[SINGLE CORRECT CHOICE TYPE]

1. $16\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{16\pi}{15}$

(A) 0 (B) –1 (C) –2 (D) 1

2. The value of $64\sqrt{3}\sin\frac{\pi}{48}\cos\frac{\pi}{48}\cos\frac{\pi}{24}\cos\frac{\pi}{12}\cos\frac{\pi}{6}$ is

(A) 8 (B) 6 (C) 4 (D) 12

3. If $P = \text{cosec}\frac{\pi}{8} + \text{cosec}\frac{2\pi}{8} + \text{cosec}\frac{3\pi}{8} + \text{cosec}\frac{13\pi}{8} + \text{cosec}\frac{14\pi}{8} + \text{cosec}\frac{15\pi}{8}$ & $Q = 8\sin\frac{\pi}{18}\sin\frac{5\pi}{18}\sin\frac{7\pi}{18}$, then value of P + Q is

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

4. Let $f(\theta) = \sum_{r=1}^{9}(\sin(2r-1)\theta + \cos 2r\theta)$ and $\sin\frac{\pi}{18} = a$, then $f\left(\frac{\pi}{18}\right)$ is equal to

(A) $\frac{1+a}{a}$ (B) $\frac{a}{1+a}$ (C) $\frac{1-2a}{1+a}$ (D) $\frac{1-a}{a}$

5. In the interval $\left(\frac{31\pi}{4}, \frac{33\pi}{4}\right)$, the expression $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta}$ is

(A) always positive (B) always negative (C) some times positive (D) can't say

6. The exact value of $\frac{60\sin 82^\circ \sin 51^\circ \sin 47^\circ}{\sin 16^\circ + \sin 78^\circ + \sin 86^\circ}$ is -

(A) 12 (B) 15 (C) 16 (D) 20

[MULTIPLE CORRECT CHOICE TYPE]

7. $\cos\frac{\pi}{15}\cos\frac{2\pi}{15}\cos\frac{3\pi}{15}\cos\frac{4\pi}{15}\cos\frac{5\pi}{15}\cos\frac{6\pi}{15}\cos\frac{7\pi}{15} =$

(A) $\frac{1}{128}$ (B) $e^{-7\log 2}$

(C) 2^{-7} (D) 1551

8. In ΔABC, tanB + tanC = 5 and tanA tanC = 3, then

(A) ΔABC is acute angled triangle

(B) ΔABC is obtuse angled triangle

(C) sum of all possible values of tanA is 10

(D) sum of all possible values of tanA is 9

[MATRIX TYPE]

Q.9 has **four** statements (A,B,C and D) given in **Column-I** and **four** statements (P, Q, R and S) given in **Column-II**. Any given statement in **Column-I** can have correct matching with one or more statement(s) given in **Column-II.**

9.

	Column-I	**Column-II**
(A)	If the value of $(\tan 18°)(\sin 36°)(\cos 54°)(\tan 72°)(\tan 108°) \times (\cos 126°)(\sin 144°)(\tan 162°)(\cos 180°)$ is $k \sin^2 18°$, then 'k' has the value equal to	(P) $\frac{1}{2}$
(B)	If $\sin^3 x \cos 3x + \cos^3 x \sin 3x = \frac{3}{8}$, then the value of $\sin 4x$ is	(Q) $\frac{3}{4}$
(C)	For all permissible values of x, the maximum value of the $f(x) = \frac{5\sin^3 x \cos x}{\tan^2 x + 1}$, is	(R) $\frac{5}{4}$
		(S) $\frac{5}{8}$

10.

	Column-I	**Column-II**
(A)	If $2^{2013} - 2^{2012} - 2^{2011} + 2^{2010} = k.2^{2010}$ then k form pythagorean triplet with	(P) 3
(B)	If $N = \frac{1}{2\sin 10°} - 2\sin 70°$; then $\text{antilog}_5 N$ is twin prime with	(Q) 4
(C)	The value of $\frac{\sqrt{1-\sin\frac{\pi}{5}}}{\sqrt{1+\sin\frac{\pi}{5}}} + \frac{2\sin\frac{\pi}{10}}{\sin\frac{\pi}{10}+\cos\frac{\pi}{10}}$ is relatively prime with	(R) 5
(D)	If $x = \sqrt[3]{\sqrt{108}+10} - \sqrt[3]{\sqrt{108}-10}$ then $x^3 + 6x$ is divisible by	(S) 6
		(T) 7

[SUBJECTIVE]

11. If m and n are positive integers satisfying $1 + \cos 2\theta + \cos 4\theta + \cos 6\theta + \cos 8\theta + \cos 10\theta = \frac{\cos m\theta \cdot \sin n\theta}{\sin \theta}$ then find the value of $(m + n)$.

12. Let $f(\theta) = \cot\left(\frac{\theta}{2}\right)(\sec\theta - 1)(1 + \sec 2\theta)(\sec 4\theta - 1)$ and $f\left(\frac{\pi}{16}\right) = a - \sqrt{b}$ (where a & b are coprime numbers), then the value of (5a – b) is

13. Number of integers in the range of $\frac{\sin 3x - \sin 2x}{\sin x}$ is

14. If $\theta \neq (2n+1)\frac{\pi}{2}, n \in I$ where the minimum value of $\tan^2\theta - \sec\theta + 2$ is k, then 4k is equal to

15. If A,B,C are the angles (in radian) of triangle ABC, such that

$\cos(A - B)\sin C + \cos^2(A - B).\ \sin^2 C + \cos^3(A - B)\sin^3 C = 3,$

then the value of $\frac{4}{\pi}(A + 2B + 3C)$ is

Answers

RACE # 23

1. (D) **2.** (B) **3.** (B) **4.** (D) **5.** (B) **6.** (B) **7.** (ABC) **8.** (A,C)
9. A–R, B–P, C–S **10.** A-QR; B-PT; C-PQRST; D-QR **11.** 11 **12.** 7 **13.** 6
14. 4 **15.** 9