EXERCISE - O

SINGLE CORRECT TYPE QUESTIONS

1. If $\sin x + \sin^2 x = 1$, then the value of $\cos^2 x + \cos^4 x$ is -

(A) 0 (B) 2 (C) 1 (D) 3

MTR001

2. The value of $\sin 10° + \sin 20° + \sin 30° + \ldots + \sin 360°$ is equal to -

(A) 0 (B) 1 (C) $\sqrt{3}$ (D) 2

MTR002

3. If $\cos x + \cos y + \cos\alpha = 0$ and $\sin x + \sin y + \sin\alpha = 0$, then $\cot\left(\frac{x+y}{2}\right) =$

(A) $\sin\alpha$ (B) $\cos\alpha$ (C) $\cot\alpha$ (D) $2\sin\alpha$

MTR003

4. $\frac{\sin(A-C)+2\sin A+\sin(A+C)}{\sin(B-C)+2\sin B+\sin(B+C)}$ is equal to -

(A) $\tan A$ (B) $\frac{\sin A}{\sin B}$ (C) $\frac{\cos A}{\cos B}$ (D) $\frac{\sin C}{\cos B}$

MTR004

5. The expression $\frac{\sin 8\theta\cos\theta - \sin 6\theta\cos 3\theta}{\cos 2\theta\cos\theta - \sin 3\theta\sin 4\theta}$ is equals -

(A) $\tan\theta$ (B) $\tan 2\theta$ (C) $\sin 2\theta$ (D) $\cos 2\theta$

MTR005

6. $\frac{1+\sin 2\theta+\cos 2\theta}{1+\sin 2\theta-\cos 2\theta} =$

(A) $\frac{1}{2}\tan\theta$ (B) $\frac{1}{2}\cot\theta$ (C) $\tan\theta$ (D) $\cot\theta$

MTR006

7. If $A = \tan 6° \tan 42°$ and $B = \cot 66° \cot 78°$, then -

(A) $A = 2B$ (B) $A = 1/3B$ (C) $A = B$ (D) $3A = 2B$

MTR007

8. In a right angled triangle, the hypotenuse is $2\sqrt{2}$ times the perpendicular drawn from the opposite vertex. Then the other acute angles of the triangle are

(A) $\frac{\pi}{3}$ and $\frac{\pi}{6}$ (B) $\frac{\pi}{8}$ and $\frac{3\pi}{8}$ (C) $\frac{\pi}{4}$ and $\frac{\pi}{4}$ (D) $\frac{\pi}{5}$ and $\frac{3\pi}{10}$

MTR008

9. If $\tan\alpha = (1 + 2^{-x})^{-1}$, $\tan\beta = (1 + 2^{x+1})^{-1}$, then $\alpha + \beta =$

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

MTR009

10. If $\tan B = \frac{n\sin A\cos A}{1-n\cos^2 A}$ then $\tan(A + B)$ equals

(A) $\frac{\sin A}{(1-n)\cos A}$ (B) $\frac{(n-1)\cos A}{\sin A}$ (C) $\frac{\sin A}{(n-1)\cos A}$ (D) $\frac{\sin A}{(n+1)\cos A}$

MTR010

11. The value of $\operatorname{cosec}\frac{\pi}{18}-\sqrt{3}\sec\frac{\pi}{18}$ is a

(A) surd
(B) rational which is not integral
(C) negative integer
(D) natural number

MTR011

12. The value of $\cot x+\cot(60°+x)+\cot(120°+x)$ is equal to :

(A) $\cot 3x$ (B) $\tan 3x$ (C) $3\tan 3x$ (D) $\frac{3-9\tan^2 x}{3\tan x-\tan^3 x}$

MTR012

13. If $\frac{5\pi}{2}<x<3\pi$, then the value of the expression $\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}$ is

(A) $-\cot\frac{x}{2}$ (B) $\cot\frac{x}{2}$ (C) $\tan\frac{x}{2}$ (D) $-\tan\frac{x}{2}$

MTR013

14. The value of $\cot 7\frac{1}{2}^{o}+\tan 67\frac{1}{2}^{o}-\cot 67\frac{1}{2}^{o}-\tan 7\frac{1}{2}^{o}$ is :

(A) a rational number
(B) irrational number
(C) $2(3+2\sqrt{3})$
(D) $2(3-\sqrt{3})$

MTR014

15. If $x+y=3-\cos 4\theta$ and $x-y=4\sin 2\theta$ then

(A) $x^4+y^4=9$ (B) $\sqrt{x}+\sqrt{y}=16$
(C) $x^3+y^3=2(x^2+y^2)$ (D) $\sqrt{x}+\sqrt{y}=2$

MTR015

16. If $\tan A+\tan B+\tan C=\tan A.\tan B.\tan C$, then -

(A) A, B, C must be angles of a triangle
(B) the sum of any two of A, B, C is equal to the third
(C) $A+B+C$ must be n integral multiple of π
(D) None of these

MTR016

17. If $f(x)=\frac{\sin 3x}{\sin x}$, $x\neq n\pi$, then the range of values of $f(x)$ for real values of x is -

(A) $[-1,3]$ (B) $(-\infty,-1]$ (C) $(3,+\infty)$ (D) $[-1,3)$

MTR017

18. Maximum and minimum value of $2\sin^2\theta-3\sin\theta+2$ is -

(A) $\frac{1}{4},-\frac{7}{4}$ (B) $\frac{1}{4},\frac{21}{4}$ (C) $\frac{21}{4},-\frac{3}{4}$ (D) $7,\frac{7}{8}$

MTR018

19. For $\theta\in(0,\pi/2)$, the maximum value of $\sin\left(\theta+\frac{\pi}{6}\right)+\cos\left(\theta+\frac{\pi}{6}\right)$ is attained at θ =

(A) $\frac{\pi}{12}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

MTR019

20. Minimum value of the expression $\cos^2\theta-(6\sin\theta\cos\theta)+3\sin^2\theta+2$, is -

(A) $4+\sqrt{10}$ (B) $4-\sqrt{10}$ (C) 0 (D) 4

MTR020

MULTIPLE CORRECT TYPE QUESTIONS

21. If $\cos x = \tan x$, then which of the following is/are true ?

(A) $\frac{1}{\sin x} + \cos^4 x = 1$ (B) $\frac{1}{\sin x} + \cos^4 x = 2$ (C) $\cos^4 x + \cos^2 x = 1$ (D) $\cos^4 x + \cos^2 x = 2$

MTR045

22. If $\cos(A-B) = \frac{3}{5}$ and $\tan A \tan B = 2$, then which of the following is/are correct ?

(A) $\cos A \cos B = -\frac{1}{5}$ (B) $\sin A \sin B = \frac{2}{5}$ (C) $\cos(A+B) = -\frac{1}{5}$ (D) $\sin A \cos B = \frac{4}{5}$

MTR046

23. If $\sin t + \cos t = \frac{1}{5}$, then $\tan\frac{t}{2}$ is equal to

(A) –1 (B) $-\frac{1}{3}$ (C) 2 (D) $-\frac{1}{6}$

MTR047

24. If $3\sin\beta = \sin(2\alpha + \beta)$, then $\tan(\alpha + \beta) - 2\tan\alpha$ is

(A) independent of α (B) independent of β

(C) dependent of both α and β (D) independent of α but dependent of β

MTR048

25. If $x + y = z$, then $\cos^2 x + \cos^2 y + \cos^2 z - 2\cos x \cos y \cos z$ is equal to

(A) $\cos^2 z$ (B) $\sin^2 z$ (C) $\cos(x + y - z)$ (D) 1

MTR051

26. If $L = \cos^2 84° + \cos^2 36° + \cos 36° \cos 84°$

$M = \cot 73° \cot 47° \cot 13°$

$N = 4\sin 156° \sin 84° \sin 36°$, then which of the following option(s) is(are) correct ?

(A) $L < 1$ (B) $M > \tan 2$ (C) $N > \sin\frac{\pi}{4}$ (D) 0 < LMN

MTR049

27. If $P_n = \cos^n\theta + \sin^n\theta$ and $Q_n = \cos^n\theta - \sin^n\theta$, then which of the following is/are true.

(A) $P_n - P_{n-2} = -\sin^2\theta \cos^2\theta\, P_{n-4}$ (B) $Q_n - Q_{n-2} = -\sin^2\theta \cos^2\theta\, Q_{n-4}$

(C) $P_4 = 1 - 2\sin^2\theta \cos^2\theta$ (D) $Q_4 = \cos^2\theta - \sin^2\theta$

MTR054

28. If $\alpha + \beta + \gamma = 2\pi$, then

(A) $\tan\frac{\alpha}{2} + \tan\frac{\beta}{2} + \tan\frac{\gamma}{2} = \tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$ (B) $\tan\frac{\alpha}{2}\tan\frac{\beta}{2} + \tan\frac{\beta}{2}\tan\frac{\gamma}{2} + \tan\frac{\gamma}{2}\tan\frac{\alpha}{2} = 1$

(C) $\tan\frac{\alpha}{2} + \tan\frac{\beta}{2} + \tan\frac{\gamma}{2} = -\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$ (D) $\tan\frac{\alpha}{4}\tan\frac{\beta}{4} + \tan\frac{\beta}{4}\tan\frac{\gamma}{4} + \tan\frac{\gamma}{4}\tan\frac{\alpha}{4} = 1$

MTR050

29. Let $y = \frac{\cos x + \cos 2x + \cos 3x + \cos 4x + \cos 5x + \cos 6x + \cos 7x}{\sin x + \sin 2x + \sin 3x + \sin 4x + \sin 5x + \sin 6x + \sin 7x}$, then which of the following hold good?

(A) The value of y when $x = \pi/8$ is not defined.

(B) The value of y when $x = \pi/16$ is 1.

(C) The value of y when $x = \pi/32$ is $\sqrt{2} - 1$.

(D) The value of y when $x = \pi/48$ is $2 + \sqrt{3}$.

MTR053

30. Let $f_n(\theta) = \sum_{r=0}^{n} \frac{1}{4^r}\sin^4\left(2^r\theta\right)$. Then which of the following alternative(s) is/are correct ?

(A) $f_2\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$ (B) $f_3\left(\frac{\pi}{8}\right) = \frac{2+\sqrt{2}}{4}$ (C) $f_4\left(\frac{3\pi}{2}\right) = 1$ (D) $f_5(\pi) = 0$

MTR052

COMPREHENSION TYPE QUESTIONS

Paragraph for Question No. 31 to 33

Consider the polynomial $P(x) = (x - \cos 36°)(x - \cos 84°)(x - \cos 156°)$

31. The coefficient of x^2 is

(A) 0 (B) 1 (C) $-\frac{1}{2}$ (D) $\frac{\sqrt{5}-1}{2}$

MTR055

32. The coefficient of x is

(A) $\frac{3}{2}$ (B) $-\frac{3}{2}$ (C) $-\frac{3}{4}$ (D) zero

MTR056

33. The absolute term in $P(x)$ has the value equal to

(A) $\frac{\sqrt{5}-1}{4}$ (B) $\frac{\sqrt{5}-1}{16}$ (C) $\frac{\sqrt{5}+1}{16}$ (D) $\frac{1}{16}$

MTR057

MATCHING LIST TYPE QUESTION

34.

	List-I		**List-II**
(I)	The value of $\tan 20° \cdot \tan 40° \cdot \tan 60° \cdot \tan 80°$ is	(P)	Odd natural Number
(II)	The value of $4\left(\sin^4\frac{\pi}{16}+\sin^4\frac{3\pi}{16}+\sin^4\frac{5\pi}{16}+\sin^4\frac{7\pi}{16}\right)$ is	(Q)	Even natural Number
(III)	$\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha = \lambda\cot\lambda\alpha$ then λ is	(R)	3
(IV)	$(4\cos^2 9° - 3)(4\cos^2 27° - 3) = \tan k°$, then k is	(S)	6
		(T)	1
		(U)	9

Which of the following is **CORRECT** ?

(A) (I) → (P,R) ; (II) → (Q,S) ; (III) → (P,T) ; (IV) → (P, U)
(B) (I) → (P,T) ; (II) → (Q,R) ; (III) → (P,U) ; (IV) → (R, U)
(C) (I) → (R,S) ; (II) → (T,U) ; (III) → (P,T) ; (IV) → (P, Q)
(D) (I) → (P,R) ; (II) → (P,U) ; (III) → (Q,S) ; (IV) → (S, T)

MTR058

MATRIX MATCH TYPE QUESTION

35. In the following matrix match **Column-I** has some quantities and **Column-II** has some comments or other quantities.

Match the each element in **Column-I** with corresponding element(s) in **Column-II**

	Column-I		**Column-II**
(A)	The value of $\left\|4\left(2\cos^3\frac{\pi}{7}-\cos^2\frac{\pi}{7}-\cos\frac{\pi}{7}\right)\right\|$ is	(P)	4
(B)	If $A + B + C = \pi$ and $\cos A = \cos B \cdot \cos C$ then $\tan B \cdot \tan C$ has the value equal to	(Q)	8
(C)	$4\left(\frac{\cos 20° + 8\sin 70°\sin 50°\sin 10°}{\sin^2 80°}\right)$ is equal to	(R)	2
(D)	The maximum value of $12\sin\theta - 9\sin^2\theta$ is	(S)	1
		(T)	6

MTR059