DPP - Daily Practice Problems

Chapter-wise Sheets

MATHEMATICS (CM17)

SYLLABUS : Inverse Trigonometric Functions

Max. Marks : 100 **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 25 Questions divided into 2 parts.
Part-I contains 20 MCQs with only one correct option. Darken the correct circle/bubble in the Response Grid provided on each page.
Marking Scheme : (+4) for correct & (–1) for incorrect answer and zero for unattempted.
Part-II contains 5 Numeric/Integer type Questions. Mark your answer in the box provided in the Response Grid.
Marking Scheme : (+4) for correct & (0) for incorrect answer and zero for unattempted.

PART-I (Single Correct MCQs)

1. $\sin^{-1}(\sin 5) > x^2 - 4x$ holds if

(a) $x = 2 - \sqrt{9 - 2\pi}$

(b) $x = 2 + \sqrt{9 - 2\pi}$

(c) $x > 2 + \sqrt{9 - 2\pi}$

(d) $x \in (2 - \sqrt{9 - 2\pi}, 2 + \sqrt{9 - 2\pi})$

2. The value of

$$\tan^{-1}\left(\frac{1}{2}(\tan 2A) + \tan^{-1}(\cot A) + \tan^{-1}(\cot^3 A)\right) \text{ is}$$

(a) 0 if $\frac{\pi}{4} < A < \frac{\pi}{2}$

(b) π, if $0 < A < \frac{\pi}{4}$

(c) both (a) and (b)

(d) None of these

3. If $\left|\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right| < \frac{\pi}{3}$, then

(a) $x \in \left[-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right]$

(b) $x \in \left(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$

(c) $x \in \left(0, \frac{1}{\sqrt{3}}\right)$

(d) None of these

4. If $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)=\frac{\pi}{2}$, where xy < 1, then

(a) x – y – xy = 1

(b) x – y + xy = 1

(c) x + y – xy = 1

(d) x + y + xy = 1

5. The range of the function

$f(x) = \sin^{-1}(\log[x]) + \log(\sin^{-1}[x])$; (where [.] denotes the greatest integer function) is

(a) R

(b) [1, 2)

(c) $\left\{\log\frac{\pi}{2}\right\}$

(d) {– sin 1}

6. If $a_1, a_2, a_3, \ldots\ldots a_n$ is an A.P. with common difference d; (d > 0) then

$$\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{d}{1+a_2a_3}\right)+\ldots\right.$$

$$\left.\ldots\ldots+\tan^{-1}\left(\frac{d}{1+a_{n-1}a_n}\right)\right]$$ is equal to

(a) $\frac{(n-1)d}{a_1+a_n}$

(b) $\frac{(n-1)d}{1+a_1a_n}$

(c) $\frac{nd}{1+a_1a_n}$

(d) $\frac{a_n-a_1}{a_n+a_1}$

7. The sum of the infinite series
$\cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 + ...$ is

(a) π

(b) $\frac{\pi}{2}$

(c) $\frac{\pi}{4}$

(d) None of these

8. If $\cos^{-1}x + \cos^{-1} y = \frac{2\pi}{7}$, then the value $\sin^{-1}x + \sin^{-1} y$ is equal to

(a) $\frac{4\pi}{7}$

(b) $\frac{3\pi}{7}$

(c) $\frac{2\pi}{7}$

(d) $\frac{5\pi}{7}$

9. The value of

$$\cot^{-1}\left\{\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right\} \left(0 < x < \frac{\pi}{2}\right) \text{ is}$$

(a) $\pi-\frac{x}{2}$

(b) $2\pi - x$

(c) $\frac{x}{2}$

(d) $\frac{x}{2} - \pi$

10. If $\sin^{-1} a + \sin^{-1} b + \sin^{-1} c = \pi$, then find the value of $a\sqrt{1-a^2} + b\sqrt{1-b^2} + c\sqrt{1-c^2}$.

(a) abc

(b) $a + b + c$

(c) $\frac{1}{a} \times \frac{1}{b} \times \frac{1}{c}$

(d) $2abc$

11. If $\alpha = \sin^{-1} \frac{\sqrt{3}}{2} + \sin^{-1} \frac{1}{3}$

and $\beta = \cos^{-1} \frac{\sqrt{3}}{2} + \cos^{-1} \frac{1}{3}$, then :

(a) $\alpha < \beta$

(b) $\alpha = \beta$

(c) $\alpha > \beta$

(d) $\alpha + \beta = 2\pi$

12. $\sum_{r=1}^{\infty} \tan^{-1}\left(\frac{1}{1+r+r^2}\right)$ = ...

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{4}$

(c) $\frac{2\pi}{3}$

(d) None of these

13. If $0 < a < b < c$, then

$$\cot^{-1}\left(\frac{ab+1}{a-b}\right)+\cot^{-1}\left(\frac{bc+1}{b-c}\right)+\cot^{-1}\left(\frac{ca+1}{c-a}\right)=$$

(a) 0
(b) π
(c) 2π
(d) None of these

14. In a ΔABC, if $A=\tan^{-1}2$ and $B=\tan^{-1}3$, then C =

(a) $\frac{\pi}{3}$

(b) $\frac{\pi}{4}$

(c) $\frac{\pi}{6}$

(d) $\frac{3\pi}{4}$

15. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\pi$, then

$x^4+y^4+z^4+4x^2y^2z^2=k(x^2y^2+y^2z^2+z^2x^2)$. where k =

(a) 1
(b) 2
(c) 4
(d) None of these

16. The sum of the infinite series

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

$$+...+\sin^{-1}\left(\frac{\sqrt{n}-\sqrt{(n-1)}}{\sqrt{\{n(n+1)\}}}\right)+... \text{ is}$$

(a) $\frac{\pi}{8}$

(b) $\frac{\pi}{4}$

(c) $\frac{\pi}{2}$

(d) π

17. If $\sin^{-1}(x-1) + \cos^{-1}(x-3) + \tan^{-1}\left(\frac{x}{2-x^2}\right)$ $= \cos^{-1} k + \pi$, then the value of k =

(a) 1

(b) $-1/\sqrt{2}$

(c) $1/\sqrt{2}$

(d) None of these

18. If θ and φ are the roots of the equation $8x^2 + 22x + 5 = 0$, then

(a) both $\sin^{-1}\theta$ and $\sin^{-1}\phi$ are real

(b) both $\sec^{-1}\theta$ and $\sec^{-1}\phi$ are real

(c) both $\tan^{-1}\theta$ and $\tan^{-1}\phi$ are real

(d) None of these

19. If $\cot(\cos^{-1} x) = \sec\left(\tan^{-1}\frac{a}{\sqrt{b^2-a^2}}\right)$, then x is equal to

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

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

(c) $\frac{\sqrt{2b^2-a^2}}{a}$

(d) $\frac{\sqrt{2b^2-a^2}}{b}$

20. What is the value of
$\tan(\tan^{-1}x + \tan^{-1}y + \tan^{-1}z) - \cot(\cot^{-1}x + \cot^{-1}y + \cot^{-1}z)$?

(a) 0

(b) $2(x + y + z)$

(c) $\frac{3\pi}{2}$

(d) $\frac{3\pi}{2} + x + y + z$

PART-II (Numeric/Integer Type Questions)

21. If $A = \tan^{-1}\left(\frac{x\sqrt{3}}{2K - x}\right)$ and $B = \tan^{-1}\left(\frac{2x - K}{K\sqrt{3}}\right)$, then the value of A – B is

22. If $\cot^{-1}\frac{n}{\pi} > \frac{\pi}{6}$, $n \in \mathbf{N}$, then the maximum value of n is :

23. If $\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - \ldots\right)$

$+ \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \ldots\right) = \frac{\pi}{2}$ for $0 < |x| < \sqrt{2}$, then x equals

24. If $\sin^{-1}\left(\frac{1}{5}\right) + \sec^{-1}(2) + 2\tan^{-1}\left(\frac{1}{\sqrt{3}}\right) + \sec^{-1}(5)$

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

25. If $\tan\left[\cos^{-1}\frac{1}{\sqrt{82}} - \sin^{-1}\left(\frac{5}{\sqrt{26}}\right)\right]$ is equal to a, then $\frac{1}{a} =$

DAILY PRACTICE PROBLEM DPP CHAPTERWISE 17 - MATHEMATICS			
Total Questions	25	Total Marks	100
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	28	Qualifying Score	45
Success Gap = Net Score – Qualifying Score			
Net Score = [(Correct × 4) – (Incorrect × 1)] *for part-I* + [(correct × 4)] *for part-II*			