[SINGLE CORRECT CHOICE TYPE]

1. Maximum value of the expression $\cos\theta \cdot \sin\left(\theta - \frac{\pi}{6}\right)$ $\forall\ \theta \in R$, is

(A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{4}$ (C) $\frac{1}{4}$ (D) 1

2. If x and y are real numbers such that $x^2 + y^2 = 8$, the maximum possible value of $x - y$, is

(A) 2 (B) $\sqrt{2}$ (C) $\frac{\sqrt{2}}{2}$ (D) 4

3. The lease value of the expression $\frac{3\sin^4\theta + 3\cos^4\theta}{1 - \sin^6\theta - \cos^6\theta}$ is

(A) 1 (B) 2 (C) 3 (D) 4

4. The smallest value of $5\cos\theta + 12$ is

(A) 5 (B) 12 (C) 7 (D) 17

5. The maximum value of $3\cos x + 4\sin x + 5$ is

(A) 5 (B) 6 (C) 7 (D) None of these

6. The maximum value of $4\sin^2 x + 3\cos 2x$ is

(A) 1 (B) 2 (C) 3 (D) 4

7. If $y = \cos^2 x + \sec^2 x$, then

(A) $y \le 2$ (B) $y \le 1$ (C) $y \ge 2$ (D) $1 < y < 2$

8. The maximum value of $5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3$ is

(A) 5 (B) 11 (C) 10 (D) –1

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

(A) $x = \frac{\pi}{12}$ (B) $x = \frac{\pi}{6}$ (C) $x = \frac{\pi}{3}$ (D) $x = \frac{\pi}{2}$

10. The number of values of x for which $f(x) = \cos x + \cos(\sqrt{2}x)$ attains its maximum values is

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

SUBJECTIVE TYPE QUESTIONS

11. If $A + B + C = \pi$, prove that $\cos A + \cos B - \cos C = -1 + 4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

12. If $A + B + C = \pi$, prove that

(A) $\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2\cos A\cos B\cos C$. (B) $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2\sin A\sin B\cos C$.

13. If A + B + C = π, prove that

$$\cos\frac{A}{2}+\cos\frac{B}{2}+\cos\frac{C}{2}=4\cos\left(\frac{\pi-A}{4}\right)\cos\left(\frac{\pi-B}{4}\right)\cos\left(\frac{\pi-C}{4}\right)$$

14. If A + B + C = π, prove that

$$\sin\frac{A}{2}+\sin\frac{B}{2}+\sin\frac{C}{2}=1+4\sin\left(\frac{\pi-A}{4}\right)\sin\left(\frac{\pi-B}{4}\right)\sin\left(\frac{\pi-C}{4}\right)$$

15. If A + B + C = π. Prove that $\frac{\cot A+\cot B}{\tan A+\tan B}+\frac{\cot B+\cot C}{\tan B+\tan C}+\frac{\cot C+\cot A}{\tan C+\tan A}=1$

16. Prove that tan(x – y) + tan (y – z) + tan (z – x) = tan (x – y) tan(y – z) tan(z – x).

17. If A + B + C = π. Prove that $\frac{\cos A}{\sin B\sin C}+\frac{\cos B}{\sin C\sin A}+\frac{\cos C}{\sin A\sin B}=2$

18. If A + B + C = π, prove that
sin (B + C – A) + sin (C + A – B) – sin (A + B – C) = 4 cos A cos B sin C

19. In a triangle ABC, tan A + tan B + tan C = 6 and tan A tan B = 2, then find values of tan A, tan B and tan C –

20. If A + B + C = 180°, then the value of (cot B + cot C) (cot C + cotA) (cotA + cot B) will be

Answers

RACE # 22

1. (C) **2.** (D) **3.** (B) **4.** (C) **5.** (D) **6.** (D) **7.** (C) **8.** (C) **9.** (A) **10.** (B)
19. 2,1,3 **20.** cosec A cosec B cosec C