1. If ABCD is a cyclic quadrilateral such that $12\tan A - 5 = 0$ and $5\cos B + 3 = 0$ then the quadratic equation whose roots are cos C, and tan D is-
(1) $39x^2 - 16x - 48 = 0$
(2) $39x^2 + 88x + 48 = 0$
(3) $39x^2 - 88x + 48 = 0$
(4) None of these

2. $\cos(\alpha+\beta) = \frac{1}{e}$, $\cos(\alpha-\beta) = 1$ find no. of ordered pair of (α,β), $-\pi \le \alpha, \beta < \pi$
(1) 0 (2) 1 (3) 2 (4) 4

3. If θ & ϕ are acute angles such that $\sin\theta = \frac{1}{2}$ and $\cos\phi = \frac{1}{3}$ then $\theta + \phi$ lies in-
(1) $\left(\frac{\pi}{3},\frac{\pi}{2}\right]$ (2) $\left(\frac{\pi}{2},\frac{2\pi}{3}\right]$
(3) $\left(\frac{2\pi}{3},\frac{5\pi}{6}\right]$ (4) $\left(\frac{\pi}{6},\pi\right]$

4. The value of $\cos\frac{2\pi}{7}+\cos\frac{4\pi}{7}+\cos\frac{6\pi}{7}+\cos\frac{7\pi}{7}$ is-
(1) 1 (2) –1
(3) 1/2 (4) –3/2

5. If $\cot\alpha$ equals the integral solution of the inequality $4x^2 - 16x + 15 < 0$ and $\sin\beta$ equals to the slope of the bisector of the first quadrant, then $\sin(\alpha+\beta)\sin(\alpha-\beta)$ is equal to-
(1) –3/5 (2) –4/5
(3) $2/\sqrt{5}$ (4) 3

6. If $\sin x + \cos x = a$, $a \in [-\sqrt{2}, \sqrt{2}] - \{-1, 1\}$, then $\sum_{n=1}^{\infty}(\sin^n x + \cos^n x)$ is equal to -
(1) $\frac{2(1+a-a^2)}{(a+1)^2}$ (2) $\frac{2(a^2-a+1)}{(a-1)^2}$
(3) $\frac{2(a^2-a+1)}{(a+1)^2}$ (4) $\frac{2(1+a-a^2)}{(a-1)^2}$

7. If $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{a + b\tan^2 2\theta}{1 + c\tan^2 2\theta + d\tan^4 2\theta}$ (where $\theta \ne \frac{n\pi}{16}$, $n \in I$), then value of $(a-b+c-d)$ is -
(1) 0 (2) 1 (3) 7 (4) 13

8. If $\alpha, \beta, \gamma, \delta$ are the smallest positive angles in ascending order of magnitude which have their sines equal to the positive quantity k, 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 :-
(1) $2\sqrt{(1-k)}$ (2) $\frac{1}{2}\sqrt{(1+k)}$
(3) $2\sqrt{(1+k)}$ (4) None of these

9. The sum of the maximum and minimum values of the function $f(x) = \frac{1}{1+(2\cos x - 4\sin x)^2}$ is :-
(1) $\frac{22}{21}$ (2) $\frac{21}{20}$ (3) $\frac{22}{20}$ (4) $\frac{21}{11}$

10. In ΔABC $\sin^2 A + \sin^2 B + \sin^2 C = 2$ then triangle is :-
(1) Equilateral (2) Right angle
(3) Isosceles (4) None

11. The value of expression
$$\frac{2(\sin 1° + \sin 2° + \sin 3° + ... + \sin 89°)}{2(\cos 1° + \cos 2° + ... + \cos 44°) + 1}$$ equals:-
(1) $\sqrt{2}$ (2) $1/\sqrt{2}$
(3) 1/2 (4) 0

12. Let $x = \sin 1°$, then the value of the expression :-
$$\frac{1}{\cos 0°.\cos 1°} + \frac{1}{\cos 1°.\cos 2°} + \frac{1}{\cos 2°.\cos 3°} + \dots + \frac{1}{\cos 44°.\cos 45°}$$ is equal to
(1) x (2) 1/x
(3) $\sqrt{2}/x$ (4) $x/\sqrt{2}$

13. Value of $\frac{3+\cot 80^\circ \cot 20^\circ}{\cot 80^\circ + \cot 20^\circ}$ is equal to :-

(1) cot 20° (2) tan 50°
(3) cot 50° (4) $\cot\sqrt{20^\circ}$

14. The value of :-

$\sin\frac{\pi}{14}\sin\frac{3\pi}{14}\sin\frac{5\pi}{14}\sin\frac{7\pi}{14}\sin\frac{9\pi}{14}\sin\frac{11\pi}{14}\sin\frac{13\pi}{14}$ is equal to

(1) $\frac{1}{8}$ (2) $\frac{1}{16}$ (3) $\frac{1}{32}$ (4) $\frac{1}{64}$

15. The value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + ... + \sin^2 85^\circ$ is equal to :-

(1) 7 (2) $8\frac{1}{2}$ (3) 9 (4) $9\frac{1}{2}$

16. $\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha$:-
(1) tan α (2) tan 2α (3) cot α (4) cot 2α

17. $\sin^4\frac{\pi}{8} + \sin^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8} =$

(1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{3}{2}$ (4) $\frac{3}{4}$

18. The maximum value of the expression $\frac{1}{\sin^2\theta + 3\sin\theta\cos\theta + 5\cos^2\theta}$ is

(1) 2 (2) $\frac{1}{2}$
(3) 1 (4) None of these

19. If $\sin x + \sin^2 x + \sin^3 x = 1$, then $\cos^6 x - 4\cos^4 x + 8\cos^2 x =$:-
(1) 3 (2) 4 (3) 2 (4) 1

20. If α is the common positive root of the equation $x^2 - ax + 12 = 0$, $x^2 - bx + 15 = 0$ and $x^2 - (a+b)x + 36 = 0$ and $\cos x + \cos 2x + \cos 3x = \alpha$, then $\sin x + \sin 2x + \sin 3x =$ ....
(1) 3 (2) –3
(3) 0 (4) none of these

21. If $\cos\alpha + \cos\beta = a$, $\sin\alpha + \sin\beta = b$, then $\cos(\alpha+\beta)$ is equal to :-

(1) $\frac{2ab}{a^2+b^2}$ (2) $\frac{a^2+b^2}{a^2-b^2}$

(3) $\frac{a^2-b^2}{a^2+b^2}$ (4) $\frac{b^2-a^2}{b^2+a^2}$

22. Which of the following is correct :-
(1) sin1 > sin2 > sin3 (2) sin1 < sin2 < sin3
(3) sin1 < sin3 < sin2 (4) sin3 < sin1 < sin2

23. The maximum value of $12\sin\theta - 9\sin^2\theta$ is :-
(1) 3 (2) 4
(3) 5 (4) None of these

24. If $y = 9\sec^2 x + 16\,\text{cosec}^2 x$, find the minimum value of y for all permissible value of x.
(1) 49 (2) 50 (3) 24 (4) 25

25. log (sin 1º) log (sin 2º) log (sin 3º) ...... log(sin 179º) is equal to –
(1) 1 (2) 0 (3) 2 (4) –1

26. If A = sin 45° + cos 45° and B = sin 44° + cos 44°, then:-
(1) A > B (2) A < B
(3) A = B (4) None of these

27. If in a ΔABC, ∠C = 90º, then the maximum value of sin A sin B is –

(1) $\frac{1}{2}$ (2) 1
(3) 2 (4) None of these

28. If tan x + tan y = 25 and cot x + cot y = 30, then the value of tan(x + y) is
(1) 150 (2) 200 (3) 250 (4) 100

29. If the maximum value of $y = \frac{7+6\tan x - \tan^2 x}{(1+\tan^2 x)}$ is λ then the value of $\log_{\sqrt{2}}(\lambda)$ is

(1) 0 (2) 6
(3) 8 (4) 1

30. If $0 < \theta < \pi$, then minimum value of $3\sin\theta + \text{cosec}^3\theta$ is :-
(1) 4 (2) 3 (3) 5 (4) 6

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	1	4	2	4	2	4	2	3	1	2
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	1	2	2	4	2	3	3	1	2	3
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	3	4	2	1	2	1	1	1	2	1