EXERCISE – I

SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. The general solution of the equation, $2\cos 2x = 3.2\cos^2 x - 4$ is

(A) $x = 2n\pi,\ n \in I$ (B) $x = n\pi,\ n \in I$
(C) $x = n\pi/4,\ n \in I$ (D) $x = n\pi/2,\ n \in I$

2. The solution set of the equation

$4\sin\theta \cdot \cos\theta - 2\cos\theta - 2\sqrt{3}\sin\theta + \sqrt{3} = 0$ in the interval $(0, 2\pi)$ is

(A) $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$ (B) $\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}$

(C) $\left\{\frac{3\pi}{4}, \pi, \frac{\pi}{3}, \frac{5\pi}{3}\right\}$ (D) $\left\{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{11\pi}{6}\right\}$

3. Total number of solutions of $\sin x \cdot \tan 4x = \cos x$ belonging to $(0, \pi)$ are

(A) 4 (B) 7 (C) 8 (D) 5

4. All solutions of the equation, $2\sin\theta + \tan\theta = 0$ are obtained by taking all integral values of m and n in

(A) $2n\pi + \frac{2\pi}{3},\ n \in I$

(B) $n\pi$ or $2m\pi \pm \frac{2\pi}{3}$ where $n, m \in I$

(C) $n\pi$ or $m\pi \pm \frac{\pi}{3}$ where $n, m \in I$

(D) $n\pi$ or $2m\pi \pm \frac{\pi}{3}$ where $n, m \in I$

5. The most general solution of $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$ is

(A) $n\pi + \frac{7\pi}{4},\ n \in I$ (B) $n\pi + (-1)^n\frac{7\pi}{4},\ n \in I$

(C) $2n\pi + \frac{7\pi}{4},\ n \in I$ (D) None of these

6. If $2\cos^2(\pi + x) + 3\sin(\pi + x)$ vanishes then the values of x lying in the interval from 0 to 2π are

(A) $y = \pi/6$ or $5\pi/6$ (B) $x = \pi/3$ or $5\pi/3$
(C) $x = \pi/4$ or $5\pi/4$ (D) $x = \pi/2$ or $5\pi/2$

7. If $20\sin^2\theta + 21\cos\theta - 24 = 0$ & $\frac{7\pi}{4} < \theta < 2\pi$ then the values of $\cot\frac{\theta}{2}$ is

(A) 3 (B) $\frac{\sqrt{15}}{3}$ (C) $-\frac{\sqrt{15}}{3}$ (D) – 3

8. If $x \in \left[0, \frac{\pi}{2}\right]$, the number of solutions of the equation, $\sin 7x + \sin 4x + \sin x = 0$ is

(A) 3 (B) 5 (C) 6 (D) None of these

9. The general solution of $\sin x + \sin 5x = \sin 2x + \sin 4x$ is

(A) $2n\pi$; $n \in I$ (B) $n\pi$; $n \in I$
(C) $n\pi/3$; $n \in I$ (D) $2n\pi/3$; $n \in I$

10. A triangle ABC is such that $\sin(2A + B) = \frac{1}{2}$. If A, B, C are in A.P. then the angle A, B, C are respectively

(A) $\frac{5\pi}{12}, \frac{\pi}{4}, \frac{\pi}{3}$ (B) $\frac{\pi}{4}, \frac{\pi}{3}, \frac{5\pi}{12}$ (C) $\frac{\pi}{3}, \frac{\pi}{4}, \frac{5\pi}{12}$ (D) $\frac{\pi}{3}, \frac{5\pi}{12}, \frac{\pi}{4}$

11. $\frac{\cos 3\theta}{2\cos 2\theta - 1} = \frac{1}{2}$ if

(A) $\theta = n\pi + \frac{\pi}{3},\ n \in I$ (B) $\theta = 2n\pi \pm \frac{\pi}{3},\ n \in I$

(C) $\theta = 2n\pi \pm \frac{\pi}{6},\ n \in I$ (D) $\theta = n\pi + \frac{\pi}{6},\ n \in I$

12. $\frac{\sin 3\theta}{2\cos 2\theta + 1} = \frac{1}{2}$ if

(A) $\theta = n\pi + \frac{\pi}{6},\ n \in I$ (B) $\theta = 2n\pi - \frac{\pi}{6},\ n \in I$

(C) $\theta = n\pi + (-1)^n\frac{\pi}{6},\ n \in I$ (D) $\theta = n\pi - \frac{\pi}{6},\ n \in I$

13. If $\cos 2\theta + 3\cos\theta = 0$ then

(A) $\theta = 2n\pi \pm \alpha$ where $\alpha = \cos^{-1}\left(\frac{\sqrt{17}-3}{4}\right)$

(B) $\theta = 2n\pi \pm \alpha$ where $\alpha = \cos^{-1}\left(\frac{-\sqrt{17}-3}{4}\right)$

(C) $\theta = 2n\pi \pm \alpha$ where $\alpha = \cos^{-1}\left(\frac{\pm\sqrt{17}-3}{4}\right)$

(D) None of these

14. If $\sin\theta + 7\cos\theta = 5$, then $\tan(\theta/2)$ is a root of the equation
(A) $x^2 - 6x + 1 = 0$ (B) $6x^2 - x - 1 = 0$
(C) $6x^2 + x + 1 = 0$ (D) $x^2 - x + 6 = 0$

15. The general solution of the equation

$\tan x + \tan\left(x+\frac{\pi}{3}\right) + \tan\left(x+\frac{2\pi}{3}\right) = 3$ is

(A) $\frac{n\pi}{4}+\frac{\pi}{12}$, $n \in I$ (B) $\frac{n\pi}{3}+\frac{\pi}{6}$, $n \in I$

(C) $\frac{n\pi}{3}+\frac{\pi}{12}$, $n \in I$ (D) None of these

16. The general solution of the equation
$\tan^2\alpha + 2\sqrt{3}\tan\alpha = 1$ is given by

(A) $\alpha = \frac{n\pi}{2}$, $n \in I$ (B) $\alpha = (2n+1)\frac{\pi}{2}$, $n \in I$

(C) $\alpha = (6n+1)\frac{\pi}{12}$, $n \in I$ (D) $\alpha = \frac{n\pi}{12}$, $n \in I$

17. $\sin 3\theta = 4\sin\theta \cdot \sin 2\theta \cdot \sin 4\theta$ in $0 \le \theta \le \pi$ has
(A) 2 real solutions (B) 4 real solutions
(C) 6 real solutions (D) 8 real solutions

18. General solution of the equation, $\cot 3\theta - \cot\theta = 0$ is

(A) $\theta = (2n-1)\frac{\pi}{2}$, $n \in I$ (B) $\theta = (2n-1)\frac{\pi}{4}$, $n \in I$

(C) $\theta = (2n-1)\frac{\pi}{3}$, $n \in I$ (D) None of these

19. The set of values of x for which $\frac{\tan 3x - \tan 2x}{1+\tan 3x \tan 2x} = 1$ is
(A) ϕ (B) $(\pi/4)$
(C) $\{n\pi + \pi/4 \mid n = 1, 2, 3.......\}$
(D) $\{2n + \pi/4 \mid n = 1, 2, 3 ....\}$

20. The number of integral values of a for which the equation $\cos 2x + a\sin x = 2a - 7$ possesses a solution is
(A) 2 (B) 3 (C) 4 (D) 5

21. The principal solution set of the equation,
$2\cos x = \sqrt{2+2\sin 2x}$ is

(A) $\left\{\frac{\pi}{8}, \frac{13\pi}{8}\right\}$ (B) $\left\{\frac{\pi}{4}, \frac{13\pi}{8}\right\}$

(C) $\left\{\frac{\pi}{4}, \frac{13\pi}{10}\right\}$ (D) $\left\{\frac{\pi}{8}, \frac{13\pi}{10}\right\}$

22. The number of solution of the equation
$|\sin x| = |\cos 3x|$ in $[-2\pi, 2\pi]$ is
(A) 32 (B) 28 (C) 24 (D) 30

23. The number of all possible triplets (a_1, a_2, a_3) such that : $a_1 + a_2\cos 2x + a_3\sin^2 x = 0$ for all x is
(A) 0 (B) 1 (C) 2 (D) infinite

24. The value 'a' for which the equation
$4\text{cosec}^2(\pi(a+x)) + a^2 - 4a = 0$ has a real solution is :
(A) a = 1 (B) a = 2 (C) a = 3 (D) None of these

25. If $2\tan^2 x - 5\sec x - 1 = 0$ has 7 different roots in $\left[0, \frac{n\pi}{2}\right]$, $n \in N$, then greatest value of n is
(A) 8 (B) 10 (C) 13 (D) 15

26. The solution of $|\cos x| = \cos x - 2\sin x$ is

(A) $x = n\pi$, $n \in I$ (B) $x = n\pi + \frac{\pi}{4}$, $n \in I$

(C) $x = n\pi + (-1)^n\frac{\pi}{4}$, $n \in I$ (D) $(2n+1)\pi + \frac{\pi}{4}$, $n \in I$

27. The number of solutions of
$\sin\theta + 2\sin 2\theta + 3\sin 3\theta + 4\sin 4\theta = 10$ in $(0, \pi)$ is
(A) 1 (B) 2 (C) 4 (D) 0

28. The arithmetic mean of the roots of the equation $4\cos^3 x - 4\cos^2 x - \cos(\pi + x) - 1 = 0$ in the interval $[0, 315]$ is equal to
(A) 49π (B) 50π (C) 51π (D) 100π

29. The values of x between 0 and 2π which satisfy the equation $\sin x \cdot \sqrt{8\cos^2 x} = 1$ are in A.P. The common difference of the A.P. is

(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{4}$ (C) $\frac{3\pi}{8}$ (D) $\frac{3\pi}{4}$