**Trigonometrical Functions and Identities**

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

Q 1. If tan θ = ****then sec θ - tan θ is equal to

(a)  (b)  (c) 2a (d) 

Q 2. sec2 θ = , where x ∈ R, y ∈ R, is true if and only if

(a) x + y ≠ 0 (b) x = y, x ≠ 0 (c) x = y (d) x ≠ 0, y ≠ 0

Q 3. sin2 θ , where x ∈ R, gives real θ if and only if

(a) x + y = 0 (b) x = y (c) |x| = |y| ≠ 0 (d) none of these

Q 4. cosec θ , where x ∈ R, y ∈ R, gives real θ if and only if

(a) x = y ≠ 0 (b) |x| = |y| ≠ 0 (c) x + y = 0, x ≠ 0 (d) none of these

Q 5. If sin θ + cosec θ = 2 then the value of sin8θ + cosec8θ is equal to

(a) 2 (b) 28 (c) 24 (d) none of these

Q 6. If x = rsin θ.cos φ, y = rsin θ . sin φ and z = rcos θ then the value of x2 + y2 + z2 is independent of

(a) θ, φ (b) r, θ (c) r, φ (d) r

Q 7. Let p = a cos θ - b sin θ. Then for all real θ

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

Q 8. If 0° < θ < 180° then

,

there being n number of 2’s, is equal to

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

Q 9. The value of + 4 is equal to

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

Q 10. The value of sin 78° - sin 66° - sin 42° + sin 6° is

(a)  (b) − (c) -1 (d) none of these

Q 11. The value of cosec 20° - sec 20° is equal to

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

Q 12. The maximum value of for real values of θ is

(a) 3 (b) 5 (c) 4 (d) none of these

Q 13. The minimum value of cos 2θ + cos θ of real values of θ is

(a)  (b) 0 (c) -2 (d) none of these

Q 14. The value of cosec 10° - is equal to

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

Q 15. The least value of cos2θ - 6 sin θ. cos θ + 3 sin2 θ + 2 is

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

Q 16. If cos4 θ . sec2 α, and sin4 θ .cosec2 α are in AP then

cos8 θ . cos6 α, and sin8 θ . cosec6 α are in

(a) AP (b) GP (c) HP (d) none of these

Q 17. If x and are in AP and , y and are also in AP then

(a) 2x = y (b) x > y (c) x = y (d) none of these

Q 18. If cos(x – y), cos x and cos(x + y) are in HP then equals

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

Q 19. If 2 sin α. cos β . sin γ = sin β . sin(α + γ) then tan α, tan β and tan γ are in

(a) AP (b) GP (c) HP (d) none of these

Q 20. If tan α = , where a is a rational number which is not a perfect square, then which of the following is a rational number ?

(a) sin 2α (b) tan 2α (c) cos 2α (d) none of these

Q 21. Let f(θ) = and . Then the value of f(α) . f(β) is

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

Q 22. If and are the roots of the equation 8x2 – 26x + 15 = 0 then cos(α + β) is equal to

(a)  (b)  (c) -1 (d) none of these

Q 23. If sin α + sin β = cos α – β = b then tan is equal to

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

Q 24. If 0 < β α < , cos (α + β) =  and (α – β) = then sin 2α is equal to

(a) 1 (b) 0 (c) 2 (d) none of these

Q 25. If cos then cos(α – β) is equal to

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

Q 26. If is equal to

(a)  (b) λ (c) 1 – λ (d) 1 + λ

Q 27. If |tan A| < 1, and |A| is acute then is equal to

(a) tan A (b) –tan 3θ (c) cot A (d) –cot A

Q 28. is equal to

(a) tan 2θ (b) tan 3θ (c) tan3 θ (d) none of these

Q 29. The set of all possible values of α in [–π, π] such that is equal to sec α – tan α is

(a)  (b)  (c) [π –, 0] (d) 

Q 30. For all real values of θ, cot θ – 2cot 2θ is equal to

(a) tan 2θ (b) tan θ (c) –cot 3θ (d) none of these

Q 31. Let a = cos A + cos B – cos (A + B) and b = . Then a – b is equal to

(a) 1 (b) 0 (c) − 1 (d) None of these

Q 32. If 3θ then k is equal to

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

Q 33. If asec α – ctan α = d and bsec α + dtan α = c then

(a) a2 + c2 = b2 + d2 (b) a2 + d2 = b2 + c2 (c) a2 + b2 = c2 + d2 (d) ab = cd

Q 34. If cos 20° – sin 20° = p then cos 40° is equal to

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

Q 35. If 3sin θ + 4cos θ = 5 then the value of 4sin θ – 3cos θ is

(a) 0 (b) 5 (c) 1 (d) none of these

Q 36. If cos 2x + 2cos x = 1 then sin2 x(2 – cos2x) is equal to

(a) 1 (b) –1 (c)  (d) 

Q 37. If then

(a) xyz = xz + y (b) xyz = xy + z (c) xyz = x + y + z (d) xyz = yz + x

Q 38. Let n be an odd integer. If sin nθ = for all real θ then

(a) b0 = 1, b1 = 3 (b) b0 = 0, b1 = n

(c) b0 = – 1, b1 = n (d) b0 = 0, b1 = n2 – 3n – 3

Q 39. If cos 5θ = acos5θ + bcos3θ then c is equal to

(a) – 5 (b) 1 (c) 5 (d) none of these

Q 40. If sin3x. sin is an identity in x, where cm’s are constant then the value of n is

(a) 4 (b) 6 (c) 9 (d) none of these

Q 41. The value of is equal to

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

Q 42. The numerical value of sin is equal to

(a) 1 (b)  (c)  (d) 

Q 43. The value of tan 63° – cot 63) is equal to

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

Q 44. The value of cos 9° – sin 9° is

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

Q 45. The value of 2tanis

(a) 0 (b)  (c) 1 (d) none of these

Q 46. The value of tan 20° + 2tan 50° – tan 70° is

(a) 1 (b) 0 (c) tan 50° (d) none of these

Q 47. If α, β, γ and δ be four angles of a cyclic quadrilateral then the value of cos α + cos β + cos γ + cos δ is

(a) 1 (b) 0 (c) – 1 (d) none of these

Q 48. If 4nα = π then cot α.cot 2α.cot 3α… cot (2n − 1)α is equal to

(a) 1 (b) – 1 (c) ∞ (d) none of these

Q 49. The value of cos 12°. cos 24°. cos 36°. cos 48°. cos 72°. cos 84° is

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

Q 50. The value of cos is

(a) 0 (b) 1 (c)  (d) none of these

Q 51. is equal to

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

Q 52. The value of sin to n terms is equal to

(a) 1 (b) 0 (c)  (d) none of these

Q 53. The sum of the real roots of cos6x + sin4 x = 1 in the interval – π < x ≤ π is equal to

(a) 0 (b) π (c) –π (d) none of these

Q 54. The number of real solution of the equation cos7 x + sin4 x = 1 in the interval [–π, π] is

(a) 2 (b) 3 (c) 5 (d) none of these

Q 55. If the solutions for θ from the equation sin2 θ – 2sin θ + λ = 0 lie in ∪then the set of possible values of λ is

(a)  (b) (–∞, 1) (c)  (d) [1]

Q 56. If ABCD is a convex quadrilateral such that 4sec A + 5 = 0 then the quadratic equation whose roots are tan A and cosec A is

(a) 12x2 – 29x + 15 = 0 (b) 12x2 – 11x – 15 = 0

(c) 12x2 + 11x – 15 = 0 (d) none of these

Q 57. If ABCD is a cyclic quadrilateral such that 12tan A – 5 = 0 and 5cos B + 3 = 0 then the quadratic equation whose roots are cos C, tan D is

(a) 39x2 – 16x – 48 = 0 (b) 39x2 + 88x + 48 = 0

(c) 39x2 – 88x + 48 = 0 (d) none of these

Q 58. The number of real solution of the equation sin(ex) = 2x + 2−x is

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

Q 59. The equation (cos p−1)x2 + (cos p)x + sin p = 0 in x has redal roots. Then the set of values of p is

(a) [0, 2π] (b) [–π, 0] (c)  (d) [0, π]

Q 60. If then the number of real values of x is

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

Q 61. If sin α = p, where |p| ≤ 1 then the quadratic equation whose roots are tan and cot is

(a) px2 + 2x + p = 0 (b) px2 – x + p = 0 (c) px2 – 2x + p = 0 (d) none of these

Q 62. If sec α and cosec α are the roots of x2 − px + q = 0 then

(a) p2 = q(q – 2) (b) p2 = q(q + 2) (c) p2 + q2 = 2q (d) none of these

Q 63. The number of values of x in the interval [0, 5π] satisfying the equation 3sin2x – 7sin x + 2 = 0 is

(a) 0 (b) 5 (c) 6 (d) 10

Q 64. If x = α, β satisfies both the equations cos2 x + acos x + b = 0 and sin2x + psin x + q = 0 then relation between a, b, p and q is

(a) 1 + b + a2 = p2 − q − 1 (b) a2 + b2 = p2 + q2

(c) 2(b + q) = a2 + p2 – 2 (d) none of these

Q 65. If 0 ≤ a ≤ 3, 0 < b ≤ 3 and the equation x2 + 4 + 3 cos (ax + b) = 2x heat at lest one solution then the value if a + b is

(a) 0 (b)  (c) π (d) none of these

Q 66. The equation cos for all x ∈ R has a real solution for θ. Then

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

Q 67. If , where x ≠ nπ, then the rage of values of f(x) for real values of x is

(a) [–1, 3] (b) (–∞, −1) (c) (3, +∞) (d) [–1, 3)

Q 68. The set of values of k ∈ R such that the equation cos 2θ + cos θ + k = 0 admits of a solution for θ is

(a)  (b) [0, +∞] (c) [–2, 0] (d) none of these

Q 69. The set of values of λ ∈ R such that tan2θ + sec θ = λ holds for some θ is

(a) (−∞, 1) (b) (–∞, –1] (c) φ (d) [–1, +∞)

Q 70. If tan A + tan B + tan C = tan A . tan B. tan C then

(a) A, B, C must be angles of a triangle

(b) the sum of any two of A, B, C is equal to the third

(c) A + B + C must be an integral multiple of π

(d) none of these

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

Q 71. If x = sin (α – β). sin (γ – δ), y = sin(β – γ). Sin (α – δ) and

z = sin(γ – α). Sin (β – δ) then

(a) x + y + z = 0 (b) x + y – z = 0 (c) y + z – x = 0 (d) x3 + y3 + z3 = 3xyz

Q 72. is equal to

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

Q 73. Which of the following is a rational numbers?

(a) sin 15° (b) cos 15° (c) sin 15° (d) sin 15°. cos 75°

Q 74. If then for all ral x

(a) the least positive value of a is  (b) the greatest negative value of a is –

(a) a ≤  (d) – ≤ a ≤ 

Q 75. Let y = sin2x + cos4x. Then for all real x

(a) the maximum value of y is 2 (b) the minimum value of y is 

(c) y ≤  (d) y ≥ – 1

Q 76. Let y = sin x. sin (60° + x). sin (60° – x). sin(60° – x). Then for al real x

(a) the minimum value of y is –  (b) then maximum value of y is 1

(c) y ≤  (d) y ≥ – 1

Q 77. Let fn(θ) = tan .(1 + sec θ)(1 + sec 2θ)(1 + sec 4θ)… (1 + sec 2nθ). Then

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

Q 78. Let 0 ≤ θ < and x = Xcos θ + Ysinθ, y = Xsinθ – Ycos θ such that

x2 + 4xy + y2 = aX2 + bY2, where a,b are constants. Then

(a) a = – 1, b = 3 (b)  (c) a = 3, b = – 1 (d) θ = 

Q 79. If 7cos x – 4sin x = λcos(x + α) < , be true for all x ∈ R then

(a) λ = 25 (b) α = sin–1  (c) λ = – 25 (d) α = cos–1 

Q 80. If A + B = and cos A + cos B = 1 then

(a) (b) (c)  (d) |cos A – cos B| = 

Q 81. If tan θ = a ≠ 0, tan 2θ = b ≠ 0 and tan θ + tan 2θ = tan 3θ then

1. a = b (b) ab = 1 (c) a + b = 0 (d) b = 2a

Q 82. cos3x. sin 2x = sin mx is an identity in x. Then

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

Q 83. If 1 + cos(x – y) = 0 then

(a) cos x – cos y = 0 (b) cos x + cos y = 0 (c) sin x + sin y = 0 (d) cos x + sin y = 1

Q 84. If A ≥ 0, B > 0, A + B and y = tan A. tan B then

(a) the maximum value of y is 3 (b) the minimum value of y is 

(c) the maximum value of y is  (d) the minimum value of y is 0

Q 85. is equal to

(a) an integer (b) a positive rational number

(c) a negative rational number (d) an irrational number

**Answers**

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

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

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

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

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

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

61c 62b 63c 64d 65c 66b 67d 68a 69d 70c

71a,d 72a,d 73c 74a,b 75b,c 76a,c 77a,b,c,d 78b,c 79a,b,d 80b,c

81c 82a,c,d 83b,c 84c,d 85c