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Test / Exam Name: Maths - Inverse Trigonometric Functions **Standard: 12th Science** **Subject: Mathematics**

Student Name: ..... **Section:** ..... **Roll No.:** .....

Questions: 27 | Time: 01:45 hh:mm | Marks: 50

Instructions

1. New section on new page
2. Honesty is the best policy.
3. Rough work at the last page should be in proper manner too

SECTION-A

Q1. The value of $\tan^{-1}\left[\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right]$ is: **1 Mark**

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

C $\frac{-3+\sqrt{5}}{2}$ D $\frac{-3-\sqrt{5}}{2}$

Q2. The value of $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$ is: **1 Mark**

A $\frac{\pi}{6}$ B $\frac{\pi}{2}$ C $\frac{\pi}{3}$ D $\frac{7\pi}{6}$

Q3. The domain of the function $f(x) = \sin^{-1}(2x)$ is **1 Mark**

A $[0, 1]$ B $[-1, 1]$

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

Q4. The principal value of $\tan^{-1}\left(\tan\frac{3\pi}{5}\right)$ is: **1 Mark**

A $\frac{2\pi}{5}$ B $\frac{-2\pi}{5}$ C $\frac{3\pi}{5}$ D $\frac{-3\pi}{5}$

Q5. The principal value of $\cot^{-1}(-\sqrt{3})$ is **1 Mark**

A $-\frac{\pi}{6}$ B $\frac{\pi}{6}$ C $\frac{2\pi}{3}$ D $\frac{5\pi}{6}$

Q6. $\left(\tan^{-1}\frac{7}{9} + \tan^{-1}\frac{1}{8}\right)$ is equal to **1 Mark**

A $\tan^{-1}\left(\frac{65}{72}\right)$ B $\tan^{-1}\left(\frac{63}{65}\right)$

C $\frac{\pi}{4}$ D $\frac{\pi}{2}$

Q7. The principal value of $\cos^{-1}\left(\cos\frac{13\pi}{6}\right)$ is: **1 Mark**

A $\frac{13\pi}{6}$ B $\frac{\pi}{2}$ C $\frac{\pi}{3}$ D $\frac{\pi}{6}$

Q8. Write the value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$ **1 Mark**

Q9. Using principal value, evaluate the following: **1 Mark**

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

Q10. Write the value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$. **1 Mark**

Q11. If $y = 2\sqrt{\sec(e^{2x})}$, then find $\frac{dy}{dx}$. **1 Mark**

Q12. If $y = \log(\operatorname{cosec}^{x})$, then find $= \frac{dy}{dx}$. **1 Mark**

Q13. Write the principal value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right)$. **1 Mark**

Q14. Fill in the blank. **1 Mark**

If $\cos\left(\tan^{-1}x + \cot^{-1}\sqrt{3}\right) = 0$, then value of x is _____.

Q15. Fill in the blank. **1 Mark**

The value of expression $\tan\left(\frac{\sin^{-1}x + \cos^{-1}x}{2}\right)$, where $x = \frac{\sqrt{3}}{2}$, is _____.

SECTION-B

Q16. If $y = \sin^{-1}(6x\sqrt{1-9x^2})$, $-\frac{1}{3\sqrt{2}} < x < \frac{1}{3\sqrt{2}}$, then find $\frac{dy}{dx}$ **2 Marks**

Q17. Prove that $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\cos^{-1}x$, $\frac{1}{\sqrt{2}} \le x \le 1$. **2 Marks**

Q18. Find the principal values: **2 Marks**

$\operatorname{cosec}^{-1}(-\sqrt{2})$

Q19. Prove the following: **2 Marks**

$3\sin^{-1}x = \sin^{-1}\left(3x - 4x^3\right), x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$

Q20. Solve the following equation: **2 Marks**

$\tan^{-1}\frac{1-x}{1+x} = \frac{1}{2}\tan^{-1}x, (x > 0)$

Q21. Find the real solutions of the equation $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$. **3 Marks**

Q22. If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$, prove that $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$. **3 Marks**

Q23. Evaluate the following: **3 Marks**

$\tan^{-1}\left(\tan\frac{5\pi}{6}\right) + \cos^{-1}\left\{\cos\left(\frac{13\pi}{6}\right)\right\}$

Q24. Evaluate the following: **3 Marks**

$\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) + \tan^{-1}\left(-\sqrt{3}\right) + \tan^{-1}\left(\sin\left(-\frac{\pi}{2}\right)\right)$

Q25. Write the following in the simplest form: **3 Marks**

$\sin\left\{2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right\}$

SECTION-C

Q26. If $x = a\sin 2t(1 + \cos 2t)$ and $y = b\cos 2t(1 - \cos 2t)$, show that at $t = \frac{\pi}{4}$, $\left(\frac{dy}{dx}\right) = \frac{b}{a}$ **4 Marks**

Q27. Prove that $y = \frac{4\sin\theta}{2+\cos\theta} - \theta$ is an increasing function of θ on $\left[0, \frac{\pi}{2}\right]$. **6 Marks**