MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

TRIGONOMETRIC EQUATIONS

Exercise 7 A

1. Find the principal solutions of the angles in the equation

$$2\cos^2\theta = 1$$

2. Find the principal solutions of the angles in the equation

$$\sqrt{3}\sec\theta + 2 = 0$$

3. Find the principal solutions of the angles in the equation

$$3\tan^2\theta = 1$$

4. Solve the following equations

$$\cos 2\theta = \frac{\sqrt{5} + 1}{4}$$

5. Solve $\tan^2 \theta = 1, \theta \in [-\pi, \pi]$

6. Solve the following equations.

$$\sin 3\theta = \frac{\sqrt{3}}{2}, \theta \in [-\pi, \pi]$$

7. Solve the following equations

$$\cos^2 \theta = \frac{3}{4}, \theta \in [0, \pi]$$

8. Solve the following equations

$$2\sin^2 \theta = \sin \theta, \theta \in (0, \pi)$$

9. Find general solutions of the following equations.

$$\sin\theta = \frac{\sqrt{3}}{2}, \ \cos\theta = \frac{-1}{2}$$

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10. Find the most general value of θ that satisfying

both the equations

$$\tan x = \frac{-1}{\sqrt{3}}, \ \sec x = \frac{2}{\sqrt{3}}$$

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11. Find general solutions of the following equations.

$\operatorname{cosec}\theta = -2, \cot \theta = -\sqrt{3}$

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12. If $\sin(270° - x) = \cos 292°$, then find x in $(0, 360°)$

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13. If $x < 90°$ and $\sin(x + 28°) = \cos(3x - 78°)$, then find x

14. Solve the following equations and write general solutions

$2\sin^2\theta = 3\cos\theta$

15. Solve the following equations and write general solutions

$$\sin^2 \theta - \cos \theta = \frac{1}{4}$$

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16. Find general solutions of the following equations.

$$5 \cos^2 \theta + 7 \sin^2 \theta = 6$$

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17. Find general solutions of the following equations.

$$3 \sin^4 x + \cos^4 x = 1$$

18. Solve the following equations and write general solutions

$$2 \sin^2 \theta - 4 = 5 \cos \theta$$

19. Solve the following equations and write general solutions

$$2 + \sqrt{3} \sec x - 4 \cos x = 2\sqrt{3}$$

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20. Solve $2 \cos^2 \theta + 11 \sin \theta = 7$

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21. Solve the following equations and write general solutions

$$6\tan^2\theta - 2\cos^2\theta = \cos 2\theta$$

22. Solve the following equations and write general solutions

$$4\cos^2 x + \sqrt{3} = 2(\sqrt{3} + 1)\cos x$$

23. Solve the following equations and write general solutions

$$1 + \sin 2x = (\sin 3x - \cos 3x)^2$$

24. Solve the following equations and write general solution.

$$2 \sin^2 x + \sin^2 2x = 2$$

25. Solve the following equations

$$\sqrt{3} \sin \theta - \cos \theta = \sqrt{2}$$

26. Solve the following equations

$$\cot x + \operatorname{cosec} x = \sqrt{3}$$

27. Solve $\sin x + \sqrt{3}\cos x = \sqrt{2}$.

28. Solve the following equations

$$\tan\theta + \sec\theta = \sqrt{3} \text{ in } [0\,2\pi]$$

29.   If

$$\cos 3x + \cos 2x = \sin(3x/2) + \sin(x/2), 0 \le x \le 2\pi$$

, then x =

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30. Solve the following equations

$$\cot^2 x - \left(\sqrt{3} + 1\right)\cot x + \sqrt{3} = 0, 0 < \xi < \frac{\pi}{2}$$

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31. If $\sec x \cos 5x + 1 = 0, 0 < x < 2\pi$, then x =

32. Solve

$$\sin x + \sin 2x + \sin 3x = \cos x + \cos 2x + \cos 3x$$

33.   If

$$x + y = \frac{2\pi}{3} \quad \text{and} \quad \sin x + \sin y = \frac{3}{2} \quad \text{then find} x, y$$

34. Solve

$$\sin 3x + \sin x + 2 \cos x = \sin 2x + 2 \cos^2 x$$

35. Solve the following equations

$$\cos 3x - \cos 4x = \cos 5x - \cos 6x$$

36. Solve the following equations

$$\cos 2\theta + \cos 8\theta = \cos 5\theta$$

37. Solve the following equations

$$\cos\theta - \cos 7\theta = \sin 4\theta$$

38. Solve $\sin\theta + \sin 5\theta = \sin 3\theta, 0 < \theta < \pi.$

39. If $\tan p\theta = \cot q\theta$ and $p \neq -q$ show that the

solution are in A.P with common difference $\dfrac{\pi}{p+q}$

40. Show that the solutions $\cos p\theta = \sin q\theta$ from two series each of which is an A.P. Find also the common difference of each A.P $(p \neq \pm q)$

41. Find the number of solutions of the equation $\tan x + \sec x = 2\cos x, \cos x \neq 0$ lying in the interval $(0, \pi)$

42. Solve

$$\sin 3\alpha = 4\sin\alpha\sin(x+\alpha)\sin(x-\alpha) \qquad \text{where}$$

$$a \neq n\pi, \, n \in z$$

43. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then prove that

$$\cos\left(\theta - \frac{\pi}{4}\right) = \pm\frac{1}{2\sqrt{2}}$$

44. Find range of $'\theta'$ if $\cos\theta + \sin\theta$ is positive

45. If α, β are solutions of $a\cos\theta + b\sin\theta = c$ where a, b, $c \in R$ and $a^2 + b^2 > 0$, $\cos\alpha \neq \cos\beta$, $\sin\alpha \neq \sin\beta$ then prove that

$$\sin\alpha + \sin\beta = \frac{2bc}{a^2 + b^2}$$

46. If α, β are solutions of $a\cos\theta + b\sin\theta = c$ where a, b, $c \in R$ and $a^2 + b^2 > 0$, $\cos\alpha \neq \cos\beta$, $\sin\alpha \neq \sin\beta$ then

prove that

$$\sin \alpha + \sin \beta = \frac{2bc}{a^2 + b^2}$$

47. If α, β are solutions of $a \cos \theta + b \sin \theta = c$

where a, b, $c \in R$ and

$a^2 + b^2 > 0, \cos \alpha \neq \cos \beta, \sin \alpha \neq \sin \beta$ then

prove that

$$\cos \alpha \cos \beta = \frac{c^2 - b^2}{a^2 + b^2}$$

48. If α, β are solutions of $a\cos\theta + b\sin\theta = c$ where a, b, $c \in R$ and $a^2 + b^2 > 0, \cos\alpha \neq \cos\beta, \sin\alpha \neq \sin\beta$ then prove that

$$\sin\alpha\sin\beta = \frac{c^2 - a^2}{a^2 + b^2}$$

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49. Common roots of the equations of $\cos 2x + \sin 2x = \cot x$ and $2\cos^2 x + \cos^2 2x = 1$

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50. The number of solution of

$$\sqrt{6 - \cos + 7\sin^2 x} + \cos x = 0$$

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51. If $|\tan x| = \tan x + \dfrac{1}{\cos x}$ and $x \in [0, 2\pi]$, then find values of x

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Solved Problems

1. Solve the following equations

$$\sin \theta = \frac{1}{\sqrt{2}}$$

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2. Solve $\sin 2\theta = \frac{\sqrt{5} - 1}{4}$

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3. Solve the following equations

$$\tan^2 \theta = 3$$

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4. Solve the following equations

$3\operatorname{cosec} x = 4\sin x$

5. If x acute angle and

$\sin(x + 10°) = \cos(3x − 68°)$ then find x in

degree.

6. Solve $\cos 3\theta = \sin 2\theta$

7. Solve $7\sin^2\theta + 3\cos^2\theta = 4$

8. Solve $2\cos^2\theta - \sqrt{3}\sin\theta + 1 = 0.$

9. Find all values of x in $(-\pi, \pi)$ satisfying the equation $8^{1+\cos x + \cos^2 x + \cdots} = 4^3$.

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10. Solve $\tan\theta + 3\cot\theta = 5\sec\theta$.

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11. Solve the equation $1 + \sin^2\theta = 3\sin\theta\cos\theta$.

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12. Solve $\sqrt{2}(\sin x + \cos x) = \sqrt{3}$

13. Find general solution of θ which satisfies both the equations $\sin \theta = -\dfrac{1}{2}$ and $\cos \theta = -\dfrac{\sqrt{3}}{2}$.

14. If θ_1, θ_2 are solutions of the equation $\cos 2\theta + b \sin 2\theta = c$, $\tan \theta_1 \neq \tan \theta_2$ and $a + c \neq 0$, then find the values of (i) $\tan \theta_1 + \tan \theta_2$ (ii) $\tan \theta_1 . \tan \theta_2$.

15. If $4 \sin x \cdot \sin 2x \cdot \sin 4x = \sin 3x$ then $\theta =$

16. If $0 < \theta < \pi$, solve $\cos \theta \cdot \cos 2\theta \cos 3\theta = \dfrac{1}{4}$.

17. Given $p \neq \pm q$. Show that the solutions of

$\cos P\theta + \cos q\theta = 0$ form two series each of which

is in A.P . Find also the common difference of each

A.P .

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18. Solve sin 2x - cos 2x = sin x - cos x.

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