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

Q 1. If f(x) = x2 + λx + μ be integral function of the integral variable x then

(a) λ is an integer and μ is a rational fraction

(b) λ and μ are integers

(c) μ is an integer and λ is a rational fraction

(d) λ and μ are rational fractions

Q 2. Let f(x) = ax2 + bx + c, where a, b, c are rational, and f : → where is the set of integers. Then a + b is

(a) a negative integer (b) an integer

(c) nonintegral rational number (d) none of these

Q 3. If f(x) = cos [π]x + cos [πx], where [y] is the greatest integer function of y then is equal to

(a) cos 3 (b) 0 (c) cos 4 (d) none of these

Q 4. Let f(x) = sin (tan-1x). Then [f(-)], where [.] denotes the greatest integer function, is

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

Q 5. If f(x) = then f(ax) in term of f(x) is equal to

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

Q 6. Let f(1) = 1 and f(n) = 2. Then is equal to

(a) 3m – 1 (b) 3m (c) 3m-1 (d) none of these

Q 7. If f(x + 1) + f(x – 1) = 2f(x) and f(0) = 0 then f(n), n ∈ N, is

(a) nf(1) (b) {f(1)}n (c) 0 (d) none of these

Q 8. If f(x + 1) + bf= x, x ≠ -1, a ≠ b then f(2) is equal to

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

Q 9. Let f be a function satisfying f(x + y) = f(x) + f(y) for all x, y ∈ R. If f(1) = k then f(n), n ∈ N, is equal to

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

Q 10. Let f be a function satisfying f(x + y)= f(x).f(y) for all x, y ∈ R. If f(1) = 3 then is equal to

(a)  (b)  (c) 3n+1 – 3 (d) none of these

Q 11. If f(x + y) = f(x) + f(y) – xy – 1 for all x, y, and f(1) = 1 then the number of solutions of f(n) = n, n ∈ N, is

(a) one (b) two (c) four (d) none of these

Q 12. Let f(x) = 1 + | x |, x < -1

[x], x ≥ -1, where [.] denotes the greatest integer function.

Then f{f(-2, 3)} is equal to

(a) 4 (b) 2 (c) -3 (d) 3

Q 13. The domain of the function

y = log10 log10 log10….log10 x is

(a) [10n, +∞) (b) (10n-1, +∞) (c) (10n – 2, +∞) (d) none of these

Q 14. The largest set of real values of x for which



is real function is

(a) [1, 2) ∪ (2, 5] (b) (2, 5] (c) [3, 4] (d) none of these

Q 15. Let f(x) = (x12 – x9 + x4 – x + 1)-1/2. The domain of the function is

(a) (1, +∞) (b) (-∞, -1) (c) (-1, 1) (d) (-∞, +∞)

Q 16. The domain of the function f(x) = is

(a)  (b) [-1, 1]

(c)  (d) 

Q 17. The domain of the function is

(a) {x | x < 1} (b) {x | x > -1} (c) [0, 1] (d) [-1, 1]

Q 18. The domain of the function f(x) = log10 log10 (1 + x3) is

(a) (-1, +∞) (b) (0, +∞) (c) [0, +∞) (d) (-1, 0)

Q 19. The domain of the function , where [x] = the greatest integer less than or equal to x, is

(a) R (b) [0, +∞) (c) (-∞, 0] (d) none of these

Q 20. The domain of is

(a) [-2nπ, 2nπ] (b) (2nπ, π) (c) (d)

Q 21. The domain of is

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

Q 22. The domain of the function f(x) = , where the symbols have their usual meanings, is the set

(a) {1, 2, 3, 4, 5} (b) {2, 3, 4} (c) {2, 3} (d) none of these

Q 23. The domain of is

(a) {1} (b) (-1, 1) (c) {1, -1} (d) none of these

Q 24. The domain of the function is

(a) (-∞, -3] ∪ [3, +∞) (b) [3, +∞) (c) φ (d) R

Q 25. The function is real valued. It is defined if

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

Q 26. The domain of the real-valued function f(x) = loge | loge x | is

(a) (1, +∞) (b) (0, +∞) (c) (e, +∞) (d) none of these

Q 27. If [.] denotes the greatest integer function then the domain of the real valued function is

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

Q 28. The domain of the function f(x) = loge (x – [x]), where [.] denotes the greatest integer function, is

(a) R (b) R -  (c) (0, +∞) (d) none of these

Q 29. The domain of the function f(x) = sin-1 (x + [x]), where [.] denote the greatest integer function, is

(a) [0, 1) (b) [-1, 1] (c) (-1, 0) (d) none of these

Q 30. Let f(x) = and g(x) = logx 5 then f(x) = g(x) holds for x belonging to

(a) R (b) (0, 1) ∪ (1, +∞) (c) φ (d) none of these

Q 31. Let f(x) = and g(x) = sec2 x – tan2 x. The two functions are equal over the set

(a) φ (b) R (c)  (d) none of these

Q 32. The range of the function is

(a) [1, +∞) (b) [2, +∞) (c)  (d) none of these

Q 33. Let f(x) = . The range of f is

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

Q 34. The range of the real-valued function is

(a) [0, 3] (b) [-3, 3] (c) [-3, 0] (d) none of these

Q 35. The range of the function f(x) = | x – 1 | + | x - 2|, -1 ≤ x ≤ 3, is

(a) [1, 3] (b) [1, 5] (c) [3, 5] (d) none of these

Q 36. The range of the function is

(a) (0, 2] (b) (-∞, 2] (c) (0, 9] (d) none of these

Q 37. Let f:{x, y, z} → {a, b, c} be a one-one function and only one of the conditions (i) f(x) ≠ b, (ii) f(y) = b, (iii) f(z) ≠ a is true then the function f is given by the set

(a) {(x, a), (y, b), (z, c)} (b) {(x, a), (y, c), (z, b)} (c) {(x, b), (y, a), (z, c)} (d) {(x, c), (y, b), (z, a)}

Q 38. Let f : R → R be a function such that f(x) = x3 – 6x2+ 11x – 6. Then

(a) f is one-one and into (b) f is many-one and into

(c) f is one-one and onto (d) f is many-one and onto

Q 39. Let f : R → R be a function such that f(x) = x3 + x2 + 3x + sin x. Then

(a) f is one-one and into (b) f is one-one and onto

(c) f is many-one and into (d) f is many-one and onto

Q 40. The function f : R → R defined by f(x) = 6x + 6|x| is

(a) one-one and onto (b) many-one and onto

(c) one-one and into (d) many-one and into

Q 41. If the real-valued function f(x) = px + sin x is a bijective function then the set of possible value of p ∈ R is

(a) R − {0} (b) R (c) (0, +∞) (d) none of these

Q 42. Let f(x) = 2x + |cos x|. Then f is

(a) one-one and into (b) one-one and onto (c) many-one and into (d) many-one and onto

Q 43. Let f be a function from R to R given by . Then f(x) is

(a) one-one and into (b) one-one and onto (c) many-one and into (d) many-one and onto

Q 44. Let f : R → A = be a function such that f(x) = tan-1(x2 + x + k), where k is a constant. The value of k for which f is an onto function, is

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

Q 45. is a function from R → R. Then f(x) is

(a) injective (b) surjective (c) bijective (d) none of these

Q 46. Which of the following is an even function ?

Here [.]denotes the greatest integer function and f is any function.

(a) [x] – x (b) f(x) – f(-x) (c) e3-2x . tan2x (d) f(x) + f(-x)

Q 47. Let f(x) = |x – 2| + |x – 3| + |x – 4| and g(x) = f(x + 1). Then

(a) g(x) is an even function (b) g(x) is an odd function

(c) g(x) is neither even nor odd (d) g(x) is periodic

Q 48. is

(a) an odd function (b) a periodic function (c) an even function (d) none of these

Q 49. A function whose graph is symmetrical about the y-axis is given by

(a)  (b) for all x, y ∈ R

(c)  (d) none of these

Q 50. A function whose graph is symmetrical about the origin is given by

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

Q 51. Let f(x) = 4, x < -1

-4x, -1 ≤ x ≤ 0.

If f(x) is an even function in R then the definition of f(x) in (0, +∞) is

(a) f(x) = 4x, 0 < x ≤ 1 (b) f(x) = 4x, 0 < x ≤ 1 (c) f(x) = 4, 0 < x ≤ 1 (d) none of these

4, x > 1 -4, x > 1 4x, x > 1

Q 52. If , |x| < 1

x |x|, |x|≥ 1 then f(x) is

(a) an even function (b) an odd function (c) a periodic function (d) none of these

Q 53. The period of the function f(x) = + |cos x| is

(a) 2π (b) π (c) 4π (d) none of these

Q 54. If f(x) is a periodic function of the period k then f(kx + a), where a is a constant, is a periodic function of the period

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

Q 55. The period of the function f(x) = 4cos(2x + 3) is

(a) 2π (b)  (c) π (d) none of these

Q 56. The period of the function f(x) = is

(a) 6 (b) 24 (c) 8 (d) 2π

Q 57. Let f(x) = ,where p = [a] = the greatest integer less than or equal to a. If the period of f(x) is π then

(a) a ∈ [4, 5] (b) a = 4, 5 (c) a ∈ [4, 5) (d) none of these

Q 58. Let f(x) = cos 3x + . Then f(x) is

(a) a periodic function of period 2π (b) a periodic function of period 

(c) not a periodic function (d) none of these

Q 59. The function is

(a) not periodic (b) periodic, with period 2(n!)

(c) periodic, with period (n + 1) (d) none of these

Q 60. The function f(x)= x – [x] + cos x, where [x] = the greatest integer less than or equal to x, is a

(a) periodic function of indeterminate period (b) periodic function of period 2π

(c) nonperiodic function (d) periodic function of period 1

Q 61. Let f(x) = nx + n – [nx + n] + , where [x] is the greatest integer ≤ x and n ∈ N. It is

(a) a periodic function of period 1 (b) a periodic function of period 4

(c) not periodic (d) a periodic function of period 2

Q 62. Let f(x) = x(2 – x), 0 ≤ x ≤ 2. If the definition of f is extended over the set R – [0, 2] by f(x + 2) = f(x) the f is a

(a) periodic function of period 1 (b) nonperiodic function

(c) periodic function of period 2 (d) periodic function of period 

Q 63. If then (gof)(x) is

(a) a polynomial of the first degree in sin x, cos x

(b) a constant function

(c) a polynomial of the second degree in sin x, cos x

(d) none of these

Q 64. If f(x) = xn, n ∈ N and (gof)(x) = ng(x) then g(x) can be

(a) n |x| (b) 3 .  (c) ex (d) log |x|

Q 65. If g{f(x)| = |sin x| and f{g(x)} = then

(a)  (b) 

(c)  (d) f and g cannot be determined

Q 66. If , x ≠ 0, 1, then the graph of the function y = f{f(f(x))}, x > 1, is

(a) a circle (b) an ellipse (c) a straight line (d)a pair of straight lines

Q 67. If f(x) is a polynomial function of the second degree such that f(-3) = 6, f(0) = 6 and f(2) = 11 then the graph of the function f(x) cuts the ordinate x = 1 at the point

(a) (1, 8) (b) (1, 4) (c) (1, -2) (d) none of these

Q 68. Let f(x) be a function whose domain is [-5, 7]. Let g(x) = |2x + 5|. Then the domain of (fog)(x) is

(a) [-5, 1] (b) [-4, 0] (c) [-6, 1] (d) none of these

Q 69. Let f : (-∞, 1] → (-∞, 1] such that f(x) = x(2 – x). Then f-1(x) is

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

Q 70. If f(x) = 3x – 5 then f-1(x)

(a) is given by  (b) is given by 

(c) does not exist because f is not one-one (d) does not exist because f is not onto

Q 71. If the function f: [1, +∞) → [1, +∞) is defined by f(x) = 2x(x-1) then f-1(x) is

(a)  (b)  (c)  (d) not defined

Q 72. If the function f : R → R be such that f(x) = x – [x], where [y] denotes the greatest integer less than or equal to y, then f-1(x) is

(a)  (b) x – [x] (c) not defined (d) none of these

Q 73. The inverse function of the function is

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

Q 74. The graph of a real-valued function f(x) is the following.

The function is



(a) f(x) = x - |x| (b) f(x) = x + |x| (c) f(x) = 2x (d) none of these

Q 75. If f(x + y, x – y) = xy then the arithmetic mean of f(x, y) and f(x, y) is

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

Q 76. The graph of the function y = f(x) is symmetrical about the line x = 2.

Then

(a) f(x + 2) = f(x – 2) (b) f(2 + x) = f(2 – x) (c) f(x) = f(-x) (d) none of these

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

Q 77. Let f(x) = x2, 0 < x < 2

2x – 3, 2 ≤ x < 3

x + 2, x ≥ 3. Then

(a)  (b) 

(c) f{f(1)} = f(1) = 1 (d) none of these

Q 78. If f(x) = cos2x + cos2- cos x . then

(a) f(x) is an even function (b) 

(c) f(x) is a constant function (d) f(x) is not periodic function

Q 79. If one of the roots of x2 + f(a) . x + a = 0 is equal to the third power of the other for real a then

(a) the domain of the real-valued function f is the set of non-negative real numbers

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

Q 80. If f is an even function defined on the interval (-5, 5) then a value of x satisfying the equation is

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

Q 81. Let f(x) = [x] = the greatest integer less than or equal to x and g(x) = x – [x]. Then for any two real numbers x and y

(a) f(x + y) = f(x) + f(y) (b) g(x + y) = g(x)+ g(y) (c) f(x + y) = f(x) + f{y + g(x)} (d) none of these

Q 82. Let x ∈ N and let x be a perfect square. Let f(x) = the quotient when x is divided by 5 and g(x) = the remainder when x is divided by 5. Then = f(x) + g(x) holds for x equal to

(a) 0 (b) 16 (c) 25 (d) none of these

Q 83. If f(x) = 27x3 + and α, β are the roots of 3x + = 2 then

(a) f(α) = f(β) (b) f(α) = 10 (c) f(β) = -10 (d) none of these

Q 84. If f(x) = sin-1(sin x) then

(a) f(x) = π - x, 0 ≤ x ≤ (b) f(x) = π - x, ≤ x ≤ π

(c) f(x) = x, 0 ≤ x ≤ π (d) f(x) = -x, -≤ x ≤ 0

Q 85. If ex + ef(x) = e then for f(x)

(a) domain = (-∞, 1) (b) range = (-∞, 1) (c) domain = (-∞, 0] (d) range = (-∞, 1]

Q 86. If f(x) is an odd function then

(a) is an even function

(b) [|f(x)| + 1] is even, where [x] = the greatest integer ≤ x

(c) is neither eve nor odd (d) none of these

Q 87. Let f(x) = sec-1[1 + cos2x] where [.] denotes the greatest integer function. Then

(a) the domain of f is R (b) the domain of f is [1, 2]

(c) the range of f is [1, 2] (d) the range of f is {sec-11, sec-1 2}

Q 88. If f(x) and g(x) are two functions of x such that f(x) + g(x) = ex and g(x) – g(x) = e-x then

(a) f(x) is an odd function (b) g(x) is an odd function

(c) f(x) is an even function (d) g(x) is an even function

Q 89. Let f(x) = . Then

(a) the domain of f is  (b) the range of f is [-1, 1]

(c) the domain of f is  (d) the range of f is [-4, 4]

Q 90. Let f(x + y) = f(x) + f(y) for all x, y ∈ R. Then

(a) f(x) is an even function (b) f(x) is an odd function

(c) f(0) = 0 (d) f(n) = nf(1), n ∈ N

Q 91. Let f(x) = [x]2 + [x + 1] – 3, where [x] = the greatest integer ≤ x. Then

(a) f(x) is a many-one and into function (b) f(x) = 0 for infinite number of values of x

(c) f(x) = 0 for only two real values (d) none of these

Q 92. Let f and g be functions from the interval [0, ∞) to the interval [0, ∞) f being an increasing function and g being a decreasing function. If f{g(0)} = 0 then

(a) f{g(x)} ≥ f{g(0)} (b) g{f(x)} ≤ g{f(0)} (c) f{g(2)} = 0 (d) none of these

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

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

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

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

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

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

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

71b 72c 73a 74b 75c 76b 77abc 78abc 79ab 80abcd

81c 82bc 83ac 84b 85ab 86ab 87ad 88bc 89cd 90bcd

91ab 92bc