RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATION

CBSE PRACTICE PAPER(2024)

(Mathematics)

Grade : XII   **Marks: 40**
marks
Chapter: INVERSE TRIGNOMETRY Set-2   **Time: 90**
minutes

SECTION A

(This section comprises of Multiple-choice questions (MCQ) of 1 mark each.)

1. The value of $\tan^{-1}\left[\dfrac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]$, $|x| < 1/2$, $x \neq 0$, is equal to

   (a) $\pi/4 + (1/2)\cos^{-1}x^2$ (b) $\pi/4 + \cos^{-1}x^2$ (c) $\pi/4 – (1/2)\cos^{-1}x^2$ (d) $\pi/4 – \cos^{-1}x^2$

2. A value of x satisfying the equation $\sin[\cot^{-1}(1 + x)] = \cos[\tan^{-1}x]$, is:

   (a) ½   (b) -1   (c) 0   (d) -1/2

3. $\alpha = 3\sin^{-1}(6/11)$ and $\beta = 3\cos^{-1}(4/9)$ where the inverse trig functions take only the principal values, then the right option is

   (a) $\cos\beta > 0$ (b) $\cos(\alpha + \beta) > 0$ (c) $\sin \beta < 0$ (d) $\cos\alpha < 0$

4. If $f'(x) = \tan^{-1}(\sec x + \tan x)$, $-\pi/2 < x < \pi/2$, and $f(0) = 0$ then $f(1)$ is equal to

   (a) $(\pi+1)/4$ (b) $(\pi+2)/4$ (c) ¼   (d) $(\pi-1)/4$

5. Let $f: [0, 4\pi] \to [0, \pi]$ be defined by $f(x) = \cos^{-1}(\cos x)$. The number of points $x \in [0, 4\pi]$ satisfying the equation $f(x) = (10-x)/10$ is

   (a) 1   (b) 2   (c) 3   (d) None of these

6. Let $f(x) = x\cos^{-1}(\sin(-|x|))$, $x \in (-\pi/2, \pi/2)$ then which of the following is true?

   (a) $f'(0) = -\pi/2$ (b) f' is decreasing in $(-\pi/2, 0)$ and increasing in $(0, \pi/2)$ (c) f is not differentiable at $x =0$ (d) f' is increasing in $(-\pi/2, 0)$ and decreasing in $(0, \pi/2)$

7. $\sin^{-1}\dfrac{\sqrt{x}}{\sqrt{x+a}}$ is equal to

   (a) $\cos^{-1}\sqrt{\dfrac{x}{a}}$ (b) $\operatorname{cosec}^{-1}\sqrt{\dfrac{x}{a}}$ (c) $\tan^{-1}\sqrt{\dfrac{x}{a}}$ (d)None of these

8. If $\sin^{-1}x = \theta + \beta$ and $\sin^{-1}y = \theta - \beta$, then $1+xy =$

   (a) $\sin^2\theta + \sin^2\beta$ (b) $\sin^2\theta + \cos^2\beta$ (c) $\cos^2\theta + \cos^2\beta$ (d)None of these

9. If $\sin^{-1}\dfrac{1}{3} + \sin^{-1}\dfrac{2}{3} = \sin^{-1}x$, then x is equal to

   (a) 0   (b) $\dfrac{\sqrt{5} - 4\sqrt{2}}{9}$ (c) $\dfrac{\sqrt{5} + 4\sqrt{2}}{9}$ (d) $\dfrac{\pi}{2}$

10. $\sin[\pi/3 – \sin^{-1}(-½)]$ is equal to:

    (a) ½   (d) 1   (c) -1   (b) ⅓

SECTION B
(This section comprises of very short answer type-questions (VSA) of 2 marks each.)

11. Find the value of $\tan^{-1}\left(\tan\left(\frac{5\pi}{6}\right)\right) + \cos^{-1}\left(\cos\left(\frac{5\pi}{6}\right)\right)$

12. Evaluate $\cos^{-1}\left(\cos\left(\frac{-\sqrt{3}}{2}\right)\right) + \frac{\pi}{6}$

13. Prove that $\cos\left(\frac{\pi}{4} - 2\cot^{-1}3\right)$

SECTION C
(This section comprises of short answer type questions (SA) of 3 marks each)

14. Find the value of $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) + \cot^{-1}\left(\frac{1}{\sqrt{3}}\right) + \tan^{-1}\left(sin\frac{-\pi}{2}\right)$

15. Prove that $6^{\cot\left(\frac{\pi}{4} - 2\cot^{-1}3\right)} = 7$

16. Solve the following equation $\cos(\tan^{-1}x) = \sin\left(\cot^{-1}\frac{3}{4}\right)$

SECTION D
(This section comprises of long answer-type questions (LA) of 5 marks each)

17. Find the real solution of $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$

18. If $\tan^{-1}(cos\,\theta) = \tan^{-1}(2cosec\,\theta)$ then show that $\theta = \frac{\pi}{4}$

19. Find the value of $\sin\left(\left(2\tan^{-1}\frac{1}{3}\right) + cos\left(\tan^{-1}2\sqrt{2}\right)\right)$