

DPP - Daily Practice Problems

Chapter-wise Sheets

Date :

Start Time :

End Time :

MATHEMATICS

CM03

SYLLABUS : Trigonometric Functions

Max. Marks : 120

Marking Scheme : (+4) for correct & (−1) for incorrect answer

Time : 60 min.

INSTRUCTIONS : This Daily Practice Problem Sheet contains 30 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. If $y = \cos^2 x + \sec^2 x$, then
(a) $y \leq 2$ (b) $y \leq 1$
(c) $y \geq 2$ (d) $1 < y < 2$
2. Period of $\frac{\sin \theta + \sin 2\theta}{\cos \theta + \cos 2\theta}$ is
(a) 2π (b) π
(c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{3}$
3. If an angle θ is divided into 2 parts A and B such that $A - B = k$ and $A + B = \theta$ and $\tan A : \tan B = k : 1$, then the value of $\sin k$ is :
(a) $\frac{k+1}{k-1} \sin \theta$ (b) $\frac{k}{k+1} \sin \theta$
(c) $\frac{k-1}{k+1} \sin \theta$ (d) None of these
4. If $2y \cos \theta = x \sin \theta$ and $2x \sec \theta - y \operatorname{cosec} \theta = 3$, then $x^2 + 4y^2 =$
(a) 4 (b) −4
(c) ±4 (d) None of these

RESPONSE GRID

1. (a)(b)(c)(d) 2. (a)(b)(c)(d) 3. (a)(b)(c)(d) 4. (a)(b)(c)(d)

Space for Rough Work

FUNDAMENTALS - CALL - 9667772681

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5. The equation $\sin^4 x + \cos^4 x = a$ has a solution for
 (a) all of values of a (b) $a = -1$
 (c) $a = -\frac{1}{2}$ (d) $\frac{1}{2} \leq a \leq 1$
6. If for $n \in \mathbb{N}$, $f_n(\theta) = \tan \theta/2 (1 + \sec \theta) (1 + \sec 2\theta) (1 + \sec 4\theta) \dots (1 + \sec 2^n \theta)$, then correct statement is
 (a) $f_2(\pi/16) = 1$ (b) $f_3(\pi/32) = 1$
 (c) $f_4(\pi/64) = 1$ (d) All of these
7. The expression $\frac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x}$ is equal to
 (a) $\cos 2x$ (b) $2\cos x$
 (c) $\cos^2 x$ (d) $1 + \cos x$
8. If $\alpha, \beta, \gamma \in \left(0, \frac{\pi}{2}\right)$, then $\frac{\sin(\alpha + \beta + \gamma)}{\sin \alpha + \sin \beta + \sin \gamma}$ is
 (a) < 1 (b) > 1
 (c) $= 1$ (d) None of these
9. The value of $\left(1 + \cos \frac{\pi}{10}\right) \left(1 + \cos \frac{3\pi}{10}\right) \left(1 + \cos \frac{7\pi}{10}\right) \left(1 + \cos \frac{9\pi}{10}\right)$ is
 (a) $\frac{1}{8}$ (b) $\frac{1}{16}$
 (c) $\frac{1}{32}$ (d) None of these
10. If $\sin A - \sqrt{6} \cos A = \sqrt{7} \cos A$, then $\cos A + \sqrt{6} \sin A$ is equal to
 (a) $\sqrt{6} \sin A$ (b) $\sqrt{7} \sin A$
 (c) $\sqrt{6} \cos A$ (d) $\sqrt{7} \cos A$
11. General solution of the equation $(\sqrt{3} - 1) \sin \theta + (\sqrt{3} + 1) \cos \theta = 2$ is
 (a) $2n\pi \pm \frac{\pi}{4} + \frac{\pi}{12}$ (b) $n\pi + (-1)^n \frac{\pi}{2}$
 (c) $2n\pi \pm \frac{\pi}{4} - \frac{\pi}{12}$ (d) None
12. The least positive non-integral solution of the equation $\sin \pi(x^2 + x) = \sin \pi x^2$ is
 (a) rational
 (b) irrational of the form $\sqrt{p}$
 (c) irrational of the form $\frac{\sqrt{p}-1}{4}$, where p is an odd integer
 (d) irrational of the form $\frac{\sqrt{p}+1}{4}$, where p is an even integer
13. If A and B are positive acute angles satisfying $3 \cos^2 A + 2 \cos^2 B = 4$ and $\frac{3 \sin A}{\sin B} = \frac{2 \cos B}{\cos A}$, Then the value of $A + 2B$ is equal to :
 (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{2}$
 (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$
14. The greatest and least value of $\sin x \cos x$ are
 (a) $1, -1$ (b) $\frac{1}{2}, -\frac{1}{2}$
 (c) $\frac{1}{4}, -\frac{1}{4}$ (d) $2, -2$

RESPONSE
GRID

5. (a)(b)(c)(d) 6. (a)(b)(c)(d) 7. (a)(b)(c)(d) 8. (a)(b)(c)(d) 9. (a)(b)(c)(d)
 10. (a)(b)(c)(d) 11. (a)(b)(c)(d) 12. (a)(b)(c)(d) 13. (a)(b)(c)(d) 14. (a)(b)(c)(d)

Space for Rough Work

15. If $\tan(\cot x) = \cot(\tan x)$, then

(a) $\sin 2x = \frac{2}{(2n+1)\pi}$ (b) $\sin x = \frac{4}{(2n+1)\pi}$

(c) $\sin 2x = \frac{4}{(2n+1)\pi}$ (d) None of these

16. $\sin \theta = \frac{1}{2} \left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} \right)$ necessarily implies :

(a) $x > y$ (b) $x < y$

(c) $x = y$

(d) both x and y are purely imaginary

17. If $p_n = \cos^n \theta + \sin^n \theta$, then $p_n - p_{n-2} = kp_{n-4}$, where :

(a) $k = 1$ (b) $k = -\sin^2 \theta \cos^2 \theta$

(c) $k = \sin^2 \theta$ (d) $k = \cos^2 \theta$

18. If $f(x) = \cos(\log x)$ then

$f(x)f(y) - \frac{1}{2} \left\{ f\left(\frac{x}{y}\right) + f(xy) \right\}$ is equal to :

(a) 0

(b) 1

(c) -1

(d) none of these

19. **Statement-1** : The maximum and minimum values of the function

$f(x) = \frac{1}{6 \sin x - 8 \cos x + 5}$ does not exist

Statement-2 : The given function is an unbounded function.

(a) Statement - 1 is false, Statement-2 is true

(b) Statement - 1 is true, Statement-2 is true ; Statement-2 is a correct explanation for Statement-1

(c) Statement - 1 is true, Statement-2 is true ; Statement-2 is not a correct explanation for Statement-1

(d) Statement - 1 is true, Statement-2 is false

20. If θ is an angle given by $\cos \theta = \frac{\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma}{\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma}$

where α, β, γ are the equal angles made by a line with the positive directions of the axes, then the measure of θ is

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

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

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

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

21. $\sin 12^\circ \sin 24^\circ \sin 48^\circ \sin 84^\circ =$

(a) $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ$

(b) $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$

(c) $\frac{3}{15}$

(d) None of these

22. If $S_n = \cos^n \theta + \sin^n \theta$ then the value of $3S_4 - 2S_6$ is given by

(a) 4

(b) 0

(c) 1

(d) 7

23. The set of all x in $(-\pi, \pi)$ satisfying $|4 \sin x - 1| < \sqrt{5}$ is given by

(a) $\left(-\frac{\pi}{10}, \frac{3\pi}{10}\right)$

(b) $\left(-\frac{\pi}{10}, \pi\right)$

(c) $(-\pi, \pi)$

(d) $\left(-\pi, \frac{3\pi}{10}\right)$

24. Let $f(x) = \frac{\sin x}{\sqrt{1 + \tan^2 x}} - \frac{\cos x}{\sqrt{1 + \cot^2 x}}$ then range of $f(x)$ is

(a) $[-1, 0]$

(b) $[0, 1]$

(c) $[-1, 1]$

(d) none of these

RESPONSE
GRID

15. (a) (b) (c) (d)

16. (a) (b) (c) (d)

17. (a) (b) (c) (d)

18. (a) (b) (c) (d)

19. (a) (b) (c) (d)

20. (a) (b) (c) (d)

21. (a) (b) (c) (d)

22. (a) (b) (c) (d)

23. (a) (b) (c) (d)

24. (a) (b) (c) (d)

Space for Rough Work

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25. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then $\frac{\tan x}{\tan y}$ is equal to

- (a) $\frac{b}{a}$ (b) $\frac{a}{b}$
(c) ab (d) None of these

26. **Statement-1:** If α and β are two distinct solutions of the equation $a \cos x + b \sin x = c$, then $\tan\left(\frac{\alpha+\beta}{2}\right)$ is independent of c .

Statement-2: Solution of $a \cos x + b \sin x = c$ is possible, if

$$-\sqrt{a^2+b^2} \leq c \leq \sqrt{a^2+b^2}$$

- (a) Statement -1 is true, Statement-2 is true; Statement -2 is a correct explanation for Statement-1
(b) Statement -1 is true, Statement-2 is true; Statement -2 is not a correct explanation for Statement-1
(c) Statement -1 is false, Statement-2 is true
(d) Statement -1 is true, Statement-2 is false
27. The value of $\tan^2 \theta \sec^2 \theta (\cot^2 \theta - \cos^2 \theta)$ is
- (a) 0 (b) 1
(c) -1 (d) $\frac{1}{2}$

28. If $\cos \theta + \cos 2\theta + \cos 3\theta = 0$, then the general value of θ is :

- (a) $\theta = 2m\pi \pm 2\pi/3$ (b) $\theta = 2m\pi \pm \pi/4$
(c) $\theta = m\pi + (-1)^n 2\pi/3$ (d) $\theta = m\pi + (-1)^n \pi/3$

29. The maximum value of $\sin\left(x + \frac{\pi}{6}\right) + \cos\left(x + \frac{\pi}{6}\right)$ is in the interval $\left(0, \frac{\pi}{2}\right)$ if the value of x is

- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{12}$
(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

30. If $\alpha, \beta, \gamma, \delta$ are the smallest positive angles in ascending order of magnitude which have their sines equal to the positive number x , then the value of

$$4 \sin \frac{\alpha}{2} + 3 \sin \frac{\beta}{2} + 2 \sin \frac{\gamma}{2} + \sin \frac{\delta}{2}$$

- is equal to
- (a) $2\sqrt{1-x}$ (b) $2\sqrt{1+x}$
(c) $2\sqrt{x}$ (d) None of these

RESPONSE
GRID

25. (a)(b)(c)(d)
30. (a)(b)(c)(d)

26. (a)(b)(c)(d)

27. (a)(b)(c)(d)

28. (a)(b)(c)(d)

29. (a)(b)(c)(d)

DAILY PRACTICE PROBLEM DPP CHAPTERWISE 3 - MATHEMATICS

Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	40	Qualifying Score	58
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct $\times$ 4) – (Incorrect $\times$ 1)			

Space for Rough Work