a) $(1 + x^2)^{3/2}$ (b) $(1 + x^2)^{-3/2}$
 (c) $(1 + x^2)^{1/2}$ (d) $(1 + x^2)^{-1/2}$
20. $\cos^{-1} \{ \cos [2\cot^{-1} (\sqrt{2} - 1)] \}$ is equal to
 (a) $\sqrt{2} - 1$ (b) $1 - \sqrt{2}$
 (c) $\pi/4$ (d) $3\pi/4$
21. $\cos \tan^{-1} \sin \cot^{-1} x$ is equal to
 (a) x (b) 1
 (c) $\frac{x^2+1}{x^2+2}$ (d) $\sqrt{\frac{x^2+1}{x^2+2}}$



22. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, then
 (a) $x^2 + y^2 = z^2$
 (b) $x^2 + y^2 + z^2 = 0$
 (c) $x^2 + y^2 + z^2 = 1 - 2xyz$
 (d) none of these
23. The value of $3\tan^{-1} a$ is
 (a) $\tan^{-1} \left(\frac{3a+a^3}{1+3a^2} \right)$
 (b) $\tan^{-1} \left(\frac{3a-a^3}{1+3a^2} \right)$
 (c) $\tan^{-1} \left(\frac{3a+a^3}{1-3a^2} \right)$
 (d) $\tan^{-1} \left(\frac{3a-a^3}{1-3a^2} \right)$
24. If $\cos^{-1} \frac{x}{2} + \cos^{-1} \frac{y}{3} = \theta$, then $9x^2 - 12xy\cos \theta + 4y^2 =$
 (a) 36
 (b) $-36\sin^2 \theta$
 (c) $36\sin^2 \theta$
 (d) $36\cos^2 \theta$
25. If $2\tan^{-1} x = \sin^{-1} \frac{2a}{1+a^2} + \cos^{-1} \frac{1-b^2}{1+b^2}$, then x is equal to
 (a) $\frac{a+b}{1+ab}$
 (b) $\frac{a-b}{1-ab}$
 (c) $\frac{a-b}{1+ab}$
 (d) $\frac{a^2-b^2}{1+a^2b^2}$
26. The value of $\tan^{-1} \left(\frac{1}{3} \right) + \tan^{-1} \left(\frac{1}{7} \right) + \tan^{-1} \left(\frac{1}{13} \right) + \dots + \tan^{-1} \left(\frac{1}{n^2+n+1} \right)$ is
 (a) $\frac{\pi}{2}$
 (b) $\frac{\pi}{4}$
 (c) $\frac{2\pi}{3}$
 (d) 0
27. If $(\tan^{-1} x)^2 + (\cot^{-1} x)^2 = \frac{5\pi^2}{8}$, then x is equal to
 (a) -1
 (b) 1
 (c) 0
 (d) none of these
28. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$, then the value of $xy + yz + xz$ is
 (a) 0
 (b) 1
 (c) xyz
 (d) $x + y + z$
29. The number of real solutions of the equation $\tan^{-1} \sqrt{x^2 - 3x + 2} + \cos^{-1} \sqrt{4x - x^2 - 3} = \pi$ is
 (a) one
 (b) two
 (c) zero
 (d) infinite
30. If $\sin^{-1} (x) + \sin^{-1} (y) + \sin^{-1} (z) = \frac{3\pi}{2}$, then the value of $(x^{100} + y^{100} + z^{100}) - (x^{101} + y^{101} + z^{101})$ is
 (a) 0
 (b) 1
 (c) 2
 (d) 4
31. $\tan \left(\frac{\pi}{4} + \frac{1}{2} \cos^{-1} x \right) + \tan \left(\frac{\pi}{4} - \frac{1}{2} \cos^{-1} x \right)$, $x \neq 0$, is equal to
 (a) x
 (b) $2x$
 (c) $2/x$
 (d) none of these
32. If $3\sin^{-1} \left(\frac{2x}{1+x^2} \right) - 4\cos^{-1} \left(\frac{1-x^2}{1+x^2} \right) + 2\tan^{-1} \left(\frac{2x}{1-x^2} \right) = \frac{\pi}{3}$, then the value of x is
 (a) $\frac{1}{\sqrt{3}}$
 (b) $\frac{1}{\sqrt{2}}$
 (c) 1
 (d) 2



33. If $\sin^{-1} \left(\frac{1}{3} \right) + \sin^{-1} \left(\frac{2}{3} \right) = \sin^{-1} x$, then x is equal to
 (a) $\frac{4+\sqrt{5}}{9}$ (b) $\frac{4\sqrt{2}+\sqrt{5}}{9}$
 (c) $\frac{\sqrt{3}+1}{6}$ (d) 1
34. If $\sin [\cos^{-1} (x+1)] = \cos (\tan^{-1} x)$, then the value of x is
 (a) $-(1/2)$ (b) $1/2$
 (c) 0 (d) $9/4$
35. In $\triangle ABC$, if $A = \tan^{-1} 2$ and $B = \tan^{-1} 3$, then C is equal to
 (a) $\pi/3$ (b) $\pi/4$
 (c) $\pi/6$ (d) none of these
36. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y =$
 (a) $2\pi/3$ (b) $\pi/3$
 (c) $\pi/6$ (d) π
37. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then the value of $xy + yz + zx$ is
 (a) 1 (b) 0
 (c) -3 (d) 3
38. If α, β, γ are the roots of the equation $x^3 + px^2 + 2x + p = 0$, then the general value of $\tan^{-1} \alpha + \tan^{-1} \beta + \tan^{-1} \gamma$ is
 (a) $n\pi$ (b) $\frac{n\pi}{2}$
 (c) $(2n+1)\frac{\pi}{2}$ (d) dependent upon the value of p
39. $6\sin^{-1} (x^2 - 6x + 8.5) = \pi$, if
 (a) $x = 1$ (b) $x = 2$
 (c) $x = 3$ (d) $x = 4$
40. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then $x =$
 (a) $1/2$ (b) $-(1/2)$
 (c) $\sqrt{3}/2$ (d) none of these
41. If $\cos^{-1} p + \cos^{-1} q + \cos^{-1} r = \pi$, then the value of $p^2 + q^2 + r^2 = 2pqr$ is
 (a) 3 (b) 1
 (c) 2 (d) -1
42. If $\sin^{-1} \sqrt{x^2 + 2x + 1} + \sec^{-1} \sqrt{x^2 + 2x + 1} = \frac{\pi}{2}$, $x \neq 0$, then the value of $2\sec^{-1} \frac{x}{2} + \sin^{-1} \frac{x}{2} =$
 (a) $-\frac{x}{2}$ (b) $-\frac{3\pi}{2}, \frac{\pi}{2}$
 (c) $\frac{3\pi}{2}$ (d) $-\frac{3\pi}{2}$
43. The sum of infinite terms of the series $\cot^{-1} \left(1^2 + \frac{3}{4} \right) + \cot^{-1} \left(2^2 + \frac{3}{4} \right) + \cot^{-1} \left(3^2 + \frac{3}{4} \right) + \dots$ is
 (a) $\pi/4$ (b) $\tan^{-1} 2$
 (c) $\tan^{-1} 3$ (d) none of these



44. If $\cos^{-1} \left(\frac{x}{a} \right) + \cos^{-1} \left(\frac{y}{b} \right) = \alpha$, then the value of $\frac{x^2}{a^2} - \frac{2x}{ab} \cos \alpha + \frac{y^2}{b^2}$ is
 (a) $\sin^2 \alpha$ (b) $\cos^2 \alpha$
 (c) $\tan^2 \alpha$ (d) $\cot^2 \alpha$
45. If $\alpha \leq \sin^{-1} x + \cos^{-1} x + \tan^{-1} x \leq \beta$, then
 (a) $\alpha = 0$ (b) $\beta = \frac{\pi}{2}$
 (c) $\alpha = \frac{\pi}{2}$ (d) $\beta = \pi$
46. 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) $\frac{17}{6}$
 (c) $\frac{7}{6}$ (d) $\frac{16}{7}$

ANSWER KEY

Q1 d	Q2 d	Q3 a	Q4 c	Q5 c	Q6 c	Q7 d
Q8 d	Q9 a	Q10 c	Q11 b	Q12 b	Q13 a	Q14 a
Q15 b	Q16 c	Q17 a	Q18 c	Q19 d	Q20 d	Q21 d
Q22 c	Q23 d	Q24 c	Q25 b	Q26 b	Q27 a	Q28 b
Q29 c	Q30 a	Q31 c	Q32 a	Q33 b	Q34 a	Q35 b
Q36 b	Q37 d	Q38 a	Q39 b,d	Q40 c	Q41 b	Q42 c
Q43 b	Q44 a	Q45 a,d	Q46 b			

