EXERCISE – III SUBJECTIVE QUESTIONS

1. What are the most general values of θ which satisfy the equations,

(a) $\sin\theta = \frac{1}{\sqrt{2}}$

(b) $\tan(x-1) = \sqrt{3}$

(c) $\tan\theta = -1$

(d) $\operatorname{cosec}\theta = \frac{2}{\sqrt{3}}$

(e) $2\cot^2\theta = \operatorname{cosec}^2\theta$

2. Solve : $\sin 9\theta = \sin\theta$

3. Solve : $\cot\theta + \tan\theta = 2\operatorname{cosec}\theta$

4. Solve : $\sin 2\theta = \cos 3\theta$

5. Solve : $\cot\theta = \tan 8\theta$

6. Solve : $\tan^2\theta - (1+\sqrt{3})\tan\theta + \sqrt{3} = 0$

7. Find all the angles between 0º and 90º which satisfy the equation $\sec^2\theta \cdot \operatorname{cosec}^2\theta + 2\operatorname{cosec}^2\theta = 8$

8. Solve : $4\cos\theta - 3\sec\theta = 2\tan\theta$

9. Solve : $\cot\theta - \tan\theta = 2$

10. Solve : $\sin\theta + \sin 3\theta + \sin 5\theta = 0$

11. Solve : $\cos\theta + \sin\theta = \cos 2\theta + \sin 2\theta$.

12. Find all values of θ between 0º & 180º satisfying the equation; $\cos 6\theta + \cos 4\theta + \cos 2\theta + 1 = 0$.

13. Solve : $\cos^2 x + \cos^2 2x + \cos^2 3x = 1$.

14. Solve : $\sin^2 n\theta - \sin^2(n-1)\theta = \sin^2\theta$, where n is constant and $n \neq 0, 1$

15. Solve : $\sqrt{3}\sin\theta - \cos\theta = \sqrt{2}$.

16. Solve : $\operatorname{cosec}\theta = \cot\theta + \sqrt{3}$.

17. Solve : $5\sin\theta + 2\cos\theta = 5$

18. Solve : $\tan 2\theta \tan\theta = 1$

19. Solve : $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$

20. Solve : $\tan x \cdot \tan\left(x+\frac{\pi}{3}\right) \cdot \tan\left(x+\frac{2\pi}{3}\right) = \sqrt{3}$.

21. If $\tan\theta + \sin\phi = \frac{3}{2}$ $\tan^2\theta + \cos^2\phi = \frac{7}{4}$ then find the general value of θ & ϕ.

22. If α & β are two distinct roots of the equation, $a\tan\theta + b\sec\theta = c$ then prove that : $\tan(\alpha+\beta) = \frac{2ac}{a^2-c^2}$.

23. If α & β satisfy the equation, $a\cos 2\theta + b\sin 2\theta = c$ then prove that : $\cos^2\alpha + \cos^2\beta = \frac{a^2+ac+b^2}{a^2+b^2}$.

24. Solve the equation for

$0 \le \theta \le 2\pi$; $(\sin 2\theta + \sqrt{3}\cos 2\theta)^2 - 5 = \cos\left(\frac{\pi}{6} - 2\theta\right)$.

25. Solve the equation : $1 + 2\operatorname{cosec} x = -\frac{\sec^2\frac{x}{2}}{2}$

26. Solve the equation : $2\sin x = 3x^2 + 2x + 3$.

27. Solve : $2 + 7\tan^2\theta = 3.25\sec^2\theta$ $(0° < \theta < 360°)$.

28. Solve the equation for x,

$$5^{\frac{1}{2}} + 5^{\frac{1}{2}+\log_5(\sin x)} = 15^{\frac{1}{2}+\log_{15}\cos x}$$

29. Find all the values of θ satisfying the equation; $\sin\theta + \sin 5\theta = \sin 3\theta$ such that $0 \le \theta \le \pi$.

30. Solve the equality : $2 \sin 11 x+\cos 3x+\sqrt{3} \sin 3x=0$

31. Find all value of θ, between 0 & π, which satisfy the equation; $\cos \theta \cdot \cos 2\theta \cdot \cos 3\theta = 1/4$

32. Find the general solution of the equation,

$$2 + \tan x \cdot \cot \frac{x}{2} + \cot x \cdot \tan \frac{x}{2} = 0$$

33. Solve for x, the equation $\sqrt{13-18\tan x} = 6\tan x - 3$, where $-2\pi < x < 2\pi$.

34. Find the principal solution of the trigonometric equation

$$\sqrt{\cot 3x + \sin^2 x - \frac{1}{4}} + \sqrt{\sqrt{3}\cos x + \sin x - 2} = \sin\frac{3x}{2} - \frac{\sqrt{2}}{2}$$

35. Determine the smallest positive value of x which satisfy the equation, $\sqrt{1+\sin 2x} - \sqrt{2}\ \cos 3x = 0$.

36. Given that A, B are positive acute angle, solve : $\sqrt{3}\ \sin 2A = \sin 2B$ & $\sqrt{3}\ \sin^2 A + \sin^2 B = \frac{\sqrt{3}-1}{2}$.