TRANSFORMATIONS

SYNOPSIS

- • Sin (A + B) + Sin (A - B) = 2 SinA CosB
  • Sin (A + B) - Sin (A - B) = 2 CosA Sin B
  • Cos (A + B) + Cos (A - B) = 2 CosA CosB
  • Cos (A - B) - Cos (A + B) = 2 Sin A Sin B
- • SinC+ Sin D = 2 Sin $\left(\frac{C+D}{2}\right)$ Cos$\left(\frac{C-D}{2}\right)$

  • SinC - Sin D = 2 Cos$\left(\frac{C+D}{2}\right)$ Sin $\left(\frac{C-D}{2}\right)$

  • CosC+CosD=2 Cos$\left(\frac{C+D}{2}\right)$ Cos$\left(\frac{C-D}{2}\right)$

  • CosC-CosD = -2Sin$\left(\frac{C+D}{2}\right)Sin\left(\frac{C-D}{2}\right)$

  $= 2\text{Sin}\left(\frac{C+D}{2}\right)\text{Sin}\left(\frac{D-C}{2}\right)$
- • $\sin 9^0 = \frac{1}{4}\left[\sqrt{3+\sqrt{5}} - \sqrt{5-\sqrt{5}}\right] =$

  $= \sqrt{\frac{4-\sqrt{10}+2\sqrt{5}}{8}} =$

  $= \frac{1}{4}\sqrt{8-2\sqrt{10+2\sqrt{5}}} = \cos 81^0$

  • $\cos 9^0 = \frac{1}{4}\left[\sqrt{3+\sqrt{5}} + \sqrt{5-\sqrt{5}}\right] =$

  $=$

  $\sqrt{\frac{4+\sqrt{10+2\sqrt{5}}}{8}} = \frac{1}{4}\sqrt{8+2\sqrt{10+2\sqrt{5}}}$

  $= \sin 81^0$

  • $\cos x.\cos 2x.\cos 4x.....\cos(2^n x) =$

  $\frac{1}{2^{n+1}}\frac{\sin\left(2^{n+1}x\right)}{\sin x}$

  • $\sin\frac{\pi}{n} + \sin\frac{3\pi}{n} + \sin\frac{5\pi}{n} + ...$ n terms $= 0$

  • $\sin\alpha + \sin(\alpha+\beta) + \sin(\alpha+2\beta) + ..$ to

  n terms $= \frac{\sin(n\beta/2)}{\sin(\beta/2)} \cdot \sin\left(\frac{2\alpha+(n-1)\beta}{2}\right)$

  • $\forall x \in R$, $\tan x + \frac{1}{2}\tan\frac{x}{2} + \frac{1}{2^2}$.

  $\tan\frac{x}{2^2} + ... + \frac{1}{2^{n-1}}\tan\left(\frac{x}{2^{n-1}}\right)$ is equal to

  $\frac{1}{2^{n-1}}\cot\left(\frac{x}{2^{n-1}}\right) - 2\cot 2x$
- • α, β are the solutions of $a\cos\theta + b\sin\theta = c$

  $\Rightarrow$

  • $\tan\left(\frac{\alpha+\beta}{2}\right) = \frac{b}{a}$ ii. $\sin(\alpha+\beta) = \frac{2ab}{a^2+b^2}$

  • $\cos(\alpha+\beta) = \frac{a^2-b^2}{a^2+b^2}$

  • $\tan(\alpha+\beta) = \frac{2ab}{a^2-b^2}$

OBJECTIVE TYPE QUESTIONS
EXERCISE - I
LEVEL - I

1. $\sin 6\theta - \sin 2\theta =$

   1. $2\sin 6\theta\cos 4\theta$ 2. $2\cos 4\theta\sin 2\theta$
   3. $2\sin 4\theta\cos 6\theta$ 4. $2\sin 4\theta\cos 2\theta$
2. $\sin A + \sin 3A + \sin 5A + \sin 7A =$

   1. $4\sin A\cos 2A\cos 4A$
   2. $4\sin A\cos 2A\cos 2A$
   3. $4\cos A\sin 2A\sin 4A$
   4. $4\cos A\cos 2A\sin 4A$
3. $4\cos 6\theta\cos 4\theta\cos 2\theta =$

   1. $\cos 12\theta + \cos 8\theta + \cos 4\theta + 1$
   2. $\cos 12\theta + \cos 8\theta - \cos 4\theta + 1$
   3. $\cos 12\theta - \cos 8\theta + \cos 4\theta + 1$
   4. $\cos 12\theta - \cos 8\theta - \cos 4\theta - 1$
4. $Sin\frac{\theta}{2}.Sin\frac{7\theta}{2} + Sin\frac{3\theta}{2}.Sin\frac{11\theta}{2} - \sin 2\theta.\sin 5\theta = Z$

   1. 0 2.1 3.-1 4. 2
5. $2(1-2\sin^2\theta)\cos 4\theta =$

   1. $\sin 6\theta + \cos 2\theta$ 2. $\sin 6\theta + \sin 2\theta$
   3. $\cos 6\theta + \cos 2\theta$ 4. $\cos 6\theta + \sin 2\theta$

6. $\left(2\cos^2 3\theta - 1\right)\cos 5\theta =$

1. $\frac{1}{2}\left[\cos 11\theta + \cos\theta\right]$ 2. $\frac{1}{2}\left[\sin 11\theta + \sin\theta\right]$

3. $\frac{1}{2}\left[\sin 11\theta + \cos\theta\right]$ 4. $\frac{1}{2}\left[\cos 11\theta + \sin\theta\right]$

7. $\cos 25^0 - \cos 65^0 =$

1. $\sqrt{2}\cos 20^0$ 2. $\sqrt{2}\sin 20^0$

3. $\sqrt{3}\cos 20^0$ 4. $\sqrt{3}\sin 20^0$

8. $\sin 65^0 + \sin 25^0 =$

1. $\sqrt{2}\cos 20^0$ 2. $\sqrt{2}\sin 20^0$

3. $\sqrt{3}\cos 20^0$ 4. $\sqrt{3}\sin 20^0$

9. $\cos 40^0 + \cos 80^0 + \cos 160^0 =$

1. 2 2. 1 3. 0 4. 3

10. $\sin 47^0 - \sin 25^0 + \sin 61^0 - \sin 11^0 =$

1. $\sin 7^0$ 2. $\cos 7^0$ 3. $2\sin 7^0$ 4. $\cos 7^0$

11. $\sin 10^0 + \sin 20^0 + \sin 40^0 + \sin 50^0$ - $\sin 70^0 - \sin 80^0 =$

1. 1/2 2. 0 3. -1/2 4. 1

12. $\cot 16^0 + \cot 44^0 + \cot 44^0.\cot 76^0$ - $\cot 76^0.\cot 16^0 =$

1. 3 2. 0 3. 1 4. 4

13. $\cos 48^0.\cos 12^0 =$

1. $\frac{1+\sqrt{5}}{8}$ 2. $\frac{1-\sqrt{5}}{8}$

3. $\frac{\sqrt{5}-1}{8}$ 4. $\frac{\sqrt{5}+1}{8}$

14. $\sin 48^0.\sin 12^0 =$

1. $\frac{\sqrt{5}+1}{8}$ 2. $\frac{1+\sqrt{5}}{8}$

3. $\frac{1-\sqrt{5}}{8}$ 4. $\frac{\sqrt{5}-1}{8}$

15. $\cos 66^0 + \sin 84^0 =$

1. $\frac{\sqrt{15}-\sqrt{3}}{4}$ 2. $\frac{\sqrt{15}-3}{4}$

3. $\frac{\sqrt{15}+\sqrt{3}}{4}$ 4. $\frac{\sqrt{15}+3}{4}$

16. $\cos 66^0 + \cos 6^0 =$

1. $\frac{\sqrt{3}\left(\sqrt{5}-1\right)}{4}$ 2. $\frac{\sqrt{2}\left(\sqrt{5}+1\right)}{4}$

3. $\frac{\sqrt{2}\left(\sqrt{5}-1\right)}{4}$ 4. $\frac{\sqrt{3}\left(\sqrt{5}+1\right)}{4}$

17. $\sin 24^0 + \cos 6^0 =$

1. $\frac{\sqrt{15}+\sqrt{3}}{4}$ 2. $\frac{\sqrt{15}+3}{4}$

3. $\frac{\sqrt{15}-3}{4}$ 4. $\frac{\sqrt{15}-\sqrt{3}}{4}$

18. $2\cos\theta - \cos 3\theta - \cos 5\theta - 16\cos^3\theta.\sin^2\theta =$

1. 2 2. 0 3. 1 4. -1

19. $4\sin\left(420^0 - \alpha\right)\cos\left(60^0 + \alpha\right) =$

1. $\sqrt{3} - 2\sin 2\alpha$ 2. $\sqrt{3} + 2\sin 2\alpha$

3. $\sqrt{3} - 2\cos 2\alpha$ 4. $\sqrt{3} + 2\cos 2\alpha$

20. $\cos 20^0.\cos 40^0.\cos 60^0.\cos 80^0 =$

1. 3/16 2. 1/32 3. 1/16 4. 1/8

21. $\cos 6^0.\sin 24^0.\cos 72^0 =$

1. -1/8 2. 1/8 3. -1/4 4. 1/4

22. $\cos^2 76^0 + \cos^2 16^0 - \cos 76^0.\cos 16^0 =$

1. 1/2 2. -1/4 3. 0 4. 3/4

23. $\cos 10^0.\cos 30^0.\cos 50^0.\cos 70^0 =$

1. 3/16 2. 1/16 3. 1/8 4. 1/32

24. $Cos^2\left(45^0 - \alpha\right) + \cos^2\left(15^0 + \alpha\right) - \cos^2\left(15^0 - \alpha\right) =$

1. 0 2. 1 3. 1/2 4. 2

25. $4\left(\cos 66^0 + \sin 84^0\right) =$

1. $\sqrt{5} - 1$ 2. $\sqrt{3}\left(\sqrt{5} - 1\right)$

3. $\left(\sqrt{5} + 1\right)$ 4. $\sqrt{3}\left(\sqrt{5} + 1\right)$

26. $\frac{\cos\left(45^0 + A\right) - Cos\left(45^0 - A\right)}{\sin\left(120^0 + A\right) - \sin\left(120^0 - A\right)} =$

1. 2 2. $\sqrt{2}$ 3. $2\sqrt{2}$ 4. $\pm\sqrt{2}$

27. $\frac{\cos 6x + 6\cos 4x + 15\cos 2x + 10}{\cos 5x + 5\cos 3x + 10\cos x} =$

1. $2\cos x$ 2. $2\sin x$ 3. $\cos x$ 4. $\sin x$

28. $\frac{\sin\alpha.\sin 3\alpha + \sin 3\alpha.\sin 7\alpha + \sin 5\alpha.\sin 15\alpha}{\sin\alpha.\cos 3\alpha + \sin 3\alpha\cos 7\alpha + \sin 5\alpha.\cos 15\alpha} =$

1. $\sin\left(11\alpha\right)$ 2. $\cot\left(11\alpha\right)$

3. $\cos\left(11\alpha\right)$ 4. $\tan\left(11\alpha\right)$

29. $\frac{1-\cos A+\cos B-\cos(A+B)}{1+\cos A-\cos B-\cos(A+B)}=$

1. $\sin\frac{A}{2}.\cos\frac{B}{2}$ 2. $\sec\frac{A}{2}\cos ec\frac{B}{2}$

3. $\tan\frac{A}{2}.\cot\frac{B}{2}$ 4. $2\sin\frac{A}{2}.\cos\frac{B}{2}$

30. $\frac{\sin A+\sin 5A+\sin 9A}{\cos A+\cos 5A+\cos 9A}=$

1. tan 3A 2. tan 5A 3. tan 4A 4. tan 2A

31. $\frac{\cos^2 33^0-\cos^2 57^0}{\sin 21^0-\cos 21^0}=$

1. $-1/\sqrt{2}$ 2. $1/2$ 3. $1/\sqrt{2}$ 4. $-1/2$

32. $\sin\alpha+\sin\beta=a,\ \cos\alpha+\cos\beta=b$

$\Rightarrow\cos(\alpha+\beta)=$

1. $\frac{a^2+b^2}{2ab}$ 2. $\frac{2ab}{a^2+b^2}$

3. $\frac{b^2-a^2}{b^2+a^2}$ 4. $\frac{ab}{a^2+b^2}$

33. $\sin\alpha+\sin\beta=a,\ \cos\alpha+\cos\beta=b$

$\Rightarrow\sin(\alpha+\beta)=$

1. ab 2. a+b 3. $\frac{2ab}{a^2-b^2}$ 4. $\frac{2ab}{a^2+b^2}$

34. $\left(1+\sqrt{1+a}\right)\tan\alpha=1+\sqrt{1-a}\Rightarrow\sin 4\alpha=$

1. -1 2. a 3. 1 4. 0

35. $\pi<\alpha-\beta<3\pi$, $\sin\alpha+\sin\beta=\frac{-21}{65}$,

$\cos\alpha+\cos\beta=\frac{-27}{65}\Rightarrow\cos\left(\frac{\alpha-\beta}{2}\right)=$

1. $\frac{-6}{65}$ 2. $\frac{-3}{\sqrt{130}}$ 3. $\frac{3}{\sqrt{130}}$ 4. $\frac{6}{65}$

36. $\cos x+\cos y=\frac{4}{5},\ \cos x-\cos y=\frac{2}{7}$

$\Rightarrow 14\tan\left(\frac{x-y}{2}\right)+5\cot\left(\frac{x+y}{2}\right)=$

1. 0 2. 1/4 3. 5/4 4. 3/4

37. $\sin x+\sin y=\frac{1}{4},\ \sin x-\sin y=\frac{1}{5}$

$\Rightarrow 4\cot\left(\frac{x-y}{2}\right)=$

1. $5\cot\left(\frac{x-y}{2}\right)$ 2. $5\tan\left(\frac{x-y}{2}\right)$

3. $5\cot\left(\frac{x+y}{2}\right)$ 4. $5\tan\left(\frac{x+y}{2}\right)$

38. $\cos x+\cos y=1/3,\ \sin x+\sin y=1/4$

$\Rightarrow\sin(x+y)$

1. 7/25 2. 25/24 3. 25/7 4. 24/25

39. $\sin 85^0-\sin 35^0-\cos 65^0$

1. 0 2. 1 3. 2 4. 3

40. If n is an odd integer then

$\left(\frac{\cos A+\cos B}{\sin A-\sin B}\right)^n+\left(\frac{\sin A+\sin B}{\cos A-\cos B}\right)^n=$

1. 0 2. $\cot^n\left(\frac{A+B}{2}\right)$

3. $\cot^n\left(\frac{A-B}{2}\right)$ 4. $2\tan^n\left(\frac{A+B}{2}\right)$

41. $\frac{\sin(x+y)}{\sin(x-y)}=\frac{a+b}{a-b}\Rightarrow\frac{\tan x}{\tan y}=$

1. b/a 2. a/b 3. 1 4. 0

42. $\cos 2B=\frac{\cos(A+C)}{\cos(A-C)}\Rightarrow\tan A,\tan B,\tan C$ are in

1. A.P. 2. H.P 3. G.P. 4. None

43. $\sin x+\sin y=3(\cos y-\cos x)$

$\Rightarrow\sin 3x+\sin 3y=$

1. -1 2. 1 3. 2 4. 0

44. $m.\tan(\theta-30^0)=n.\tan(\theta+120^0)$,

$\Rightarrow\cos 2\theta=$

1. $\frac{m-n}{2(m-n)}$ 2. $\frac{m+n}{2(m-n)}$

3. $\frac{m-n}{2(m+n)}$ 4. $\frac{m-n}{2(m+n)}$

45. $\sin\theta=n\sin(\theta+2\alpha)\Rightarrow(1-n)\tan(\theta+\alpha)=$

1. $(n+1)\tan\alpha$ 2. $(n+1)\tan\beta$

3. $(n-1)\tan\alpha$ 4. $(n-1)\tan\beta$

46. $\tan(\alpha+\theta)=n.\tan(\alpha-\theta),\Rightarrow(n+1)\sin 2\theta=$

1. $(n+1)\sin 2\alpha$ 2. $(n+1)\sin 2\beta$
3. $(n-1)\sin 2\alpha$ 4. $(n-1)\sin 2\beta$

47. $\cos\theta=\dfrac{\cos\alpha-\cos\beta}{1-\cos\alpha.\cos\beta}\Rightarrow\tan^2\left(\dfrac{\theta}{2}\right)\tan^2\left(\dfrac{\beta}{2}\right)=$

1. $\tan\dfrac{\alpha}{2}$ 2. $\tan^2\dfrac{\alpha}{2}$ 3. $\cot\dfrac{\alpha}{2}$ 4. $\cot^2\dfrac{\alpha}{2}$

48. $xy+yz+zx=1,\ \Rightarrow\dfrac{x}{1+x^2}+\dfrac{y}{1+y^2}+\dfrac{z}{1+z^2}=$

1. $\dfrac{2}{\sqrt{(1+x^2)(1-y^2)(1-z^2)}}$
2. $\dfrac{2}{\sqrt{(1-x^2)(1+y^2)(1-z^2)}}$
3. $\dfrac{2}{\sqrt{(1+x^2)(1+y^2)(1+z^2)}}$
4. $\dfrac{2}{\sqrt{(1-x^2)(1+y^2)(1+z^2)}}$

49. $\cot(15^0-A)+\tan(15^0+A)=$

1. $\dfrac{4\cos 2A}{1+2\cos 2A}$ 2. $\dfrac{4\cos 2A}{1-2\sin 2A}$
3. $\dfrac{4\cos 2A}{1+2\sin 2A}$ 4. $\dfrac{4\cos 2A}{1-2\cos 2A}$

50. $x=\cos 55^0, y=\cos 65^0,\ z=\cos 175^0$
$\Rightarrow xy+yz+zx=$
1. -3/4 2. 3/4 3. 3/2 4. 1/2

KEY

1) 2	2) 4	3) 1	4) 1
5) 3	6) 1	7) 2	8) 1
9) 3	10) 4	11) 2	12) 3
13) 2	14) 4	15) 3	16) 4
17) 1	18) 2	19) 1	20) 3
21) 2	22) 4	23) 1	24) 3
25) 4	26) 2	27) 1	28) 4
29) 3	30) 2	31) 1	32) 3
33) 4	34) 2	35) 2	36) 1
37) 3	38) 4	39) 1	40) 1
41) 2	42) 3	43) 4	44) 2
45) 1	46) 3	47) 2	48) 3
49) 2	50) 1		

LEVEL - II

1. $\cos ec\theta=\dfrac{p+q}{p-q}\Rightarrow\cot\left(\dfrac{\pi}{4}+\dfrac{\theta}{2}\right)=$

1. $\sqrt{q/p}$ 2. $\sqrt{p/q}$ 3. pq 4. $\sqrt{pq}$

2. $\cos\alpha+\cos\beta=a$, $\sin\alpha+\sin\beta=b$,

$\alpha-\beta=2\theta\Rightarrow\dfrac{\cos 3\theta}{\cos\theta}=$

1. $3-a^2-b^2$ 2. $\dfrac{a^2+b^2}{4}$
3. a^2+b^2-1 4. a^2+b^2-3

3. $16\sin 144^0.\sin 108^0.\sin 72^0.\sin 36^0=$
1. 5 2. 4 3. 3 4. 1

4. $\dfrac{x}{\tan(\theta+\alpha)}=\dfrac{y}{\tan(\theta+\beta)}=\dfrac{z}{\tan(\theta+\gamma)}$

$\Rightarrow\left(\dfrac{x+y}{x-y}\right)\sin^2(\alpha-\beta)+\left(\dfrac{y+z}{y-z}\right)\sin^2(\beta-\gamma)$

$+\left(\dfrac{z+x}{z-x}\right)\sin^2(\gamma-\alpha)=$

1. 1 2. -1 3. 0 4. 2

5. $x\tan\left(\theta-\dfrac{\pi}{6}\right)=y\tan\left(\theta+\dfrac{2\pi}{3}\right)\Rightarrow\dfrac{x+y}{x-y}=$

1. $\cos 2\theta$ 2. $2\cos 2\theta$
3. $\sin 2\theta$ 4. $2\sin 2\theta$

6. In a Quadrilateral ABCD,
$\cos A.\cos B+\sin C\sin D=$
1. $\cos C\cos D+\sin A\sin B$
2. $\cos C\cos D-\sin A\sin B$
3. $\sin C\sin D-\cos A\cos B$
4. $\sin A+\sin B+\sin C+\sin D$

7. $\dfrac{\sin(n+1)A+2\sin A+\sin(n-1)A}{\cos(n-1)A-\cos(n+1)A}=$

1. $\tan A/2$ 2. $\cot A/2$
3. tan A 4. cot A

8. $\dfrac{(\cos\alpha-\cos 3\alpha)(\sin 8\alpha+\sin 2\alpha)}{(\sin 5\alpha-\sin\alpha)(\cos 4\alpha-\cos 6\alpha)}=$ is

1. 1 2. -1 3. 2 4.-2

9. $\frac{\sin 6\theta + 6\cos 3\theta + 15\cos 2\theta + 10}{\cos 5\theta + 5\cos 3\theta + 10} =$

1. $\sin\theta$ 2. $\cos\theta$ 3. $2\sin\theta$ 4. $2\cos\theta$

10. $\frac{\sin 8\alpha\cos\alpha - \sin 6\alpha\cos 3\alpha}{\cos 2\alpha\cos\alpha - \sin 3\alpha\sin 4\alpha} =$

1. $\cot 2\alpha$ 2. $\tan 2\alpha$ 3. $\cos 2\alpha$ 4. $\sin 2\alpha$

11. $\cos\frac{\pi}{7} + \cos\frac{2\pi}{7} + \cos\frac{3\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{5\pi}{7}$

$+ \cos\frac{6\pi}{7} + \cos\frac{7\pi}{7} =$

1. 0 2. 1 3. -1 4. None

12. $\sin\alpha + \cos\alpha = m \Rightarrow \sin^6\alpha + \cos^6\alpha =$

1. $\frac{4 + 3\left(m^2 - 1\right)^2}{4}$ 2. $\frac{4 - 3\left(m^2 - 1\right)^2}{4}$

3. $\frac{3 + 4\left(m^2 - 1\right)^2}{4}$ 4. None

13. $\sin\frac{\pi}{4}.\sin\frac{3\pi}{4}.\sin\frac{5\pi}{4}.\sin\frac{7\pi}{4} =$

1. $\sqrt{2}/7$ 2. $1/4$ 3. $1/8$ 4. 1

14. $K = \sin\left(\frac{\pi}{18}\right)\sin\left(\frac{5\pi}{18}\right)\sin\left(\frac{7\pi}{18}\right) \Rightarrow K =$

1. 1/4 2. 1/6 3. 1/8 4. 1/2

15. $\sin\frac{\pi}{14}.\sin\frac{3\pi}{14}.\sin\frac{5\pi}{14}.\sin\frac{7\pi}{14}.\sin\frac{9\pi}{14}$.

$\sin\frac{11\pi}{14}.\sin\frac{13\pi}{14} =$

1. 1/64 2. 3/64 3. 5/64 4. 7/64

16. $\sin 81^0 =$

1. $\frac{\sqrt{3+\sqrt{5}} - \sqrt{5-\sqrt{5}}}{4}$

2. $\frac{\sqrt{3+\sqrt{5}} + \sqrt{5-\sqrt{5}}}{4}$

3. $\frac{\sqrt{3-\sqrt{5}} - \sqrt{5+\sqrt{5}}}{4}$

4. $\frac{\sqrt{3-\sqrt{5}} + \sqrt{5+\sqrt{5}}}{4}$

17. $\cos x + \cos y + \cos z = 0 =$

$\sin x + \sin y + \sin z \Rightarrow \cos^2\left(\frac{x-y}{2}\right)$

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{3}{4}$ 4. 1

18. $1 + \cos 2x + \cos 4x + \cos 6x$

$-4\cos x\cos 2x\cos 3x =$

1. 1 2. -1 3. 2 4. 0

19. $\cos 20^0\cos 100^0 + \cos 100^0.\cos 140^0$

$- \cos 140^0.\cos 200^0 =$

1. $\frac{3}{4}$ 2. $\frac{1}{4}$ 3. $-\frac{1}{4}$ 4. $-\frac{3}{4}$

20. $\sin 70^0.\sin 50^0 - \cos 85^0\cos 65^0 =$

1. 0 2. 1 3. $\frac{\sqrt{5}+1}{4}$ 4. $\frac{\sqrt{3}+1}{4}$

21. $\frac{\sin 3\theta - \sin\theta.\sin^2(2\theta)}{\sin\theta + \sin 2\theta.\cos\theta} = \cos x \Rightarrow x$

1. 4θ 2. 2θ 3. θ 4. 3θ

22. $\frac{\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2}}}}}{2} =$

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

3. $\cos\frac{\pi}{16}$ 4. $\cos\frac{\pi}{32}$

23. $\sin(y+z-x)$, $\sin(z+x-y)$,

$\sin(x+y-z)$ are in A.P. $\Rightarrow$

$\tan x$, $\tan y$, $\tan z$ are in

1. A.P. 2. G.P. 3. H.P. 4. None

24. $x\cos\theta = y\cos\left(\theta + \frac{2\pi}{3}\right) = z\cos\left(\theta + \frac{4\pi}{3}\right)$

$\Rightarrow xy + yz + zx =$

1. -1 2. 1 3. 0 4. 2

25. $2\sin^2\beta + 4\cos(\alpha+\beta)\sin\alpha\sin\beta$

$+ \cos\left[2(\alpha+\beta)\right] =$

1. $\cos 2\alpha$ 2. $\cos 2\beta$ 3. $\sin 2\alpha$ 4. $\sin 2\beta$

26. $\alpha = \frac{\pi}{21} \Rightarrow \frac{\sin 3\alpha - \sin 7\alpha}{\sin 24\alpha + \sin 14\alpha} =$

1. 0 2. 1 3. -1 4. 2

27. If $\cos(\theta-\alpha), \cos\theta, \cos(\theta+\alpha)$ are in H.P.

then $\cos\theta.\sec\frac{\alpha}{2} =$

1. $-\sqrt{2}$ 2. $\sqrt{2}$ 3. $\pm\sqrt{2}$ 4. 1

28. $\tan\theta_1 = K\cot\theta_2 \Rightarrow \frac{\cos(\theta_1 - \theta_2)}{\cos(\theta_1 + \theta_2)} =$

1. $\frac{1+K}{1-K}$ 2. $\frac{1-K}{1+K}$ 3. $\frac{K+1}{K-1}$ 4. $\frac{K-1}{K+1}$

KEY

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

EXERCISE - II
LEVEL -I

1. $A+B+C=180^0 \Rightarrow$
$\cos 2A+\cos 2B+\cos 2C=$
1. $1-4\sin A\sin B\sin C$
2. $1+4\sin A\sin B\sin C$
3. $1+4\cos A\cos B\cos C$
4. $-1-4\cos A\cos B\cos C$

2. $A+B+C=180^0 \Rightarrow$
$\cos^2 A+\cos^2 B+\cos^2 C=$
1. $1+2\cos A\cos B\cos C$
2. $1+2\sin A\sin B\sin C$
3. $1-2\cos A\cos B\cos C$
4. $1-2\sin A\sin B\sin C$

3. $A+B+C=180^0 \Rightarrow$
$\cos A-\cos B+\cos C=$
1. $1+4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$
2. $1+4\sin\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$
3. $-1+4\cos\frac{A}{2}\sin\frac{B}{2}\cos\frac{C}{2}$
4. $-1-4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

4. A+B+C = $180^0 \Rightarrow$
$\cos^2 2A+\cos^2 2B+\cos^2 2C=$
1. 1+2 sin A sin B sin C
2. 1+2 cos A cos B cos C
3. 1+2 sin 2A sin 2B sin 2C
4. 1+2 cos 2A cos 2B cos 2C

5. $A+B+C=180^0$
$\Rightarrow \cos^2\frac{A}{2}+\cos^2\frac{B}{2}+\cos^2\frac{C}{2}=$
1. $1+2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
2. $1+2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
3. $2+2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
4. $2+2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

6. $A+B+C=180^0$
$\Rightarrow \sin 2A-\sin 2B+\sin 2C=$
1. $2\sin A\cos B\sin C$
2. $2\cos A\sin B\cos C$
3. $2\sin A\cos B\sin C$
4. $4\cos A\sin B\cos C$

7. $A+B+C=180^0$ $\sin A+\sin B+\sin C=$
1. $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
2. $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
3. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
4. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

8. $A+B+C=180^0$ $\sin^2 A+\sin^2 B+\sin^2 C=$
1. $1+\cos A\cos B\cos C$
2. $1+\sin A\sin B\sin C$
3. $2(1+\cos A\cos B\cos C)$
4. $2(1+\sin A\sin B\sin C)$

9. $A+B+C=180^0 \Rightarrow$
$\sin^2\frac{A}{2}+\sin\frac{B}{2}+\sin^2\frac{C}{2}=$
1. $1+2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
2. $1+2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
3. $1-2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
4. $1-2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

10. $A+B+C=90^0 \Rightarrow \cos 2A+\cos 2B+\cos 2C=$

1. $1-4\cos A\cos B\cos C$
2. $1-4\sin A\sin B\sin C$
3. $1+4\cos A\cos B\cos C$
4. $1+4\sin A\sin B\sin C$

11. $A+B+C=90^0 \Rightarrow \cos^2 A+\cos^2 B+\cos^2 C=$

1. 1+2 sin Asin B sin C
2. 1+2 cosA cosB cos C
3. 2+2sinAsinB sinC
4. 2+2 cosAcosB cosC

12. $A+B+C=90^0 \Rightarrow \sin 2A+\sin 2B-\sin 2C=$

1. 2 cos A cos B sinC
2. 2 sin A sin B sin C
3. 4 cos A cos B sin C
4. 4 sin A sin B cos C

13. $A+B+C=90^0 \Rightarrow \sin^2 A+\sin^2 B+\sin^2 C=$

1. 1+2 cos A cos B cos C
2. 1+2 sin A sin B sin C
3. 1-2 sin A sin B sin C
4. 1-2 cos A cos B cos C

14. $A+B+C=270^0 \Rightarrow \cos 2A+\cos 2B+\cos 2C=$

1. 1+4 cosA cos B cos C
2. 1+4 sin A sin B sin C
3. 1-4 cos A cos B cos C
4. 1-4 sin A sin B sin C

15. $A+B+C=270^0 \Rightarrow \cos^2 A+\cos^2 B-\cos^2 C=$

1. -2 sin A sin B cos C
2. -2 cos A cos B sin C
3. 2 sin A sin B cos C
4. 2 cosA cos B sin C

16. $A+B+C=270^0 \Rightarrow \sin 2A-\sin 2B+\sin 2C=$

1. 4 sin A cos B sin C
2. 4 cos A sin B cos C
3. -4 sin A cos B sin C
4. -4 cos A sin B cos C

17. $A+B+C=270^0 \Rightarrow \sin^2 A-\sin^2 B+\sin^2 C=$

1. 1-2cos A sin B cos C
2. 1-2 sin A cos B sin C
3. 1+ 2 cos A sin B cos C
4. 1+2 sin A cos B sin C

18. $A+B+C=0^0 \Rightarrow \cos^2 A+\cos^2 B+\cos^2 C=$

1. 1+2 cos A cos B cos C
2. 1+2 sin A sin B sin C
3. 1-2 cos A cos B cos C
4. 1-2 sin A sin B sin C

19. $A+B+C=0^0 \Rightarrow \sin A+\sin B+\sin C=$

1. $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
2. $-2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
3. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
4. $-4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

20. $A+B+C=0^0$

$\Rightarrow \sin^2 A-\sin^2 B+\sin^2 C=$

1. 1-cosA cos B cos C
2. 1+ cos A cos B cos C
3. 2(1+cos A cos B cos C)
4. 2 (1-cos A cos B cos C)

21. $A+B+C=2S \Rightarrow$

$\sin S.\sin(S-A)+\sin(S-B)-\sin(S-C)=$

1. sin A sin B
2. sin B sin C
3. sin C sin A
4. sin A sin B sin C

22. $A+B+C=2S \Rightarrow$

$\sin(S-A)+\sin(S-B)+\sin(S-C)-\sin S=$

1. $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
2. $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
3. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
4. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

23. $A+B+C=2S$

$\Rightarrow \sin^2 S-\sin^2(S-A)+\sin^2(S-B)-\sin^2(S-C)=$

1. 2 cos A sin B cos C
2. 2 sin A cos B sin C
3. 4 cos A sin B cos C
4. 4 sin A cos B sin C

24. $A+B+C=2S$

$\Rightarrow \cos S+\cos(S-A)+\cos(S-B)+\cos(S-C)=$

1. $2\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
2. $2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
3. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
4. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

25. $A+B+C=2S$

$\Rightarrow \cos(S-A)+\cos(S-B)+\cos C+1=$

1. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\left(\frac{S-C}{2}\right)$

2. $4\sin\frac{A}{2}\sin\frac{B}{2}\sin\left(\frac{S-C}{2}\right)$

3. $4\cos\left(\frac{S-A}{2}\right)\cos\left(\frac{S-B}{2}\right)\cos\frac{C}{2}$

4. $4\sin\left(\frac{S-A}{2}\right)\cos\left(\frac{S-B}{2}\right)\sin\frac{C}{2}$

KEY

1. 4	2. 3	3. 3	4. 4	5. 3
6. 4	7. 4	8. 3	9. 3	10. 4
11. 3	12. 4	13. 3	14. 4	15. 2
16. 3	17. 3	18. 1	19. 4	20. 4
21. 2	22. 4.	23. 2	24. 3	25. 3

LEVEL - II
(NEW PATTERN QUESTIONS)

1. I: $A+B+C=\pi$ and $\cos A=\cos B\cos C$ then

$\cos B\cot C=\frac{1}{3}$

II: If $5\sin B=\sin(2A+B)$ then

$2\tan(A+B)=3\tan A$

1. only I is true 2. only II is true
3. Both I and II are true
4. Neither I nor II are true

2. I: If $A+B+C=\frac{3\pi}{2}$ then

$\cos 2A+\cos 2B+\cos 2C+$

$+4\sin A\sin B\sin C=0$

II.If $A+B+C=0$, then

$\sin 2A+\sin 2B+\sin 2C$

$+\ 4\sin A\sin B\sin C=0$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

3. I: $\cos^2 76^0+\cos^2 16^0-\cos 76^0\cos 16^0=\frac{3}{4}$

II : $\cos 6^0\sin 24^0\cos 72^0=\frac{1}{8}$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

4. I: $4\left(\sin 24^0+\cos 6^0\right)=\sqrt{15}+\sqrt{3}$

II: $\sin 21^0\cos 9^0-\cos 84^0\cos 6^0=\frac{1}{4}$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

5. I : If $A+B+C=180^0$ then

$\cos 2A+\cos 2B+\cos 2C=$

$1-4\cos A\cos B\cos C$

II :If $A+B+C=0^0$ then

$\cos A+\cos B+\cos C=$

$-1+\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

6. I: $\sin\theta.\sin\left(60^0-\theta\right).\sin\left(60^0+\theta\right)=\frac{1}{4}\sin 3\theta$

II: $\cos\theta\cos\left(120^0-\theta\right)\cos\left(120^0+\theta\right)$

$=\frac{1}{4}\cos 3\theta$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

7. I: $\cos\theta.\cos\left(300^0-\theta\right).\cos\left(300^0+\theta\right)=\frac{1}{4}\cos 3\theta$

II : $\tan.\tan\left(60^0-\theta\right).\tan\left(60^0+\theta\right)=$

$\frac{1}{4}\tan 3\theta$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

8. I: $\cos x+\cos y=\frac{1}{3}$, $\sin x+\sin y=\frac{1}{4}$,

$\Rightarrow \cos(x+y)=\frac{-7}{25}$

II. $\sin x+\sin y=\frac{1}{4}, \sin x-\sin y=\frac{1}{5}$

then

$4\cot\left(\frac{x-y}{2}\right)=5\cot\left(\frac{x+y}{2}\right)$

1. only I is true
2. only II is true
3. Both I and II are true
4. Neither I nor II are true

9. I: If $A+B+C=180^0$ then

$\sin^2 A+\sin^2 B+\sin^2 C=$

$2(1+\cos A\cos B\cos C)$

II : If $A+B+C=180^0$ then

$\cos^2 A+\cos^1 B+\cos^2 C=$

$1-2\cos A\cos B\cos C$

1. only I is true 2. only II is true
3. Both I and II are true
4. Neither I nor II are true

10. I: $\cos 6^0\sin 24^0\cos 72^0=\frac{1}{8}$

II. $\cos 12^0\cos 24^0\cos 36^0\cos 48^0\cdot$

$\cos 72^0\cos 84^0=\frac{1}{64}$

1. only I is true 2. only II is true
3. Both I and II are true
4. Neither I nor II are true

11. If $A+B+C=180^0$ match the follwing.

List - I	List - II
1. cosA+cosB+cos C	a. 2+2cosAcosBcosC
2. $\sin^2 A+\sin^2 B+\sin^2 C$	b. $4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$
3. $\sin 2A+\sin 2B+\sin 2C$	c. $1+4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
4. sinA + sinB + Sin C	d. 4sinAsin B sinC

1. 1-c, 2-a, 3-d,4-b 2. 1-d,2-b, 3-a, 4-c
3. 1-a, 2-c, 3-b,4-d 4. 1-b,2-d,3-c,4-a

12. Match the follwing.

List - I	List - II
1. $\cos 6^0\sin 24^0\cos 72^0$	a. 3/16
2. $\cos 10^0\cos 30^0\cos 50^0\cos 70^0$	b. $\frac{1}{16}$
3. $\sin 12^0\sin 24^0\sin 48^0\sin 84^0$	c. $\frac{3}{16}$
4. $\sin 20^0\sin 40^0\sin 60^0\sin 80^0$	d. $\frac{1}{8}$

1. 1-c, 2-b, 3-a,4-d 2. 1-d,2-c, 3-b, 4-a
3. 1-d, 2-b, 3-a,4-c 4. 1-b,2-c,3-d,4-a

13. Match the follwing.

List - I	List - II
1. $\sin 48^0\sin 12^0$	a. $\frac{\sqrt{3}}{\sqrt{2}}$
2. $\cos 48^0\cos 12^0$	b. $\frac{\sqrt{15}+\sqrt{3}}{4}$
3. $\sin 75^0+\sin 15^0$	c. $\frac{\sqrt{5}-1}{8}$
4. $\sin 24^0+\cos 6^0$	d. $\frac{1-\sqrt{5}}{8}$

1. 1-b, 2-c, 3-a,4-d 2.1-d,2-b, 3-a, 4-c
3. 1-c, 2-d, 3-a,4-b 4.1-a,2-d,3-b,4-c

14. Match the following:

If $\cos x+\cos y=a$,

$\sin x-\sin y=b$ then match the following.

List - I	List - II
1. $\tan\left(\frac{x-y}{2}\right)$	a. $\frac{a^2-b^2}{a^2+b^2}$
2. $\sin(x-y)$	b. $\frac{2ab}{a^2-b^2}$
3. $\cos(x-y)$	c. b/a
4. $\tan(x-y)$	d. $\frac{2ab}{a^2+b^2}$

1. 1-c, 2-d, 3-a,4-b 2.1-b,2-c, 3-a, 4-d
3. 1-d, 2-a, 3-b,4-c 4.1-a,2-d,3-b,4-c

15. Match the following:

Sect - I	Sect - II
1. $\sin 20^0.\sin 40^0.\sin 80^0$	a. $1/64$
2. $\sin^2 20^0 + \sin^2 40^0 + \sin^2 80^0$	b. $3/2$
3. $\cos^3 20^0 + \cos^3 140^0 + \cos^3 160^0$	c. $\sqrt{3}/8$
4. $\sin 12^0.\sin 24^0 \sin 36^0.\sin 48^0 .\ \sin 72^0.\sin 84^0$	d. $3/8$

1. 1-b, 2-c, 3-d, 4-a 2. 1-c,2-d, 3-b,4-a
3. 1-d, 2-c, 3-a,4-b 4. 1-c,2-b,3-d,4-a

16. P = $\cos 20^0 \cos 40^0 \cos 60^0 \cos 80^0$,
Q = $\cos 6^0 \cos 42^0 \cos 66^0 \cos 78^0$
R = $\cos 36^0 \cos 72^0 \cos 108^0 \cos 144^0$ then
1. A > B > C 2. B > C > A
3. C > A > B 4. A = B = C

17. If A = $\sin 45^0 \sin 12^0$; B = $\cos 45^0 \cos 12^0$
C = $\cos 66^0 + \sin 84^0$ then descending order of these value is
1. C, A, B 2. B, A,C
3. A, C, B 4. A, B,C

18. A = $\cos 6^0 \sin 24^0 \cos 72^0$

B = $\dfrac{\cos^2 33^0 - \cos^2 57^0}{\sin 21^0 - \cos 21^0}$

C = $\dfrac{\sin 9^0 \cos 9^0}{\sin 48^0 \sin 12^0}$

Arrangement in descending order is
1) A, B, C 2) B, A, C
3) A, C, B 4) C, A, B

19. Assertion (A): If $x = \sin(\alpha - \beta)\sin(\gamma - \delta)$,
$y = \sin(\beta - \gamma)\sin(\alpha - \delta)$
$z = \sin(\gamma - \alpha)\sin(\beta - \delta)$ then $x + y + z = 0$
Reason(R): $2\sin A\sin B = \cos(A-B) - \cos(A+B)$
1) A is true, R is true and R is correct explanation of A
2) A is true, R is true and R is not correct explanation of A
3) A is true, R is false
4) A is false, R is true.

20. Assertion(A): $a = \tan\theta, b = \tan 2\theta$, $a \neq 0, b \neq 0$ and $\tan\theta + \tan 2\theta = \tan 3\theta$ then $a + b = 0$
Reason(R): If $A - B = C$, then
$\tan A - \tan B - \tan C = \tan A \tan B \tan C$
1) A is true, R is true and R is correct explanation of A
2) A is true, R is true and R is not correct explanation of A
3) A is true, R is false
4) A is false, R is true.

21. Assertion(A):In ΔABC, $\sum \dfrac{\cos A}{\sin B \sin C} = 2$
Reason(R): In ΔABC,
$\sin A + \sin B + \sin C = 4\cos\dfrac{A}{2}\cos\dfrac{B}{2}\cos\dfrac{C}{2}$
1) A is true, R is true and R is correct explanation of A
2) A is true, R is true and R is not correct explanation of A
3) A is true, R is false
4) A is false, R is true.

22. Assetion(A): If $A + B + C = 180^0$ then
$\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2\cos A \cos B \cos C$
Reason(R): If $A + B + C = 180^0$ then
$\cos 2A + \cos 2B + \cos 2C =$
$-1 - 4\cos A \cos B \cos C$
1) A is true, R is true and R is correct explanation of A
2) A is true, R is true and R is not correct explanation of A
3) A is true, R is false
4) A is false, R is true.

23. Assetion(A): If $x + y + z = xyz$ then
$\sum\left(\dfrac{2x}{1-x^2}\right) = \pi\left(\dfrac{2x}{1-x^2}\right)$
Reason(R): If $\tan A + \tan B + \tan C$
= $\tan\tan B \tan C$, then $A + B + C = n\pi, n \in z$
1) A is true, R is true and R is correct explanation of A
2) A is true, R is true and R is not correct explanation of A
3) A is true, R is false
4) A is false, R is true.

KEY

1) 2	2) 2	3) 3	4) 3	5) 2
6) 3	7) 1	8) 2	9) 3	10) 3
11) 1	12) 2	13) 3	14) 1	15) 4
16) 4	17) 2	18) 4	19) 3	20) 1
21) 2	22) 1	23) 1		

PERIODICITY AND EXTREME VALUES OF TRIGONOMETRIC FUNCTIONS

SYNOPSIS :

- Periodic function : A real function $f : A \to R$ is said to be a periodic function if there exists a +ve real number P such that $f(x+p) = f(x)$, $\forall\ x \in A$. Least value of P is known as period of f.
- Period of $\frac{C_1 f_1(x) \pm C_2 f_2(x)}{C_3 f_3(x) \pm C_4 f_4(x)}$ where f_1, f_2, f_3, f_4 are trigonometric functions is the L.C.M. of periods of the functions $f_1(x), f_2(x), f_3(x), f_4(x)$ and C_1, C_2, C_3. C_4 are constants.

Note : Numerator and Denominator can be extended to sum of any number of trignometric functions.

- If 'f' in a periodic function with period 'P' then '-f' is also a periodic function with period P.
- Periods of trignometric functions are given below:

Function	Period
1. *Sin ax*	$\frac{2\pi}{\lvert a\rvert}$
2. $\cos ax$	$\frac{2\pi}{\lvert a\rvert}$
3. *Tan ax*	$\frac{\pi}{\lvert a\rvert}$
4. $\cos ec\ ax$	$\frac{2\pi}{\lvert a\rvert}$
5. sec *ax*	$\frac{2\pi}{\lvert a\rvert}$
6. cot *ax*	$\frac{\pi}{\lvert a\rvert}$

- Standard bits :
  - Period of $\lvert\sin x + \cos x\rvert, \lvert\sin x - \cos x\rvert$ is π
  - Period of $\lvert\tan x + \cot x\rvert, \lvert\tan x - \cot x\rvert$ is $\frac{\pi}{2}$
  - If $n \in z^+$, the period of $\sin^{2n} x + \cos^{2n} x$ (or) $\sec^{2n} x + \cos ec^{2n} x, \tan^{2n} x + \cot^{2n} x$ is $\frac{\pi}{2}$
  - Period of $\lvert\sin x\rvert, \lvert\cos x\rvert, \lvert\tan x\rvert, \lvert\cot x\rvert, \lvert\sec x\rvert, \lvert\cos ec\ x\rvert$ is π
- Period of $a\sin^{2n} x + b\cos^{2n} x$, $a\sec^{2n} x + b\cos ec^{2n} x$, $a\tan^{2n} x + b\cot^{2n} x$, $\sin^{2n} x + \cos^{2n} x$, $a\sin^{2n} x + b\cos^{2m} x, \sec^{2n} x + \cos ec^{2m} x$, $\tan^{2n} x + \cot^{2m} x$, $a\tan^{2n} x + b\cot^{2m} x$ is π $(n, m \in z^+)$
- Maximum and minimum values:
  - Minimum value of $\sin x$ = -1 maximum value of $\sin x = 1$ Range of $\sin x = [-1, 1]$
  - Minimum value of $\cos x = -1$ maximum value of $\cos x = 1$ Range of $\cos x = [-1, 1]$
  - Minimum value of $a\cos x + b\sin x + c$ is $c - \sqrt{a^2 + b^2}$

  Maximum value of $a\cos x + b\sin x + c$ is $c + \sqrt{a^2 + b^2}$ Range of $a\cos x + b\sin x + c$ is $\left[c - \sqrt{a^2 + b^2},\ c + \sqrt{a^2 + b^2}\right]$
  - The minimum value of $a^2\sin^2\theta + b^2\cos ec^2\theta$ is 2ab $\left(\text{Q } a^2\sin^2\theta + b^2\cos ec^2\theta \geq 2ab\right)$
  - The minimum value of $a^2\cos^2\theta + b^2\sec^2\theta$ is 2ab $\left(\text{Q } a^2\cos^2\theta + b^2\sec^2\theta \geq 2ab\right)$
  - The minimum and maximum values of $a^2\tan\theta + b^2\cot\theta$ and $a^2\tan^2\theta + b^2\cot^2\theta$ are -2ab, 2ab
  - The range of $a^2\sin^2\theta + b^2\cos ec^2\theta$ is $[2ab, \infty)$
  - The range of $a^2\cos^2\theta + b^2\sec^2\theta$ is $[2ab, \infty)$

EXERCISE - III
LEVEL -I

1. Period of $6 + 7\cos^2 x$ is

   1. 2π 2. π 3. $\frac{\pi}{2}$ 4. $\frac{2\pi}{3}$

2. Period of $\cos^6 x + \sin^6 x$ is

   1. $\frac{\pi}{2}$ 2. π 3. $\frac{3\pi}{2}$ 4. 2π

3. Period of $6\cos^4 x - 7\sin^4 x$ is

1. $\frac{\pi}{2}$ 2. π 3. $\frac{3\pi}{2}$ 4. 2π

4. Period of $\cot\left(\frac{5-7x}{2}\right)$ is

1. $\frac{\pi}{2}$ 2. $\frac{2\pi}{7}$ 3. $\frac{\pi}{7}$ 4. $\frac{7\pi}{2}$

5. Period of $\frac{2\sin 2x - 5\cos 2x}{7\cos x - 8\sin x}$ is

1. π 2. 2π 3. $\frac{\pi}{2}$ 4. $\frac{\pi}{3}$

6. Period of $\tan x + \cot x$ is

1. $\frac{\pi}{2}$ 2. π 3. $\frac{3\pi}{2}$ 4. 2π

7. Period of $\tan 4x + \sec 4x$ is

1. 2π 2. $\frac{3\pi}{2}$ 3. π 4. $\frac{\pi}{2}$

8. Period of $\sin(x + 2x + 6x)$ is

1. $\frac{2\pi}{9}$ 2. $\frac{2\pi}{45}$ 3. $\frac{\pi}{9}$ 4. $\frac{\pi}{45}$

9. Period of $\cos(x + 2x + 3x + ... + nx)$ is

1. $\frac{2\pi}{n(n+1)}$ 2. $\frac{4\pi}{n(n+1)}$

3. $\frac{\pi}{n(n+1)}$ 4. $\frac{6\pi}{n(n+1)}$

10. Period of $\tan(x + 4x + 9x + ... + n^2x)$ is

1. $\frac{2\pi}{n(n+1)(2n+1)}$ 2. $\frac{4\pi}{n(n+1)(2n+1)}$

3. $\frac{6\pi}{n(n+1)(2n+1)}$ 4. $\frac{8\pi}{n(n+1)(2n+1)}$

11. Period of $\sec(x + 8x + 27x)$ is

1. $\frac{\pi}{18}$ 2. $\frac{\pi}{9}$ 3. $\frac{2\pi}{9}$ 4. $\frac{\pi}{36}$

12. Period of $\operatorname{cosec}\left(x + \frac{x}{2} + \frac{x}{4} + ...\text{to } \infty\right)$ is

1. π 2. 2π 3. $\frac{\pi}{2}$ 4. $\frac{\pi}{4}$

13. Period of $\cos\left(x + \frac{x}{3} + \frac{x}{3^2} + ...\text{to } \infty\right)$ is

1. $\frac{\pi}{3}$ 2. $\frac{2\pi}{3}$ 3. π 4. $\frac{4\pi}{3}$

14. Period of $\sin x \sin(120^0 - x)\sin(120^0 + x)$ is

1. $\frac{\pi}{3}$ 2. $\frac{2\pi}{3}$ 3. π 4. $\frac{\pi}{2}$

15. Period of $\cos x \cos(60^0 - x)\cos(60^0 + x)$ is

1. $\frac{\pi}{2}$ 2. $\frac{\pi}{3}$ 3. $\frac{2\pi}{3}$ 4. π

16. Period of $\tan x(\tan 120^0 - x)\tan(120^0 + x)$ is

1. $\frac{\pi}{2}$ 2. $\frac{\pi}{3}$ 3. $\frac{2\pi}{3}$ 4. π

17. Period of $\sin\left(\frac{\pi}{4} - x\right)\sin\left(\frac{\pi}{4} + x\right)$ is

1. $\frac{\pi}{2}$ 2. π 3. $\frac{3\pi}{2}$ 4. 2π

18. Period of $|\sin x| + |\cos x|$ is

1. $\frac{\pi}{2}$ 2. π 3. $\frac{3\pi}{2}$ 4. 2π

19. Period of $2\sin^3 x - 3\cos^3 x$ is

1. $\frac{\pi}{2}$ 2. π 3. 2π 4. 4π

20. Sine function whose period is 6 is

1. $\sin\frac{2\pi x}{3}$ 2. $\sin\frac{\pi x}{3}$

3. $\sin\frac{\pi x}{6}$ 4. $\sin\frac{3\pi x}{2}$

21. Cosine function whose period is 5 is

1. $\cos\frac{\pi x}{3}$ 2. $\cos\frac{2\pi x}{5}$

3. $\cos\frac{3\pi x}{5}$ 4. $\cos\frac{4\pi x}{5}$

22. The tangent function whose period is $\frac{2}{3}$ is

1. $\tan\frac{\pi x}{2}$ 2. $\tan\frac{\pi x}{3}$

3. $\tan\frac{3\pi x}{2}$ 4. $\tan\frac{2\pi x}{3}$

23. The cosecant function whose period is 4 is

1. $\cos\frac{\pi x}{3}$ 2. $\cos\frac{2\pi x}{5}$

3. $\tan 2\pi x$ 4. $\operatorname{cosec}\frac{\pi x}{2}$

24. The cosine function whose period is 7 is

1. $\sin\frac{\pi x}{7}$ 2. $\cos\frac{2\pi x}{7}$

3. $\tan\frac{2\pi x}{7}$ 4. $\cot\frac{3\pi x}{7}$

25. The cotangent function whose period is 3π is

1. cosec 2x 2. sec 4 x

3. $\tan\frac{3x}{2}$ 4. $\cot\frac{x}{3}$

KEY

1. 2	2. 1	3. 2	4. 2	5. 2
6. 2	7. 4	8. 1	9. 2	10. 3
11. 1	12. 1	13. 4	14. 2	15. 3
16. 2	17. 2	18. 1	19. 3	20. 2
21. 2	22. 3	23. 4	24. 2	25. 4

LEVEL-2

1. Period of $\sin x \cos\left(x+\frac{\pi}{4}\right)$

1. $\frac{\pi}{2}$ 2. π 3. $\frac{3\pi}{2}$ 4. 2π

2. Period of $\sin\frac{3\pi x}{2}+\cos\frac{\pi x}{2}$

1. 1 2. 2 3. 3 4. 4

3. Period of

$\tan\left(\frac{3\pi x}{4}\right)-2\ \sec\left(\frac{\pi x}{3}\right)+5\ \sin\left(\frac{2\pi x}{5}\right)$

1. 20 2. 30 3. 60 4. 80

4. Period of $\cos\frac{\pi x}{4}-2\operatorname{cosec}\frac{\pi x}{6}+5\tan\frac{\pi x}{3}$

1. 12 2. 24 3. 48 4. 6

5. Period of $\sin\left(x^0+2x^0+3x^0+4x^0\right)$

1. 18 2. 36 3. 54 4. 9

6. Period of $\sec\left(x^0+\frac{x^0}{4}+\frac{x^0}{16}+..\text{to}\ \infty\right)$

1. 90 2. 180 3. 270 4. 360

7. Period of $\tan\left(x^0+2x^0+3x^0+..+9x^0\right)$

1. 4 2. 8 3. 12 4. 2

8. Period of $\cos\frac{3x}{5}+2\sin\frac{2x}{7}-5\cot 14x$

1. 7π 2. $14\ \pi$ 3. $28\ \pi$ 4. $70\ \pi$

KEY

1. 2	2. 4	3. 3	4. 2	5. 2
6. 3	7. 1	8. 4		

LEVEL -3

A mapping $f: A \to R$ is said to be periodic if there exists a positive real number T such that $f(x+T)=f(x)\forall x\in A$. And the period of $f(ax+b)$ is $\frac{T}{|a|}$.

1. Period of $|\sin x|+|\cos x|$ is

1) π 2) 2π 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{3}$

2. Period of $\sin\sqrt{x}+\cos\sqrt{x}$ =

1) π 2) 2π 3) 1 4) does not exist

3. The function $\sin\left(x^2\right)+\cos\sqrt{x}$ is

1) Periodic with period π
2) Periodic with period 2π
3) Periodic with period 0
4) Not a Periodic function

4. If $f(x)$ is a periodic function with the period T then it can also have, the period.

1) $\lambda T(\lambda\in N)$ 2) $2\lambda T(\lambda\in N)$

3) $(2\lambda-1)T(\lambda\in N)$ 4) All above

KEY

1. 3 2. 4 3. 4 4. 4

EXERCISE -IV
LEVEL - I

1. The minimum and maximum values of $2\sqrt{2}\ \cos x+\sin x$ are

1. - 1, 1 2. $-2\sqrt{2},2\sqrt{2}$

3. 1,8 4. -3,3

2. The minimum and maximum values of $8\cos 3x - 15\sin 3x$ are

1. -7,7 2. -23,23 3. -17,17 4. -15,8

3. The range of $11\sin 5x + 60\cos 5x + 40$ is

1. [-61,61] 2. [-21,101]
3. [-31,91] 4. [-41,81]

4. The minimum and maximum values of $1-12\sin^2 x\cos^2 x$ are

1. -1,1 2. -1,2 3. -2,1 4. 1,2

5. The range of $1 + 12\sin^2 x\cos^2 x$ is

1. [-1,1] 2. [-2,1] 3. [1,2] 4. [1,4]

6. The minimum and maximum values of $\sin^4 x + \cos^4 x$ are

1. $\frac{1}{2},\frac{3}{2}$ 2. $\frac{1}{2},1$ 3. $1,\frac{3}{2}$ 4. 1,2

7. The range of $\cos^4 x - \sin^4 x$

1. $\left[-\frac{1}{2},\frac{1}{2}\right]$ 2. (-1,1)

3. [-1,1] 4. $\left[1,\frac{3}{2}\right]$

8. The range of $\sin^6 x + \cos^6 x$

1. $\left[-\frac{1}{4},\frac{1}{4}\right]$ 2. $\left[\frac{1}{4},\frac{1}{2}\right]$

3. $\left[\frac{1}{4},1\right]$ 4. $\left[-\frac{1}{2},-\frac{1}{4}\right]$

9. The minium and maximum values of $\sin^2(60^0 - x) + \sin^2(60^0 + x)$ are

1. $-\frac{1}{2},\frac{1}{2}$ 2. $\frac{1}{2},1$ 3. $\frac{1}{2},\frac{3}{2}$ 4. $\frac{3}{2},2$

10. $\cos^2(60^0 - x) + \cos^2(60^0 + x) \in$

1. $\left[-\frac{1}{2},\frac{1}{2}\right]$ 2. $\left[\frac{1}{2},1\right]$

3. $\left[\frac{1}{2},\frac{3}{2}\right]$ 4. $\left[\frac{3}{2},2\right]$

11. $\sin^2(120^0 - x) + \sin^2(120^0 + x) \in$

1. $\left[-\frac{1}{2},\frac{1}{2}\right]$ 2. $\left[\frac{1}{2},1\right]$

3. $\left[\frac{1}{2},\frac{3}{2}\right]$ 4. $\left[\frac{3}{2},2\right]$

12. $\cos^2(120^0 - x) + \cos^2(120^0 + x) \in$

1. $\left[\frac{1}{2},1\right]$ 2. $\left[1,\frac{3}{2}\right]$ 3. $\left[\frac{3}{2},2\right]$ 4. $\left[\frac{1}{2},\frac{3}{2}\right]$

13. $\sin^2(240^0 - x) + \sin^2(240^0 + x) \in$

1. $\left[\frac{1}{2},1\right]$ 2. $\left[-1,-\frac{1}{2}\right]$

3. $\left[-\frac{3}{2},\frac{1}{2}\right]$ 4. $\left[\frac{1}{2},\frac{3}{2}\right]$

14. $\cos^2(240^0 - x) + \cos^2(240^0 + x) \in$

1. $\left[\frac{1}{2},\frac{3}{2}\right]$ 2. $\left[\frac{3}{2},\frac{5}{2}\right]$ 3. $\left[\frac{5}{2},\frac{7}{2}\right]$ 4. $\left[\frac{7}{2},\frac{9}{2}\right]$

15. $\sin^2(300^0 - x) + \sin^2(300^0 + x) \in$

1. $\left[-\frac{1}{2},0\right]$ 2. $\left[0,-\frac{1}{2}\right]$ 3. $\left[\frac{1}{2},1\right]$ 4. $\left[\frac{1}{2},\frac{3}{2}\right]$

16. $\cos^2(300^0 - x) + \cos^2(300^0 + x) \in$

1. [1,2] 2. [-1,1] 3. $\left[\frac{1}{2},1\right]$ 4. $\left[\frac{1}{2},\frac{3}{2}\right]$

17. The minimum and maximum values of $\sin^2(60^0 - x) - \sin^2(60^0 + x)$ are

1. $-\frac{3}{2},\frac{3}{2}$ 2. $-\frac{\sqrt{3}}{2},\frac{\sqrt{3}}{2}$

3. $\frac{1}{2},\frac{3}{2}$ 4. $-\frac{1}{2},-\frac{3}{2}$

18. The minimum and maximum values of $\cos^2(60^0 - x) - \cos^2(60^0 + x)$ are

1. $-\frac{1}{2},-\frac{3}{2}$ 2. $\frac{1}{2},\frac{3}{2}$

3. $-\frac{\sqrt{3}}{2},\frac{\sqrt{3}}{2}$ 4. $\frac{1}{2},1$

19. $\sin^2(60^0 + x) - \sin^2(60^0 - x) \in \left[-\frac{k}{2},\frac{k}{2}\right] \Rightarrow k =$

1. 3 2. 2 3. $\sqrt{3}$ 4. $\sqrt{2}$

20. $\cos^2(60^0+x)-\cos^2(60^0-x)\in\left[-\frac{m}{2},\frac{m}{2}\right]$

$\Rightarrow m =$

1. 1 2. 3 3. $-\sqrt{3}$ 4. $\sqrt{3}$

21. $\sin^2(120^0+x)-\sin^2(120^0-x)\in\left[-\frac{n}{2},\frac{n}{2}\right]$

$\Rightarrow n =$

1. 2 2. 3 3. $\sqrt{2}$ 4. $\sqrt{3}$

22. $\cos^2(120^0+x)-\cos^2(120^0-x)\in\left[\frac{-K}{2},\frac{K}{2}\right] \Rightarrow K =$

1. 3 2. 2 3. $\sqrt{3}$ 4. $\sqrt{2}$

23. $\sin^2(120^0-x)-\sin^2(120^0+x)\in\left[-\frac{p}{2},\frac{p}{2}\right]$

$\Rightarrow p =$

1. $-\sqrt{2}$ 2. $-\sqrt{3}$ 3. $\sqrt{2}$ 4. $\sqrt{3}$

24. $\cos^2(120^0-x)-\cos^2(120^0+x)\in[-q,q]\Rightarrow q =$

1. 1 2. $\frac{3}{2}$ 3. $\sqrt{\frac{3}{2}}$ 4. $\frac{\sqrt{3}}{2}$

25. $\sin\theta\sin(60^0-\theta)\sin(60^0+\theta)\in[-k,k]\Rightarrow k =$

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{3}{4}$

26. $\sin\theta\sin(120^0-\theta)\sin(120^0+\theta)\in\left[-\frac{m}{4},\frac{m}{4}\right]$

$\Rightarrow m =$

1. 1 2. 3 3. -1 4. -3

27. $\sin x\sin(240^0-x)\sin(240^0+x)\in[-n,n]$

$\Rightarrow n =$

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{3}{2}$

28. $\cos x\cos(240^0-x)\cos(240^0+x)\in[-p,p]$

$\Rightarrow p =$

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{3}{2}$

29. $\sin^3x+\sin^3(60^0-x)-\sin^3(60^0+x)\in$

1. [-1,1] 2. $\left[-\frac{1}{4},\frac{1}{4}\right]$

3. $\left[-\frac{3}{4},\frac{3}{4}\right]$ 4. $\left[\frac{1}{2},\frac{1}{2}\right]$

30. $\sin^3x-\sin^3(120^0-x)+\sin^3(120^0+x)\in$

1. [-1,1] 2. $\left[-\frac{1}{4},\frac{1}{4}\right]$

3. $\left[-\frac{3}{4},\frac{3}{4}\right]$ 4. [-2, 2]

31. $\sin^3x-\sin^3(240^0-x)+\sin^3(240^0+x)\in$
[-k,k] $\Rightarrow k =$

1. 1 2. 1/4 3. 3/4 4. 5/4

32. $\sin^3x-\sin^3(60^0+x)+\sin^3(120^0+x)\in$

$\left[-\frac{m}{4},\frac{m}{4}\right]\Rightarrow m =$

1. 1 2. 3 3. -1 4. -3

33. $\sin^3x+\sin^3(120^0+x)+\sin^3(240^0+x)\in$

$\left[-\frac{p}{4},\frac{p}{4}\right]\Rightarrow p =$

1. 1 2. -1 3. 3 4. -3

34. $\cos^3x-\cos^3(60^0-x)-\cos^3(60^0+x)\in$

$\left[-\frac{k}{4},\frac{k}{4}\right]\Rightarrow k =$

1. -3 2. -5 3. 3 4. 5

35. $\cos^3x+\cos^3(120^0-x)+\cos^3(120^0+x)\in$

1. [-1,1] 2. $\left[-\frac{1}{4},\frac{1}{4}\right]$

3. $\left[-\frac{3}{4},\frac{3}{4}\right]$ 4. [-2, 2]

36. $\cos^3x-\cos^3(60^0+x)+\cos^3(120^0+x)\in$

$\left[-\frac{m}{4},\frac{m}{4}\right]\Rightarrow m =$

1. 1 2. 3 3. -1 4. -3

37. $\cos^3x+\cos^3(120^0+x)+\cos^3(240^0+x)\in$

1. [-1,1] 2. $\left[-\frac{1}{4},\frac{1}{4}\right]$

3. $\left[-\frac{3}{4},\frac{3}{4}\right]$ 4. [-2, 2]

38. $16\cos^5x-20\cos^3x+5\cos x\in$

1. [-1,1] 2. $\left[-\frac{1}{4},\frac{1}{4}\right]$

3. $\left[-\frac{3}{4},\frac{3}{4}\right]$ 4. [–2, 2]

39. $\sin^2 x + 4\sin x + 5 \in [k, 5k] \Rightarrow k =$

1. 1 2. 2 3. 3 4. 4

40. $3\sin^2 x + 4\cos^2 x \in$

1. [0,3] 2. [0,4] 3. [3,4] 4. [-4,-3]

41. $3\sin^2 x - 4\cos^2 x \in$

1. [0,3] 2. [-4,0] 3. [-3,4] 4. [-4, 3]

42. The maximum value of

$$\cos x\left(\frac{\cos x}{1-\sin x} + \frac{1-\sin x}{\cos x}\right) \text{ is}$$

1. 4 2. 3 3. 2 4. 1

43. The minimum value of

$$\sin x\left(\frac{1-\cos x}{\sin x} + \frac{\sin x}{1-\cos x}\right) \text{ is}$$

1. 1 2. 2 3. 3 4. 4

44. $A + B = 90^0 \Rightarrow \cos A \cos B \in$

1. $\left[-\frac{1}{3}, \frac{1}{3}\right]$ 2. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

3. $\left[-\frac{1}{4}, \frac{1}{4}\right]$ 4. $\left[-\frac{3}{4}, \frac{3}{4}\right]$

45. $A + B = 90^0 \Rightarrow \sin A \sin B \in$

1. $\left[-\frac{1}{4}, \frac{1}{4}\right]$ 2. $\left[-\frac{1}{3}, \frac{1}{3}\right]$

3. $\left[-\frac{3}{4}, \frac{3}{4}\right]$ 4. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

46. $A + B = 90^0 \Rightarrow \cos A - \cos B \in$

1. [-1,1] 2. $\left[-\sqrt{2}, \sqrt{2}\right]$

3. $\left[-\sqrt{3}, \sqrt{3}\right]$ 4. $[-2,2]$

47. $A + B = 90^0 \Rightarrow \sin A + \sin B \in$

1. [-1,1] 2. $\left[-\sqrt{2}, \sqrt{2}\right]$

3. $\left[-\sqrt{3}, \sqrt{3}\right]$ 4. $[-2,2]$

48. $$\frac{\text{Minimum of } \left\{\sin^2 x + \cos^2 x\right\}}{\text{Maximum of } \left\{\cos^2 \frac{x}{2} + \sin^2 \frac{x}{2}\right\}} =$$

1. -1 2. 1 3. 2 4. -2

49. $2\sqrt{2}\cos x - \sin x + 4$

1. ≤ 1 2. $= 1$ 3. ≥ 1 4. 2

50. $16 \sin x \cos x \cos 2x \cos 4x \cos 8x \in$

1. [-1,1] 2. $\left[-\frac{1}{4}, \frac{1}{4}\right]$

3. $\left[-\frac{3}{4}, \frac{3}{4}\right]$ 4. $\left[-\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}\right]$

51. $\sec x + 2 \cot 2x \sin x \in$

1. [-1,1] 2. [-2,2] 3. [-3,3] 4. [-4,4]

52. The range of $f(x) = -3 \cos \sqrt{3 + x + x^2}$

1. [-1,1] 2. [-2,2] 3. [-3,3] 4. [-4,4]

53. $3 - 2\cos^2 x \in$

1. [0,2] 2. [1,3] 3. [1,2] 4. [2,3]

54. The maximum value of

$$\frac{3}{5\sin x - 12\cos x + 19}$$

1. 1 2. $\frac{1}{2}$ 3. $\frac{1}{3}$ 4. $\frac{1}{4}$

KEY

1. 4	2. 3	3. 2	4. 3	5. 4
6. 2	7. 3	8. 3	9. 3	10. 3
11. 3	12. 4	13. 4	14. 1	15. 4
16. 4	17. 2	18. 3	19. 3	20. 4
21. 4	22. 3	23. 4	24. 4	25. 3
26. 1	27. 3	28. 3	29. 3	30. 3
31. 3	32. 2	33. 3	34. 3	35. 3
36. 2	37. 3	38. 1	39. 2	40. 3
41. 4	42. 3	43. 2	44. 2	45. 4
46. 2	47. 2	48. 2	49. 3	50. 1
51. 2	52. 3	53. 2	54. 2	

LEVEL-2

1. $\sin^2 x + \cos^4 x \in$

1. $\left[\frac{1}{4}, \frac{1}{2}\right]$ 2. $\left[\frac{3}{4}, 1\right]$

3. $\left[-1, -\frac{3}{4}\right]$ 4. $\left[-\frac{3}{4}, \frac{3}{4}\right]$

2. $\cos^2 x + \sin^4 x \in$

1. $\left[\frac{1}{2}, 1\right]$ 2. $\left[1, \frac{3}{2}\right]$ 3. $\left[\frac{3}{2}, 2\right]$ 4. $\left[\frac{3}{4}, 1\right]$

3. The minimum and maximum values of $\sin\left(x + \frac{\pi}{4}\right)\sin\left(x - \frac{\pi}{4}\right)$ are

1. -1, 1 2. $-\frac{1}{2}, \frac{1}{2}$ 3. $-\frac{3}{2}, \frac{3}{2}$ 4. $-\frac{1}{4}, \frac{1}{4}$

4. $\sin\left(x+\frac{\pi}{4}\right)\cos\left(x-\frac{\pi}{4}\right)\in$

1. [-1,0] 2. [0,1] 3. [1,2] 4. [-1,1]

5. $\cos\left(x+\frac{\pi}{6}\right)\cos\left(x-\frac{\pi}{6}\right)\in$

1. $\left[-\frac{1}{4},\frac{1}{4}\right]$ 2. $\left[-\frac{3}{4},\frac{3}{4}\right]$

3. $\left[-\frac{1}{4},\frac{3}{4}\right]$ 4. $\left[-\frac{1}{2},\frac{1}{2}\right]$

6. The minium and maximum values of $\cos x+3\sqrt{2}\sin\left(x+\frac{\pi}{4}\right)+6$ are

1. 1, 11 2. 11,-1 3. 6,5 4. 5, 6

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

1. 1 2. $\frac{1}{2}$ 3. $\frac{3}{2}$ 4. 2

8. $\sin x\cos\left(\frac{\pi}{4}-x\right)\in\left[\frac{1-k}{2\sqrt{2}},\frac{1+k}{2\sqrt{2}}\right]\Rightarrow k=$

1. $\sqrt{2}$ 2. $\sqrt{3}$ 3. $\sqrt{5}$ 4. $\sqrt{6}$

9. $(\sin x+\cos x)^2+\cos^2\left(\frac{\pi}{4}-x\right)\in$

1. [0,1] 2. [0,2] 3. [1,2] 4. [0,3]

10. $(\sin x+\cos x)^2+\cos^2\left(\frac{\pi}{4}+x\right)\in$

1. [0,1] 2. [0,2] 3. [1,2] 4. [0,3]

11. $(\sin x-\cos x)^2+\cos^2\left(\frac{\pi}{4}+x\right)\in$

1. [0,1] 2. [0,2] 3. [1,2] 4. [0,3]

12. $(\sin x-\cos x)^2+\cos^2\left(\frac{\pi}{4}-x\right)\in$

1. [0,1] 2. [0,2] 3. [1,2] 4. [0,3]

13. $5\cos\theta+3\cos\left(\theta-\frac{\pi}{3}\right)+8\in$

1. [-7,1] 2. [1,8] 3. [1,15] 4. [2,15]

14. $7\cos x+5\sqrt{2}\cos\left(\frac{\pi}{4}-x\right)+12\in$

1. [-13,13] 2. [-1,25] 3. [0,25] 4. [-25,25]

15. $\cos x+4\sqrt{2}\sin\left(x-\frac{\pi}{4}\right)+6\in$

1. [1,11] 2. [-1,11] 3. [2,10] 4. [11, 1]

KEY

1. 2	2. 4	3. 2	4. 2	5. 3
6. 1	7. 1	8. 1	9. 4	10. 3
11. 4	12. 3	13. 3	14. 2	15. 1

EXERCISE -V
(New Pattern Questions)

1. Assertion(A): Maximum value of $2\cos^2\theta+\sqrt{5}\cos\theta\sin\theta+4\sin^2\theta$ is $\frac{9}{2}$

Reason (R): Maximum value of $a\cos^2\theta+b\sin\theta\cos\theta+c\sin^2\theta$ is $\frac{1}{2}\left[(a+c)+\sqrt{(a-c)^2+b^2}\right]$

1) A is true, R is true and R is the correct explanation of A
2) A is true, R is false and R is not correct explanation of A
3) Both A and R are false
4) A is false, R is true.

2. Assertion(A): Range of $-3\cos\sqrt{3+x+x^2}$ is $[-3, 3]$

Reason(R): Maxima and Minima of $\cos x$ does not lie in $[-1, 1]$

1) A is true, R is true and R is the correct explanation of A.
2) A is true, R is false and R is not correct explanation of A.
3) Both A and R are false
4) A is false, R is true.

3. Assertion(A): A, B, C are positive angles such that A + B + C= π then maximum value of $\cot A \cot B \cot C = \frac{1}{3\sqrt{3}}$

Reason(R): A.M. of three +ve number $\geq$ their G.M.

1) A is true, R is false
2) Both A and R are false
3) A is false, R is true
4) Both A and R are true and R is correct explanation of A

4. Assertion(A): Period of $\frac{\sin x + \cos 2x}{\tan x + \tan 2x}$ is 2π

Reason(R): Period of $\frac{f_1(x)+f_2(x)}{f_3(x)+f_4(x)}$ is least of periods of $f_1(x),\ f_2(x),\ f_3(x), f_4(x)$.

1) A is false, R is true.
2) Bothe A and R are true and R is the correct explanation of A
3) A is true, R is false
4) A is false, R is false

5. Assertion(A): Period of $\cos 8x - \sin 2x$ is π

Reason(R): Period of $\cos ax$ or $\sin a\,x\,is\ \frac{2\pi}{|a|}$

1) A is true, R is true, R is correct explanation of A
2) A is true, but R is not correct explanation of A
3) A is true, R is false.
4) A is false R is true

6. Assertion(A): Period of $\frac{e^x}{e^{[x]}}$ is 1

Reason(R): Period of $x - [x]$ is 1

1. A is true , R is true and R is correct explanation of A
2. A is true, R is correct explanation of A
3. A is true, R is true and R is not correct explanation of A
4. A is true, R is false.

7. Assertion(A): Period of $\sin x$ is 2π

Reason(R): P is period of $f(x)$ if $f(x+p)=f(x)$ for any value of P

1. A is true, R is true
2. A is true R is false
3. Both A and R are false
4. A is false , R is true

8. Assertion(A): A sine function whose period $2/3$ is $\pm\sin(3\pi x)$

Reason(R): $\sin x$ is a periodic function with period $\frac{2\pi}{3}$

1. A is false R is false
2. A is flse R is true
3. Both A and R are false
4. A is true R is false

9. Assertion (A) : $\frac{\sin^3 107^0 + \sin^3 13^0}{\sin 107^0 + \sin 13^0} = \frac{3}{4}$

Reason (R) : $A + B = 120^0$ then

$\frac{\sin^3 A + \sin^3 B}{\sin A + \sin B} = \frac{3}{4}$

1. Both A and R are true and R is correct explanation of A
2. R is true and A is false
3. Both are flase
4. A is false B is true

EXERCISE - VI

10. **Match of the following :**

List - I	**List - II**
1. Period of $\cos x \cos(60^0 - x)\cos(60^0 + x)$	a. 2π
2. Period of $3\sin 2x + 100\cot 4x$	b. $\pi/2$
3. Period of $\sin x + \cos x$	c. π
4. Period of $\sin^4 x + \cos^4 x$	d. $2\pi/3$

1. 1-d, 2-c,3-a, 4-b 2. 1-d, 2-c, 3-b, 4-a
3. 1-a, 2-b, 3-c,4-d 4. 1-b, 2-c,3-a,4-d

11. Match of the following :

List - I	**List - II**
1. Period of $\cos\sqrt{x}$	a. $\pi/2$
2. Period of $\sin^3 x + \cos^3 x$	b. π
3. Period of $\lvert\sin x\rvert + \lvert\cos x\rvert$	c. 2π
4. Period of $\sin x \cos x$	d. does not exist

1. 1-a, 2-d, 3-b, 4-c 2.1-d, 2-c, 3-a, 4-b
3. 1-a, 2-b, 3-c,4-d 4. 1-b, 2-c,3-d,4-a

12. Match of the following :

List - I	List - II
1. Min.value of $4\cos x + 5\sin^2 x$	a. 3
2. Max.value of $\sin^4 x + \cos^4 x$	b. 1
3. Min.value of $\cos^4 x - \sin^4 x$	c. -1
4. Min.value of $1 + 8\sin^2 x \cos^2 x$	d. 4

1. 1-b, 2-c, 3-d, 4-a 2.1-c, 2-b, 3-a, 4-d
3. 1-b, 2-c, 3-a,4-d 4. 1-d, 2-b,3-a,4-c

13. Match of the following :

List - I	List - II
1. Max.value of $3\sin x + 4\cos x$	a. 24
2. Min.value of $\sin x + \cos ecx$	b. 5
3. Min.value of $9\sin^2 x + 16\cos ec^2 x$	c. 2
4. Max.value of $\sin^4 x + \cos^4 x$	d. 1

1. 1-b, 2-c, 3-a, 4-d 2. 1-d, 2-a, 3-b, 4-c
3. 1-c, 2-d, 3-a, 4-b 4. 1-c, 2-b,3-d, 4-a

14. Match of the following :

List - I	List - II
1. Max.value of $\sin x \cos x$ is obtained at	a. $\pi/3$
2. Max.value of $\sin 4x$ is obtained at	b. $5\pi/4$
3. Max.value of $\cos x + \sqrt{3}\sin x - 2$ is obtained at	c. $\pi/4$
4. Min.value of $\cos x + \sin x$ is obtained at	d. $\pi/8$

1. 1-d, 2-a, 3-b, 4-c 2. 1-c, 2-d, 3-a, 4-b
3. 1-b, 2-c, 3-a,4-d 4. 1-d, 2-c,3-a, 4-b

15. Match of the following :

List - I	List - II
1. Local min.of $a\tan x + b\cot x$	a. $(a+b)^2$
2. Local min.of $a\sec x + b\tan x$	b. 2ab
3. Min.of $a^2\sin^2 x + b^2\cos ec^2 x$	c. $\sqrt{a^2 - b^2}$
4. Min.of $a^3\sec^2 x + b^2\cos ec^2 x$	d. $2\sqrt{ab}$

1. 1-c, 2-b, 3-d, 4-a
2.1-b, 2-a, 3-c, 4-d
3. 1-a, 2-d, 3-b, 4-c
4. 1-d, 2-c,3-b, 4-a

16. Match of the following :

List - I	List - II
1. Max.value of $\cos A - \cos B$ if $A + B = \frac{\pi}{2}$	A. 26
2. Min.of $\cos A - \cos B$, if $A + B = \pi/2$	B. $\sqrt{2}$
3. Max. of $5\cos x + 12\sin x + 13$	C. $-\sqrt{2}$

1. 1-C, 2-A, 3-B
2. 1-A, 2-C, 3-B
3. 1-B, 2-A, 3-C
4. 1-B, 2-C,3-A

17. Match of the following :

List - I	List - II
1. Period of $\cos x^2$	a. $\pi/3$
2. Period of $\cos\left(e^{\tan x} + e^{\cot} x\right)$	b. 2π
3. Period of $\cos(3x + 2x + x)$	c.does not exist
4. Period of $\sin\left[\left(\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + ..\alpha\right)x\right]$	d. π

1. 1-c, 2-a, 3-b, 4-d
2. 1-b, 2-a, 3-d, 4-c
3. 1-c, 2-d, 3-a, 4-b
4. 1-b, 2-c,3-a, 4-d

18. Observe the following :

List - I	List - II
A. $\sin\frac{\pi}{10}\ \sin\frac{13\pi}{10}$	1. $-\frac{1}{8}$
B. $\sin 50^0 - \sin 70^0 + \sin 10^0$	2. 0
C. $\sqrt{3}\cos ec20^0 - \sec 20^0$	3. 1
D. $\cos\frac{\pi}{7}\cos\frac{2\pi}{7}\cos\frac{4\pi}{7}$	4. $-\frac{1}{4}$
	5. 4

The correct Match for List-I from List - II

	A.	B	C	D
1.	3	1	4	5
2.	1	3	4	2
3.	4	2	1	5
4.	4	2	5	1

19. Observe the following :

List - I	List - II
A. $\tan A+2\tan 2A+4\tan 4A$ $+8\cot 8A=K\cot A\Rightarrow K=$	1. 1
B. $\cos x+\cos y+\cos z=0\Rightarrow$ $\sin x+\sin y+\sin z$ $\Rightarrow\cos^2\left(\frac{x-y}{2}\right)=$	2. 0
C. $\sin\theta.\sin\left(60^0-\theta\right).\sin\left(60^0+\theta\right)$ $\in\left[\frac{-k}{2},\frac{k}{2}\right]\Rightarrow k=$	3. $\frac{1}{2}$
D. $x\cos\theta=y\cos\left(\theta+\frac{2\pi}{3}\right)=$ $z\cos\left(\theta+\frac{4\pi}{3}\right)\Rightarrow xy+yz+zx=$	4. $\frac{1}{8}$
	5. $\frac{1}{4}$

The correct Match for List-I from List - II

	A.	B	C	D
1.	1	2	3	5
2.	2	3	5	1
3.	1	5	3	2
4.	1	4	5	2

20. Observe the following :

List - I	List - II
A. If $\tan\theta+\cot\theta=2$ then $\sin\theta=$	1. $\frac{2ab}{a^2+b^2}$
B. $\sum_{k=1}^{3}\cos^2\left(2k-1\right)\frac{\pi}{12}=$	2. $\pm\frac{1}{\sqrt{2}}$
C. $\frac{\sin 70^0+\sin 50^0}{\cos 70^0+\cos 50^0}=$	3. $\frac{3}{2}$
D. $\sin\alpha+\sin\beta=a,$ $\cos\alpha+\cos\beta=b$ $\Rightarrow\sin\left(\alpha+\beta\right)=$	4. $\frac{a^2-b^2}{a^2+b^2}$
	5. $\sqrt{3}$

The correct Match for List-I from List - II

	A.	B	C	D
1.	2	1	5	3
2.	2	3	5	1
3.	1	2	4	5
4.	1	2	3	4

21. Observe the following results from List-I to List II.

List - I	List - II
A. $\sin^2\frac{3\pi}{5}+\sin^2\frac{4\pi}{5}$	1. $\frac{3}{4}$
B. $\cos^2\frac{3\pi}{5}+\cos^2\frac{4\pi}{5}$	2. $\frac{\sqrt{5}}{4}$
C. $\cos^2\frac{\pi}{5}-\cos^2\frac{2\pi}{5}$	3. $\frac{5}{4}$
D. $\cos^2\frac{\pi}{12}+\cos^2\frac{3\pi}{12}+\cos^2\frac{5\pi}{12}$	4. $\frac{3}{2}$
	5. $\frac{1}{4}$

The correct Match for List-I from List - II

	A.	B	C	D
1.	2	4	5	3
2.	3	1	2	4
3.	2	1	3	4
4.	3	4	2	1

22 I : Period of $\sin\frac{\theta}{3}+\cos\frac{\theta}{2}$ is 12π

II: Period of

$\cos^3 x+\cos^3\left(120^0-x\right)+\cos^3\left(120^0+x\right)$ is $\frac{\pi}{3}$

1. only I is true
2. Bothe I and II are true
3. only II is true
4. Neither I nor II is true

23. I: Period of $2\sin^3 x+5\cos^3 x$ is 2π

II : Period of $\sin^4 x+\cos^4 x$ is $\pi/2$

1. only I is true 2. only II is true
3. Both I and II are true
4. Neither I nor II true

24. I : Max.value of $\sqrt{3}\sin x-\cos x$ is $\sqrt{2}$

II: Min.value of $9\tan^2 x+16\cot^2 x$ is 24

1. only II is true
2. Bothe I and II are true
3. only I is true
4. Neither I nor II is true

25. I:Period of $\sin^3 x+\cos^3 x=2\pi$

II: Period of $\frac{\cos nx}{\sin\left(\frac{x}{n}\right)}$ is $4\pi\Rightarrow n=2$

1.only I is true 2. only II is true
3. Both I and II are true
4. Neither I nor II true

26. I: Range of $2\cos x - 3\cos^2 x + 5$ is [0, 4]
II:Range of $2\cos x - 5\sin x$ is [3, 5]
Which of the above statement is true
1. only I 2. only II
3. Both I and II 4. Neither I nor II

27. I: $U = \sqrt{a^2\cos^2\theta + b^2\sin^2\theta}$ + $\sqrt{a^2\sin^2\theta + b^2\cos^2\theta}$ lies between
$a+b$ and $\sqrt{2\left(a^2+b^2\right)}$
II: $A>0, B>0$ and $A+B=\frac{\pi}{3}$ Max value of $\tan A\tan B$ is $\frac{1}{3}$
Which of the above is true
1.only I 2. only II
3. Both I and II 4. Neither I nor II

28. I: If $K = \sin^6 x + \cos^6 x$, then $\frac{1}{4} \le K \le 1$
II: If $p = \sin x + \cos x$ then $\frac{1}{2} \le p \le 1$
Which of the above is true
1. only I 2. only II
3. Both I and II 4. Neither I nor II

29. I : In a ΔABC if angle A is given by $5\cos A + 3 = 0$ then sin A, tan A are roots of the equation $15x^2 + 8x - 16 = 0$
II : $\tan A$ and $\tan B$ are roots of the equation $x^2 - px + q = 0$ then
$\sin^2(A+B) = \frac{q^2}{p^2-(1-q)^2}$
which of the above statement are true:
1. only I 2. only II
3. Both I and II 4. Neither I nor II

30. I: If A,B,C, D are angles a circle quadrila $\sin A + \sin B + \sin C + \sin D = 0$
II: If α and β are solutions of
$a\cos\theta + b\sin\theta = C$ then $\sin\alpha\sin\beta = \frac{2bc}{a^2+b^2}$
Which of the above statement true:
1. only I 2. only II
3. Both I and II 4. Neither I nor II

31. The arrangement of following functions in descending order of their periods:
A) $3\cos\frac{x}{2} + \sin\frac{x}{2}$ B) $3\tan\frac{x}{3} - \cot\frac{x}{3}$
C) $3\sin^3 x + 4\cos^3 x$ D) $\sin^2 x - 2\cos^2 x$
1. C,A,B,D 2. D,C,A,B
3. A,B,C,D 4. B,D,C,A

32. Arrange the following in decreasing order of their periods
A) $\cos\left(\frac{3\pi}{5}x\right) - \sin\left(\frac{2\pi}{7}x\right)$
B) $\sin\left(\frac{\pi x}{2}\right) + \cos\left(\frac{\pi x}{3}\right)$
C) $\sin\left(\frac{\pi x}{5}\right) + \tan\left(\frac{\pi x}{3}\right)$
D) $x - [x]$
1. A,C,B,D 2. A,B,C,D
3. D,B,C,A 4. B,A,D,C

33. Arrange the following in ascending order
A) Min.value of $\tan x + \cot x$
B) Min.value of $\sin^3 x + \cos^3 x$
C) Min.value of $\cos^4 x - \sin^4 x$
D) Min.value of $3\sin x - 4\cos x$
1. B,C,A,D 2. C,B,D,C
3. D,A,C,B 4. A,D,B,C

34. Arrange the following in descending order:
A) Min.value of $\sin 4x + \cos 4x$
B) Min.value of $\cos^2 x$
C) Max.value of $1 - 8\sin^2 x\cos^2 x$
D) Max.value of $\sqrt{3}\sin x - \cos x$
1. D,C,B,A 2. A,B,C,D
3. A,D,B,C 4. C,D,B,A

35. Arrange the following in increasing order:
A) Max.value of $\frac{1}{\sqrt{7\sin x} + \sqrt{29}\cos x + 7}$
B)Min.value of
$\left(\sin\theta + \cos ec\theta\right)^2 + \left(\cos\theta + \sec\theta\right)^2$
C) Min.value of $\cos^2 x$
D) Min.value of $5\sec x + 4\tan x$
1. C,A,D,B 2. A,C,B,D
3. B,D,A,C 4. A,B,C,D

KEY

1) 1	2) 2	3) 4	4) 3	5) 1
6) 1	7) 2	8) 4	9) 1	10) 1
11) 2	12) 1	13) 1	14) 2	15) 4
16) 4	17) 3	18) 4	19) 3	20) 2
21) 2	22) 1	23) 2	24) 2	25) 3
26) 1	27) 3	28)1	29) 1	30) 2
31) 3	32) 1	33) 2	34) 1	35) 1

UP TO EXTREME VALUES
PREVIOUS EAMCET QUESTIONS

EAMCET - 2005

1. If $\cos\theta - 4\sin\theta = 1, \sin\theta + 4\cos\theta =$

   1) ± 1 2) 0 3) ± 2 4) ± 4

2. $\frac{\tan 3A}{\tan A} = a \Rightarrow \frac{\sin 3A}{\sin A} =$

   1) $\frac{2a}{a+1}$ 2) $\frac{2a}{a-1}$ 3) $\frac{a}{a+1}$ 4) $\frac{a}{a-1}$

3. $A + C = 2B \Rightarrow \frac{\cos C - \cos A}{\sin A - \sin C} =$

   1) $\cot B$ 2) $\cot 2B$ 3) $\tan 2B$ 4) $\tan B$

4. $A + B = C \Rightarrow$

   $\cos^2 A + \cos^2 B + \cos^2 C - 2\cos A \cos B \cos C =$

   1) 1 2) 2 3) 0 4) 3

5. Extream values of

   $4\cos\left(x^2\right).\cos\left(\frac{\pi}{3}+x^2\right).\cos\left(\frac{\pi}{3}-x^2\right)$ over R.

   1) -1, 1 2) -2, 2 3) -3, 3 4) -4, 4

EAMCET - 2004

6. In a Δ ABC,

   $\cos\left(\frac{B+2C+3A}{2}\right)+\cos\left(\frac{A-B}{2}\right) =$

   1) -1 2) 0 3) 1 4) 2

7. $\cos 12^0 + \cos 84^0 + \cos 132^0 + \cos 156^0 =$

   1) 1 2)1/2 3) -1/2 4) 0

8. $\tan 9^0 - \tan 27^0 - \tan 63^0 + \tan 81^0 =$

   1) 4 2) 3 3) 2 4) 1

9. If $n \in ¥$, and the period of $\frac{\cos nx}{\sin\left(\frac{x}{n}\right)}$ is 4π, then $n =$

   1) 4 2) 3 3) 2 4) 1

EAMCET - 2003

10. $\cos\alpha.\sin(\beta-\gamma)+\cos\beta.\sin(\gamma-\alpha)+\cos\gamma.\sin(\alpha-\beta) =$

    1) 0 2) 1/2

    3) 1 4) $4\cos\alpha\cos\beta\cos\gamma$

11. $\sin 47^0 - \sin 25^0 + \sin 61^0 - \sin 11^0 =$

    1) $\cos 7^0$ 2) $\sin 7^0$

    3) $2\cos 7^0$ 4) $2\sin 7^0$

12. If $A + B + C = 270^0$, then

    $\cos 2A + \cos 2B + \cos 2C + 4\sin A \sin B \sin C =$

    1) 0 2) 1 3) 2 4) 3

13. The period of the funtion

    $f(\theta) = \sin\left(\frac{\theta}{3}\right) + \cos\left(\frac{\theta}{2}\right)$ is

    1. 3π 2. 6π 3. 9π 4. 12π

EAMCET - 2002

14. If $\cos(\alpha+\beta) = \frac{4}{5}, \sin(\alpha-\beta) = \frac{5}{13}$ and

    α, β lie between 0 and $\frac{\pi}{4}$, then $\tan 2\alpha =$

    1. $\frac{56}{33}$ 2. $\frac{33}{56}$ 3. $\frac{16}{65}$ 4. $\frac{60}{61}$

15. $\sum_{k=1}^{3}\cos^2(2k-1)\frac{\pi}{12} =$

    1) 0 2) $\frac{1}{2}$ 3) $-\frac{1}{2}$ 4) $\frac{3}{2}$

16. $\cos^2 76^0 + \cos^2 16^0 - \cos 76^0 \cos 16^0 =$

    1) 1/2 2) 0 3) $-1/4$ 4) 3/4

17. If $f(x) = \sin^2\left(\frac{\pi}{8}+\frac{x}{2}\right) - \sin^2\left(\frac{\pi}{8}-\frac{x}{2}\right)$, then the period of f is

    1. π 2. $\frac{\pi}{2}$ 3. $\frac{\pi}{3}$ 4. 2π

EAMCET - 2001

18. If A,B,C,D are the angles of a cyclic quadrilateral, then Cos A + Cos B + Cos C + Cos D =

    1. 4 2. 1 3. 0 4. -1

19. $\cos ec\theta = \frac{p+q}{p-q} \Rightarrow \cot\left(\frac{\theta}{2}+\frac{\pi}{4}\right) =$

    1. $\sqrt{\frac{p}{q}}$ 2. $\sqrt{\frac{q}{p}}$ 3. $\sqrt{pq}$ 4. pq

20. $\cos^2\left(\frac{\pi}{6}+\theta\right)-\sin^2\left(\frac{\pi}{6}-\theta\right)$

1. $\frac{1}{2}\cos 2\theta$ 2. 0

3. $-\frac{1}{2}\cos 2\theta$ 4. $\frac{1}{2}$

EAMCET - 2000

21. $\left(\frac{\sqrt{3}+2\cos A}{1-2\sin A}\right)^{-3}+\left(\frac{1+2\sin A}{\sqrt{3}-2\cos A}\right)^{-3}=$

1. 1 2. $\sqrt{3}$ 3. 0 4. -1

22. $\frac{\cos A}{\cos B}=n,\frac{\sin A}{\sin B}=m\Rightarrow\left(m^2-n^2\right)\sin^2 B=$

1. $1-n^2$ 2. $1+n^2$ 3. 1-n 4. 1+n

23. $(\sin\alpha+\text{cosec}\,\alpha)^2+(\cos\alpha+\sec\alpha)^2 = k+\tan^2\alpha+\cot^2\alpha \Rightarrow K =$

1. 9 2. 7 3. 5 4. 3

24. $\frac{\sin\left(-660^0\right)\tan\left(1050^0\right)\sec\left(-420^0\right)}{\cos\left(225^0\right)\cos ec\left(315^0\right)\cos\left(510^0\right)}=$

1. $\frac{\sqrt{3}}{4}$ 2. $\frac{\sqrt{3}}{2}$ 3. $\frac{2}{\sqrt{3}}$ 4. $\frac{4}{\sqrt{3}}$

25. $\cos 6^0 \sin 24^0 \cos 72^0 =$

1. $-\frac{1}{8}$ 2. $\frac{1}{4}$ 3. $\frac{1}{8}$ 4. $-\frac{1}{4}$

26. $\sin\alpha+\sin\beta=a, \cos\alpha+\cos\beta=b \Rightarrow \sin(\alpha+\beta)=$

1. $\frac{2ab}{a^2-b^2}$ 2. ab

3. a + b 4. $\frac{2ab}{a^2+b^2}$

27. $\tan\theta_1=K\cot\theta_2\Rightarrow\frac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)}=$

1. $\frac{1+k}{1-k}$ 2. $\frac{1-k}{1+k}$ 3. $\frac{k+1}{k-1}$ 4. $\frac{k-1}{k+1}$

EAMCET - 1999

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

1. $\sin\theta$ 2. $\cos\theta$ 3. $\tan\theta$ 4. $\cot\theta$

29. Maximum value of $1+8\sin^2 x^2\cos^2 x^2$ is

1. 3 2. -1 3. -8 4. 9

30. The period of $\sin^3 x+\cos^3 x$ is

1. $\frac{\pi}{3}$ 2. π 3. 2π 4. $\frac{2\pi}{3}$

EAMCET - 1998

31. $A+B+C=\pi \Rightarrow \sin^2 A+\sin^2 B+\sin^2 C =$

1. $2+2\cos A\cos B\cos C$
2. $2+2\sin A\sin B\sin C$
3. $2-2\cos A\cos B\cos C$
4. $2+\cos A\cos B\cos C$

EAMCET - 1997

32. $\tan 35^0 = K \Rightarrow \frac{\tan 145^0-\tan 125^0}{1+\tan 145^0\tan 125^0}=$

1. $\frac{2k}{1-k^2}$ 2. $\frac{2k}{1+k^2}$ 3. $\frac{1-k^2}{2k}$ 4. $\frac{1-k^2}{1+k^2}$

33. $x=a(\sec\theta+\tan\theta)^2$, $y=b(\sec\theta-\tan\theta)^4$

$\Rightarrow x^4y^2 =$

1. $ab\sec\theta$ 2. $a^2b^2\tan\theta$
3. a^2b^4 4. a^4b^2

34. The period of the function $\tan(3x+5)$ is

1. $\frac{2\pi}{3}$ 2. $\frac{\pi}{6}$ 3. $\frac{\pi}{3}$ 4. π

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

1. $\cos\theta$ 2. $\sin\theta$ 3. $-\cos\theta$ 4. $-\sin\theta$

36. $x=\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}\Rightarrow\frac{2x}{1-x^2}=$

1. $\sin\theta$ 2. $\cos\theta$ 3. $\pm\tan\theta$ 4. $\pm\cot\theta$

37. $\sin A+\sin B=l$, $\cos A-\cos B=m \Rightarrow \cos(A-B)=$

1. $\frac{l^2-m^2}{l^2+m^2}$ 2. $\frac{l^2+m^2}{l^2-m^2}$

3. $\frac{2lm}{l^2+m^2}$ 4. $\frac{2lm}{l^2-m^2}$

EAMCET - 1996

38. $\frac{3\cos\theta+\cos 3\theta}{3\sin\theta-\sin 3\theta}$

1. $\cot^2\theta$ 2. $\cot^4\theta$ 3. $\cot^3\theta$ 4. $2\cot\theta$

39. $\cos^2\frac{3\pi}{5}+\cos^2\frac{4\pi}{5}=$

1. $\frac{4}{5}$ 2. $\frac{5}{2}$ 3. $\frac{5}{4}$ 4. $\frac{3}{4}$

40. If $A = \sin^2\theta + \cos^4\theta$ then for all values of θ

1. $1 \le A \le 2$ 2. $\frac{3}{4} \le A \le 1$

3. $0 \le A \le 1$ 4. $\frac{1}{4} \le A \le \frac{1}{2}$

41. $x = r\cos\alpha\cos\beta\cos\gamma$,
$y = r\cos\alpha\cos\beta\sin\gamma$, $z = r\sin\alpha\cos\beta$,
$\mu = \sin\beta \Rightarrow x^2 + y^2 + z^2 + \mu^2 =$

1. 1 2. 0 3. r 4. r^2

42. $\sum \cos\alpha\sin(\beta - \alpha) =$

1. 1 2. $4\cos\alpha\cos\beta\cos\gamma$

3. 0 4. $\frac{1}{2}$

43. $\cos(\alpha+\beta+\gamma) + \cos(\alpha-\beta-\gamma)$
$+ \cos(\beta-\gamma-\alpha) + \cos(\gamma-\alpha-\beta) =$

1. $2\cos\alpha\cos\beta\cos\gamma$
2. $3\cos\alpha\cos\beta\cos\gamma$
3. $4\cos\alpha\cos\beta\cos\gamma$
4. $6\cos\alpha\cos\beta\cos\gamma$

EAMCET - 1995

44. If θ is an acute angle and $\tan\theta = 1/\sqrt{7}$, then the value of $\frac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta} =$

1) 3/4 2) 1/2 3) 2 4) 5/4

45. $\tan 7\frac{1}{2}^0 =$

1. $\frac{2\sqrt{2} - 1 - \sqrt{3}}{\sqrt{3} - 1}$ 2. $\frac{1+\sqrt{3}}{1-\sqrt{3}}$

3. $\frac{1}{\sqrt{3}} + \sqrt{3}$ 4. $\frac{\sqrt{2}+1}{\sqrt{2}}$

46. $\cos 255^0 + \sin 165^0 =$

1. 0 2. $\frac{\sqrt{3}-1}{\sqrt{2}}$ 3. $\frac{\sqrt{3}-1}{2\sqrt{2}}$ 4. $\frac{\sqrt{2}+1}{\sqrt{2}}$

47. The value of
$\cos(2\pi/15)\cos(4\pi/15)\cos(8\pi/15)\cos(14\pi/15)$

1) 1/16 2) 1/8 3) 3/4 4) 1/12

KEY

1. 4	2. 2	3. 4	4. 1	5. 1
6. 2	7. 3	8. 1	9. 3	10. 1
11. 1	12. 2	13.4	14. 1	15. 4
16. 4	17. 4	18. 3	19. 2	20. 1
21. 3	22. 1	23. 2	24. 3	25. 3
26. 4	27. 1	28. 3	29. 1	30. 3
31. 1	32. 3	33. 4	34. 3	35. 2
36. 3	37. 1	38. 3	39. 4	40. 2
41. 4	42. 3	43. 3	44. 1	45. 1
46. 1	47. 1			