

# DPP - Daily Practice Problems

## Chapter-wise Sheets

# MATHEMATICS (CM03)

SYLLABUS : 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)

- If  $y = \cos^2 x + \sec^2 x$ , then
  - $y \leq 2$
  - $y \leq 1$
  - $y \geq 2$
  - $1 < y < 2$
- Period of  $\frac{\sin \theta + \sin 2\theta}{\cos \theta + \cos 2\theta}$  is
  - $2\pi$
  - $\pi$
  - $\frac{2\pi}{3}$
  - $\frac{\pi}{3}$
- If an angle  $\theta$  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. 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)  $\frac{1}{2} \leq a \leq 1$

5. 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

6. 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)  $1 + \cos x$ .

7. 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

8. 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)  $\sqrt{7} \cos A$

9. General solution of the equation

$$(\sqrt{3} - 1)\sin \theta + (\sqrt{3} + 1)\cos \theta = 2 \text{ is}$$

- (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

10. The least positive non-integral solution of the equation

$$\sin \pi(x^2 + x) = \sin \pi x^2 \text{ is}$$

- (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

11. If A and B are positive acute angles satisfying

$$3 \cos^2 A + 2 \cos^2 B = 4 \text{ and } \frac{3 \sin A}{\sin B} = \frac{2 \cos B}{\cos A},$$

Then the value of  $A + 2B$  is equal to :

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

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

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

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

12. 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

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

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

(a) 0

(b) 1

(c) -1

(d) none of these

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

(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

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

16. 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

17. 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

18. If  $\cos \theta + \cos 2\theta + \cos 3\theta = 0$ , then the general value of  $\theta$  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)  $\theta = m\pi + (-1)^n \pi/3$

19. 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)  $\frac{\pi}{4}$

20. 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

### PART-II (Numeric/Integer Type Questions)

21. If  $2y \cos \theta = x \sin \theta$  and  $2x \sec \theta - y \operatorname{cosec} \theta = 3$ , then

$$x^2 + 4y^2 =$$

22. The value of

$$4 \left( 1 + \cos \frac{\pi}{10} \right) \left( 1 + \cos \frac{3\pi}{10} \right) \left( 1 + \cos \frac{7\pi}{10} \right) \left( 1 + \cos \frac{9\pi}{10} \right) \text{ is}$$

23. The sum of greatest and least value of  $\sin x \cos x$  are

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

25. The value of  $\tan^2 \theta \sec^2 \theta (\cot^2 \theta - \cos^2 \theta)$  is

**DAILY PRACTICE PROBLEM DPP CHAPTERWISE 3 - MATHEMATICS**

Total Questions	25	Total Marks	100
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	30	Qualifying Score	48
Success Gap = Net Score – Qualifying Score			
Net Score = $[(\text{Correct} \times 4) - (\text{Incorrect} \times 1)]_{\text{for part-I}} + [(\text{correct} \times 4)]_{\text{for part-II}}$			