**Solutions of Equations and Inequations**

**Choose the most appropriate option (a, b, c or d).**

Q 1. The number of distinct solutions of sin 5θ. cos 3θ = sin 9θ. cos 7θ in [0, π/2] is

(a) 4 (b) 5 (c) 8 (d) 9

Q 2. The number of solutions of sin2 θ + 3cosθ = , 0 ≤ θ ≤ 3π, is

(a) 4 (b) 2 (c) 0 (d) None of these

Q 3. The number of distinct solutions of sec θ + tan θ = ,0 ≤ θ ≤ 3π, is

(a) 3 (b) 5 (c) 4 (d) 0

Q 4. The number of solution of the equations 5sec θ – 13 = 12tan θ in [0, 2π] is

(a) 2 (b) 1 (c) 4 (d) 0

Q 5. The equations pcos x − qsin x = r admits of a solution for x only if

(a) r < max {p, q} (b) (c) r2 = p2 + q2 (d) none of these

Q 6. The equations kcos x − 2sin x = k + 1 is solvable only if k belongs to the interval

(a) [4, +∞) (b) [–4, 4] (c) (–∞, 4] (d) none of these

Q 7. The number of solutions of cos θ + sin θ = 5, 0 ≤ θ ≤ 5π, is

(a) 4 (b) 0 (c) 5 (d) none of these

Q 8. If the equation a1 + a2cos 2x + a3sin2 x = 1 is satisfied by every real every of x then the number of possible values of the triplet (a1, a2, a3) is

(a) 0 (b) 1 (c) 3 (d) infinite

Q 9. The number of solutions of the equations tan x + sec x = 2 cos x lying in the interval [0, 2π] is

(a) 0 (b) 1 (c) 2 (d) 3

Q 10. The number of values of x in [0, 5π] satisfying the equation3cos 2x–10cos x + 7 = 0 is

(a) 5 (b) 6 (c) 8 (d) 10

Q 11. The smallest positive integral value of p for which the equation cos(psin x) = sin (pcos x) in x has solution in [0, 2π] is

(a) 2 (b) 1 (c) 3 (d) none of these

Q 12. If sin2θ – 2sin θ – 1 = 0 is to be satisfied for exactly 4 distinct values of θ ∈[0, nπ], n∈N, then the least value of n is

(a) 2 (b) 6 (c) 4 (d) 1

Q 13. If 2tan2x–5sec x is equal to 1 for exactly 7 distinct values of x ∈ , n ∈ N, then the greatest value of n is

(a) 6 (b) 12 (c) 13 (d) 15

Q 14. The number of values of x ∈ [0, 2π] that satisfy cot x – cosec x = 2 sin x is

(a) 3 (b) 2 (c) 1 (d) 0

Q 15. If sin α, 1 and cos 2α are in GP then α is equal to

(a)  (b)  (c)  (d) none of these

Q 16. If sin θ, cos θ and tan θ are in GP the general value if θ is

(a)  (b)  (c)  (d) 

Q 17. The general values of x for which cos 2x, and sin 2x are in AP are given by

(a)  (b)  (c)  (d) nπ

Q 18. The most general values of θ satisfying tan θ + tan = are given by

(a)  (b)  (c)  (d) 

Q 19. The most general solutions of the equation sec x = – 1 (–1) tan x are given by

(a) nπ +  (b)  (c) 2nπ (d) none of these

Q 20. The most general solutions of the equation sec2 x = (1 – tan2x) are given by

(a)  (b)  (c)  (d) none of these

Q 21. The most general values of x for which

sin x + cos x = min {1, a2 – 4a + 6}

are given by

(a) 2nπ (b)  (c)  (d) none of these

Q 22. If max {5sin θ + 3sin(θ – α)} = 7 then the set of possible values of α is θ ∈ R

(a)  (b) 

(c)  (d) none of these

Q 23. Let α, β be any two positive values of x for which 2cos x, |cos x| and 1–3cos2x are in GP. The minimum values of |α – β| is

(a)  (b)  (c)  (d) none of these

Q 24. The sum of all the solution of the equation

is

(a) 15π (b) 30π (c)  (d) none of these

Q 25. The values of x ∈ [–2P, 2π] such that , is purely imaginary, are given by

(a)  (b)  (c) nπ (d) none of these

Q 26. If , the greatest positive solution of 1 + sin4 x = cos23xis

(a) π (b) 2π (c)  (d) none of these

Q 27. The number of solutions of |cos x| = sin x, 0 ≤ x ≤ 4π, is

(a) 8 (b) 4 (c) 2 (d) none of these

Q 28. The number of solution of cos x = 11 + sin x|, 0 ≤ x ≤ 3π, is

(a) 3 (b) 2 (c) 4 (d) none of these

Q 29. Let [x] = the greatest integer less than or equal to x and let f(X) = sin x + cos x. Then the most general solutions of  are

1. 2nπ + , n ∈  (b) nπ, n ∈  (c) 2nπ, n ∈  (d) none of these

Q 30. The most general solution of are given by

(a)  (b)  (c)  (d) none of these

Q 31. If and then all solutions of x are given by

(a) 2nπ +  (b)  (c)  (d) none of these

Q 32. The solution of the equation (sin x + cos x)1 + sin 2x = 2, – π ≤ x < π, is

(a)  (b) π (c)  (d) none of these

Q 33. The most general solutions 2sin x + 2 cos x =  are

(a)  (b)  (c)  (d) 

Q 34. The number of solutions of is

(a) 8 (b) 6 (c) 4 (d) 2

Q 35. If 3sin2θ + 2sin2φ =1 and 3sin 2θ = 2sin 2φ, 0 < θ , and 0 < φ < , then the value of θ + 2φ is

(a)  (b)  (c) 0 (d) none of these

Q 36. The most general values of θ satisfying the equation (1 + 2 sin θ)2 + (tan θ – 1)2 = 0 are given by

(a)  (b)  (c)  (d) 

Q 37. If r > 0, –π ≤ θ ≤ π and r, θ satisy rsin θ = 3 and r = 4(1 + sin θ) then the number of possible solutions of the pair (r, θ) is

(a) 2 (b) 4 (c) 0 (d) infinite

Q 38. The number of solutions of the equation x3 + x2 + 4x + 2sin x = 0 in 0 ≤ x ≤ 2π is

(a) zero (b) one (c) two (d) four

Q 39. The number of real solutions of sin ex. cos ex = 2x – 2 + 2–x–2 is

(a) zero (b) one (c) two (d) infinite

Q 40. The least positive nonintegral of sin π(x2 + x) − sin πx2 = 0 is

(a) rational

(b) irrational of the form 

(c) irrational of the form , where p is even integer

(d) irrational of the form , where p is an even integer

Q 41. If the equation 2cos x + cos 2λx = 3 has only one solution then λ is

(a) 1 (b) a rational number (c) an irrational number (d) none of these

Q 42. If 0 ≤ x ≤ 2π, 0 ≤ y < 2π and sin x + siny = 2 then the value of x + y is

(a) π (b)  (c) 3π (d) none of these

Q 43. If –π < x ≤ π, –π ≤ y ≤ π and cos x + cos y = 2 then the value cos(x – y) is

(a) – 1 (b) 0 (c) 1 (d) none of these

Q 44. If 0 ≤ x ≤ 3π, 0 ≤ y ≤ 3π and cos x.sin y = 1 then the possible number of values of the ordered pair (x, y) is

(a) 6 (b) 12 (c) 8 (d) 15

Q 45. If θ ∈ [0, 5π] and r ∈ R such that 2sin θ = r4 – 2r2 + 3 then maximum number of values of the pair (r, θ)is

(a) 8 (b) 10 (c) 6 (d) none of these

Q 46. The number of values of x for which sin 2x + cos 4x = 2 is

(a) 0 (b) 1 (c) 2 (d) infinite

Q 47. If 2 sin x + 1 ≥ 0 and x ∈ [0, 2π] then the solution set for x is

(a)  (b)  (c)  (d) none of these

Q 48. If 2cos x <  and x ∈ [–π, π] then the solution set for x is

(a)  (b)  (c)  (d) none of these

Q 49. If cos x − sin x ≥ 1 and 0 ≤ x ≤ 2π then the solution set for x is

(a)  (b)  (c)  (d) none of these

Q 50. If |tan x| ≤ 1 and x ∈ [−π, π] then the solution set for x is

(a) (b)  (c)  (d) none of these

Q 51. If 4sin2x − 8 sin x + 3 ≤ 0, 0 ≤ x ≤ 2π, then the solution set for x is

(a)  (b)  (c)  (d) 

Q 52. The set of values of x for which sin x . cos3 x > cos x. sin3x, 0 ≤ x ≤ 2π, is

(a) (0, π) (b)  (c)  (d) none of these

Q 53. The number of values of x ∈ [0, 4Pπ] satisfying is 

(a) 2 (b) 0 (c) 4 (d) 8

**Type 2**

**Choose the correct options. One or more options may be correct.**

Q 54. If α ∈ [–2π, 2π] and cos then a value of α is

(a)  (b)  (c)  (d) 

Q 55. If cos x = 0 ≤ π, then a value of x is

(a) π (b) 0 (c) tan−12 (d) none of these

Q 56. If sin 3θ = cos 2θ then θ is equal to

(a) (4n + 1) ,(4n + 1) ; when n is an even integer only

(b) (4n + 1) , (4n + 1) ; when n is an any integer

(c) (4n + 1), (4n + 1) ; when n is an odd integer only

(d) none of these

Q 57. Sin θ + cos θ = 6x – x2 – 11, 0 ≤ θ ≤ 4π, x ∈ R, holds for

(a) no value of x and θ (b) one value of x and two values of θ

(c) two values of x and two values of θ (d) two pairs of values of (x, θ)

Q 58. If 0 ≤ x ≤ 2π and |cos x| ≤ sin x then

(a) the set of value of x is 

(b) the number of solutions that are integral of is three

(c) the sum of the largest and the smallest solution is 

(d) 

Q 59. is satisfied by

(a) those values of x for which tan x − 1 (b) those values of x for which tan x = – 

(c) those values of x for which cos x = 0 (d) those values of x for which tan x= 1

Q 60. Let [x] = the greatest integer less than or equal to x. The equation sin x = [1 + sin x] + [1 – cos x] has

(a) no solution in  (b) no solution in 

(c) no solution in  (d) none of these solution for x ∈ R

Q 61. If sin θ = a for exactly one values of θ ∈ then the value of a is

(a)  (b) 1 (c) 0 (d) – 1

**Answers**

1d 2d 3d 4a 5d 6c 7b 8d 9c 10c

11a 12c 13d 14d 15b 16a 17b 18a 19b 20c

21c 22a 23d 24b 25a 26b 27b 28a 29d 30a

31d 32c 33b 34a 35a 36c 37a 38b 39a 40c

41c 42a 43c 44a 45c 46a 47b 48a 49c 50a

51d 52b 53c 54a,d 55b,c 56b 57b,d 58b,d 59a,c 60a,b,c,d

61b,d