**Miscellaneous Questions**

**Type – 1**

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

Q 1. If y is a function of x defined by ax+y = ax + ay where a is a real constant (a > 1) then the domain of y(x) is

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

Q 2. If y is a function of x given by 21og y - log x — log (y - 1) = 0 then the

(a) domain = [4,+ ∞ ), range = (1,+ ∞) (b) domain = [4, +∞), range = (2, +∞)

(c) domain = (2, +∞), range = (2, +∞) (d) none of these

Q 3. If the latus rectum of the parabola 2x2 - ky + 3 = 0 be 2 then the vertex is

(a)  (b)  (c)  (d) (0, 0)

Q 4. The ends of a quadrant of a circle have the coordinates (1, 3) and (3,1). Then the centre of such a circle is

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

Q 5. If the function f(x) = x2 ­– ax + 4 is monotonic increasing in the open interval (2, +∞) then a is

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

Q 6. If = the total number of arrangements of 4 different things taking at least one at a time, then x is equal to

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

Q 7. Let Ar; r = 1,2,3, …, be points on the number line such that OA1, OA2, OA3, are in GP where O is the origin, and the common ratio of the GP be a positive proper fraction. Let Mr be the middle point of the line segment Ar + 1 Ar.

Then the value of is equal to

(a)  (b)  (c)  (d) ∞

Q 8. If x2 − px + q, q ≠ 0, is a factor of x3 – ax2 + bx − c, c ≠ 0, then

(a) pq + c = aq (b) q(ac – b + 1) = c2 (c) q2 + c2 = pqc (d) a2 + b2 + c2 = p2 + q2

Q 9. The shortest distance between the lines whose equations are and is

(a) 3 (b)  (c)  (d) 

Q 10. Four cards are drawn at random from a pack of 52 playing cards. The probability that the draw contains exactly one pair (i.e., having the same number) is

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

Q 11. If  < x < 1 then cos–1x + is equal to

(a)  (b) 2cos−1x (c)  (d) 0

Q 12. Two circles x2 + y2 - 2kx = 0 and x2 + y2 - 4x - 8y + 16 = 0 touch each other externally. Then k is

(a) 4 (b) 1 (c) 2 (d) – 4

Q 13. ABC is an equilateral triangle of side 4 cm. If R, r, h be the circumradius inradius and altitude respectively thenis equal to

(a) 4 (b) 2 (c) 1 (d) 3

Q 14. If y = 2 be the directrix and (0, 1) be the vertex of the parabola x2 + λy + μ = 0 then (λ, μ) is equal to

(a) (8,-8) (b) (8,8) (c) (-4,4) (d) (4,-4)

Q 15. The real value of a for which the value of m satisfying the equation (a2 - 1)m2 - (2a - 3)m + a = 0 gives the slope of a line parallel to the y-axis

(a)  (b) 0 (c) 1 (d) ±1

Q 16. The number of values of θ satisfying 4cos θ + 3 sin θ = 5 as well as 3cos θ + 4sin θ = 5 is

(a) one (b) two (c) zero. (d) none of these

Q 17. Four boys and eight gills sit at random in a row. The probability that each boy sits between two girls is

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

Q 18. ,where [x] denotes the greatest integer £ x, is equal to

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

Q 19. If then value of is

(a)  (b) aλ (c) 2aλ (d) none of these

Q 20. The value of tan-12 + tan-1 3 is equal to

(a)  (b)  (c) tan–15 (d) 

Q 21. If in the ΔABC, AC is double of AB then the value of is equal to

(a)  (b)  (c) 3 (d) 

Q 22. Let C1,C2, ...,Cn,,... be a sequence of concentric circles. The nth circle has the radius n and it has n openings. A point P starts travelling on the smallest circle C1 and leaves it at an opening along the normal at the point of opening to reach the next circle C2.Then it moves on the second circle C2 and leaves it likewise to reach the third circle C3 and so on. The total number of different paths in which the point can come out of the nth circle is

(a) 2n. n! (b) 2n-1.n! (c) n! (d) 2n-1.(m - 1)!

Q 23. If are orthogonal unit vectors then for a vector , noncoplanar with and , the vector  is equal to

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

Q 24. If the rank of the matrixis 2 then

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

Q 25. The number of solutions of the equationis

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

Q 26. If the line ax + by = 2 is a normal to the circle x2 + y2 - 4x - 4y = 0 and a tangent to the circle x2 + y2 = 1 then

Q 27. If A and B are two independent events then which of the following is not equal to any of the remaining?

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

Q 28. An event X can take place in conjunction with any one of the mutually exclusive and exhaustive

events A, B and C. If A, B, C are equiprobable and the probability of X is 5/12, and the probability of X taking plate when A has happened is 3/8 while it is 1 /4 when B has taken place then the probability of X taking place in conjunction with C is

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

Q 29. The largest value of a for which the circle x2 + y2 = a2 falls totally in the interior of the parabola y2  = 4(x + 4) is

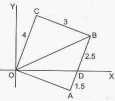
(a)  (b) 4 (c)  (d) 

Q 30. Let where [.] denotes the greatest integer function. Then the vectorsare

(a) perpendicular to each other (b) parallel to each other

(c) inclined at an angle cos-1  (d) inclined at cos-1 

Q 31. The equation of the diagonal OB of the rectangle given in the diagram is

  
(a) y = 2x (b) 2y = x (c) 3y = x (d) none of these

Q 32. Let f(x) be a continuous function whose range is [2,6.5]. If h(x) = , λ ∈ N, be continuous, where [.] denotes the greatest integer function, then the least value of X is

(a) 6 (b) 7 (c) 8 (d) none of these

Q 33. For the equation 1 + sin x = ax, the number of solutions is

(a) 1 if a > 1 (b) at least 3 if 0 < a < 1 (c) 2 if a = 1 (d) none of these

Q 34. If the point (0, λ) is a point of the region bounded by the semicircle x = and the line x = 0 then the equation x2 - 2x - λ = 0 has

(a) at least one real root in [2,3] (b) at least one real root in [-1, 0]

(c) two real roots in [-1, 3] (d) no real roots in (0,2)

Q 35. Let E be an event which is neither a certainty nor an impossibility. Its probability is such that P(E) = 1 + λ + λ2 and P(E') = (1 + λ)2 in terms of an unknown X. Then P(E) is equal to

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

Q 36. A word of at least 5 letters is made at random from 3 vowels and 3 consonants, all the letters being different The probability that no consonant falls between any two vowels in the word is

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

Q 37. A number is selected at random from the first twenty-five natural numbers. If it is a composite number then it is divided by 5. But if it is not a composite number, it is divided by 2. The probability that there will be no remainder in the division is

(a) AP (b) 0.4 (c) 0.2 (d) none of these

Q 38. If Pr = (xr, yr); r = 1, 2,3; are three points on the parabola x2 = 8y, where x1, x2, x3 are in GP, then y1, y2, y3 are in

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

Q 39. Let fix) be an even function in R. If f(x) is monotonic increasing in [2,6] then

(a) f(3) > f (-5) (b) f(-2) < f(2) (c) f(-2) > f(2) (d) f(-3) < f (5)

Q 40. If (2) = g(2) and f'(2) = a, g'(2) = 2a thenis equal to

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

Q 41. If are three vectors such thatand then λ is

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

Q 42. If f(x) = where [x] = greatest integer less than or equal to x then f(π/2) is

(a) {sin 1 + (π – 2) sin 2} (b) {sin 1 + sin 2 + (π – 3)sin 3}

(c) 0 (d) sin 1 + 

Q 43. where [x] = greatest integer ≤ x, is equal to

(a) (e2 - 1)(e + 1) (b) e – 1 (c) (e2 + 1)(e - 1) (d) e2 + 1

Q 44. Let f(x) = min{x, 1 - x} for all x ∈ R. Then the value of f(x) dx is

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

Q 45. A dice is thrown six times, being known that each time a different digit shows up. The probability a sum of 12 will be obtained in the first three throws is

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

Q 46. A composite number is selected at random from the first 30 natural numbers and it is divided by 5. The probability that there will be a remainder is

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

Q 47. In a ΔABC the sides b, c and the angle B are given such that a has two? values a1, a2. Then |a1 - a2| is equal to

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

Q 48. If f:(3,4) → (0, 1) is defined by f(x) = x-[x] where [x] denote the greatest integer function then f-1 (x) is

(a)  (b) [x] - x (c) x - 3 (d) x + 3

Q 49. Let f(x) = [4 + 3cos x], x ∈ , where [x] = greatest integer less than or equal to x. The number of points of discontinuity of f(x) is

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

Q 50. Let (x) = 1-(1 - x)2, x < 1. The number of solutions of the equation f{f(x)} = x is

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

Q 51. The system of inequations x - y ≤ -1, y ≤ x, x ≥ 0, y ≥ 0 has

(a) one solution (b) infinite number of solutions

(c) finite number of solutions (d) no solution

Q 52. If px = qw = a and qy = zz = b then

(a) xy = wz (b) xz = yw (c) x + z = y + w (d) x + y = a + w

Q 53. If sinθ – 1 = 0 and 2cos θ + = 0 then the general values of θ are given by

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

Q 54. The angle between the straight lines joining the point (–1, 0) to the common points of 3x2 + 5xy – 3y2 + 8x + 8y + 5 = 0 and 3x – 2y + 2 = 0 is

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

Q 55. If xcos α + y sin α = p is a tangent to the circle x2 + y2 = 2q (xcos α + ysin α) then the set of possible values of p is

(a) {q} (b) {0,q} (c) {0, 2q} (d) {q, 2q}

Q 56. If and g are two functions such that (fg)(x) = (gf)(x) for all x. Then f and g may be defined as

(a) f(x) , g(x) = cos x

(b) f(x) = x3, g(x) = x + 1

(c) f(x) = x – 1, g(x) = x2 + 1

(d) f(x) = xm, g(x) = xn where m,n are unequal integers

Q 57. If the parabola y = ax2 – 6x + b passes through (0, 2) and has its tangent at parallel to the x−axis then

(a) a = 2, b = – 2 (b) a = 2m b = 2 (c) a = –2, b = 2 (d) a = –2, b = –2

Q 58. If f(x) = , x > 0, then f(x).f’(x) is equal to

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

Q 59. If in a ΔABC, 4tan A + 3 = 0 then sin and cos are the roots of

(a) 10x2 – 4x + 3 = 0 (b) 10x2 + 4x + 3 = 0

(c) 101x2 – 4x – 3 = 0 (d) 10x2 + x – 3 = 0

Q 60. If sin6θ + cos6θ + kcos22θ = 1 then k is equal to

(a) tan2θ (b) tan2θ (c) 4cot2θ (d) tan22θ

Q 61. If a,b,c are in AP and one root of the equation ax2 + bx + c = 0 is 2 then the other roots is

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

Q 62. The number of solution of [cos x] + |sin x| 1 in π ≤ x < 3π is

(a) 3 (b) 4 (c) 2 (d) 1

Q 63. A variable lineis drawn through the point (k, 2k) so as to form a triangle of area A. If a, b are of the same sign then the least value of A is

(a) k2 (b) 2k2 (c) 4k2 (d) 8k2

Q 64. If the set A = then which of the following intervals is a subset of A?

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

Q 65. If θ ∈then the value of coslies in the interval

(a)  (b)  (c)  (d) (0, 1)

Q 66. In ΔABC, the median AD divides ∠BAC such that ∠BAD : ∠CAD = 2: 1.

Then cosis equal to

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

Q 67. If the coordinates of two vertices and the orthocentre of a triangle are integers then the coordinates of the third vertex must be

(a) integers (b) rational numbers (c) irrational numbers (d) none of these

Q 68. The number of triangles that the four lines y = x + 3,y = 2x + 3,y = 3x + 2 and y + x = 3 form is

(a) 4 (b) 2 (c) 3 (d) 1

Q 69. Let PQR be a right-angled triangle, right angled at P(2,1). If the equation of the line QR is 2x + y = 3 and Q = (2,-1) then the centroid of the ΔPQR

(a) (b)  (c) (2, 0) (d) 

Q 70. If n is a multiple of 3 them the coefficient of xn in the expansion of loge(1 + x + x2), |x| < 1, is

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

Q 71. The possible number of different orders that a matrix can have when it has 24 elements, is

(a) 8 (b) 16 (c) 4 (d) none of these

Q 72. If in the expansion of (1 + x)m'.(1 - x)n, the coefficients of x and x2 are 3 and -6 respectively then

(a) m = 6,n = 15 (b) m = 9, n = 12 (c) m = 12,n = 9 (d) m = 24, n = 21

Q 73. The coefficient of x28 in the expansion of (1 + x3 - x6)30 is

(a) 1 (b) 0 (c) 30C6 (d) 30C3

Q 74. (n + 2). nC0 . 2n+1-(n + 1)- nC1.2n + n. nC2 . 2n-1-...is equal to

(a) 4 (b) 4n (c) 4(n + 1) (d) 2(n + 2)

Q 75. If un = 2cos n0 then u1un - un-1 is equal to

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

Q 76. Thevalueoftan90 - tan27° - tan63o + tan81° is

(a) 4 (b) 3 (c) 2 (d) 1

Q 77. tanare in

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

Q 78. Thenumberofrealsolutionsoftheequationcos7x + sin5x = 1, 0 < x < 2p, is

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

Q 79. The sum of cos-13 + cot-113 + cot-121 + cot-131 is

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

Q 80. One root of the equation 2cos x 1 = 2x lies in the interval

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

Q 81. If 2, 4 are in HP then x is equal to

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

Q 82. The value of is equal to

(a)  (b)  (c)  (d) π

Q 83. In a ΔPQR, ∠R =. If tan and tanare the roots of the equation ax2 + bx + c = 0 then

(a) a + b = c (b) b + c = a (c) a + c = b (d) b = c

Q 84. A particle moving on a curve has the position given by x =f'(t) sin t + f"(t) cos t, y = f'(t) cos t - f"(t) sin at where f is a thrice - differentiable function. Then the velocity of the particle at time t is

(a) f"'(t) (b) f'(t) + f'"(t) (c) f'(f) + f"(t) (d) f'(f) - f'"(t)

85. If f(x) = cos-1then f'(-2) is

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

Q 86. The slope of the tangent to the curve tan y = is

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

Q 87. then A + B + C + D is

(a) 4 (b) 3 (c) 0 (d) 2

Q 88. The distance between the plane whose equation is = 5 and the line whose equation is , is

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

Q 89. The number of ways in which 10 red balls, 10 green balls and a white ball can be arranged in a row with the white ball in the middle, and the arrangement of colours on balls being symmetrical about the white ball,

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

Q 90. A flag is to be coloured in four stripes by using 6 different colours, no two consecutive stripes being of the same colour. This can be done in

(a) 1500 ways (b) 750 ways (c) 64 ways (d) none of these

Q 91. Two vertices of an equilateral triangle in the Argand plane represent the nonreal cube roots of unity. The area of the triangle is

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

Q 92. If 2x - y + 1 = 0, x + yz = 2, x > 0, y > then

(a) z e [0,2) (b) z ∈ (c) z ∈ [0,1] (d) z ∈

Q 93. Let A =and apq = ip+ q where i = .The value of A is

(a) real and positive (b) real and negative (c) 0 (d) imaginary

Q 94. A piece of paper is in the shape of a square of side 1 metre. It is cut at the four corners to make a regular polygon of eight sides (octagon). The area of the polygon is

(a) 2(– 1)m2 (b) ( - 1)m2 (c) m2 (d) none of these

Q 95. The sum of the first n terms of the series 3++...is

(a) 2n + 21-n (b) 2{n + 1 - 2-n} (c) n + 2n (d) none of these

Q 96. The number of solutions of || x - 4| - 1I = 2 is

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

Q 97. If 1 ∈ (α, β) where α, β are roots of x2 - a(x + 1) + 3 = 0 then

(a) a > 2 (b) a < - 6 or a > 2 (c) - 6 < a < 2 (d) a < 2

Q 98. The number of ways of selecting two numbers from the first 15 natural numbers such that their sum is a multiple of 5, is

(a) 20 (b) 36 (c) 21 (d) 16

Q 99. If  = 1 then the greatest value of |z| is

(a) 2 (b) 1 (c) 4 (d) 3

Q 100. If |z1 - z0| = |z2 - z0I = a and ampmen z0 is equal to

(a) {(1 + i)z1 + (1 - i)z2) (b) |(1 - i)z1 + (1 + i)z2} (c) Iz1 + z2) (d) none of these

Q 101. The fractional part of the number is

(a) 3/25 (b) 23/25 (c) 22/25 (d) 8/25

Q 102. A boy goes to a place with a speed of a km/h and comes back with a speed of b km/h. The

constant speed with which he should travel to cover the entire distance in the same total time is

(a) km/h (b) km/h (c) km/h (d) none of these

Q 103. If a, B be unequal real roots of the equation ax2 + bx + c = 0 where a, b, c are real and y is the solution of 2ax + b = 0 then

(a) γ > α, > β (b) γ < α, γ < β (c) α < γ < β or β < γ < α (d) none of these

Q 104. If f be a function defined as f(x) = ,x3 - 3x, -1 ≤ x ≤ 3 then the range of f is

(a) [0,24] (b) [-2,2] (c) [-2,18] (d) none of these

Q 105. Let a, b, c be unit vectors and α, β, γ are angles between the vectors a, b; b,c and c,a respectively. If a + b + c is also a unit vector then cos a + cos B + cos y is equal to

(a) -1 (b) 3 (c) -3 (d) 1

Q 106. If cos-1 x + cos-1 y + cos-1 z = 3π then the value of xy + yz + zx is

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

Q 107. Le fn (x) = . The value ofdx is

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

Q 108. Let three positive numbers a, b, c be in GP such that a, b + 8, c are in AP, while a, b + 8, c + 64 are in GP. Then the AM of a, b, c is

(a)  (b)  (c) 26 (d) 14

Q 109. The number of ways in which the five digits 1,2,3,4,5 can be arranged to make a number greater than 10000 such that the odd digits are in the ascending order, is

(a) 10 (b) 20 (c) 120 (d) 60

Q 110. The number of real solutions of the equationis

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

Q 111. Iff(x) = x3 - 6x2 + 6x then f(3l2+ ^4 + 2) has the value

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

Q 112. Let fix) = Ix +1|. The number of values of x ∈ [-2,2] for which f(x - 3), f(x - 1),f(x + 1) are in AT is

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

Q 113.In a college of 300 students, every student reads 5 newspapers and every newspaper is read by 60 students. The number of newspapers is

(a) at least 30 (b) at most 20 (c) exactly 25 (d) none of these

Q 114. IF (x + 1)(x1/2 + 1) (+ 1) = (x2 – 1) f(x) then f(x) is

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

Q 115. The minimum positive integral value of x such that (1073) 71 - x is divisible by 10, is

(a) 1 (b) 3 (c) 7 (d) 9

Q 116. The minimum value of Iz - 1| + IzI for complex values of z is

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

Q 117. If in ΔABC, a2 + b2 > c2 then the A is

(a) acute angled at C (b) obtuse angled at C (c) an acute-angled triangle (d) none of these

Q 118. In the ΔABC, BC b produced to D and ∠ACD = and tan A, tan B are roots of the equation x2 - >x + m = 0. Then

(a) λ2 - μ2 = 1 + 6μ (b) λ2 - μ2 = 1 (c) λ = μ – 1 (d) none of these

Q 119. If α, β are the roots of x2 + px + q = 0 and γ, δ are the roots of x2 + px – r = 0 thenis equal to

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

Q 120. If a body starts with a velocity u in a straight line with uniform aeceleration f and covers a distance s in time t seconds, and s, denotes the distance covered by it in the t th second, then s2, s4, s6 are in

(a) AP (b) GP (c) the ratio 3 : 7 :15 (d) the ratio 1: 3 : 7

Q 121. The value of is

(a) n.2n-1 – 1 (b) n .2n-1 + (n + 1)! (c) n.2n −1 + (n + 1)! – 1 (d) n2 + n + 5

Q 222. For a positive integer n, let a(n) = . Then

(a) a(100) ≤ 100 (b) a (100) ≥ 100 (c) a (200) ≤ 100 (d) a(200) ≥ 100

Q 123. If a is a nonreal root of x5 + 1 = 0 then a110m + 2 + a5n + 2 +a5n, where n is an odd positive integer, has the value

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

Q 124. If the 6th, 11th and 16th trams of a GP are a, b, c respectively then

(a) a + c = 2b (b) b2 = ac (c) a2 + c2 = b2 (d) none of these

Q 125. Let f(x) = x3 - 3x +1 and, f(0), f(1) are of opposite signs. Then the set of values of t is

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

Q 126. If z = 1 + cos + isinthen

(a) Re(z5) = (b) Re(z5)=  (c) Im(z5)=  (d) Im(z5) = 

Q 127. If f(x) = then  f(0)is

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

Q 128. If a, b, c, d are non-negative real numbers where a + b + c + d =1 then the maximum value of ab + bc + cd is

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

Q 129. If x 3 - mx2 - 3x + 2 - 0 has two roots equal in magnitude but opposite in sign then m is

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

Q 130. If ui = 1 –  then u2.u3. ... un is equal to

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

Q 131. The value of is equal to

(a) 2n (b) 2n + 1 (c) 3.2n (d) 2n - 1

Q 132. If in the triangle ABC the equation of the side BC is x + 2y = 3, the vertex A is (1,2) and the abscissa of the orthocentre is 3 then the ordinate of the orthocentre is

(a) 6 (b) 4 (c) 2 (d) 0

Q 133. If the circles x2 + y2 - 2x = 0 and x2 + y2 + 2>.y = 4have only one common tangent then X is

(a) 1 (b) – 1 (c) 0 (d) 2

Q 134. The least number of sides of a polygon in which the number of diagonals is at least 10 more than the number of sides, is

(a) 8 (b) 10 (c) 11 (d) 25

Q 135. If the algebraic sum of the distance of the points (1,2), (-3,1) and (2, -5) from a straight line be equal to zero then the straight line must pass through

(a) (0,-2) (b) (0,0) (c)  (d) at least one of the given points

Q 136. Let ABCDEF be a regular hexagon in the x-y plane and = 4.Then CD is equal to

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

Q 137. In a ΔABC, ∠B = . The range of values of \*, where x = sin A.sin C, is the interval

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

Q 138. If φ(x) =then the value of

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

Q 139. If f(x + 2) = and f(x) > 0 for all x e R then f(x) is

(a) 1 (b) 2 (c) – 2 (d) 0

Q 140. If I =  dx then I is equal to

(a) 0 (b) π (c)  (d) 

Q 141. If the equations 4x2 - x - 1 = 0 and 3x2 + (λ + μ)x + λ - μ = 0 have a common root then the rational values of λ and μ are

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

Q 142. If ax 2 + bx + 1 = 0, a e R, b e R, does not have distinct real roots then the least value of 3a – 2b is

(a)  (b) – 1 (c)  (d) 

Q 143. A square is inscribed in the circle x2 + y2 - 2x - 4y = 0 whose sides are parallel to the axes of reference. A vertex of the square is

(a) (3,1) (b) (-2,3) (c) (d) 

Q 144. Let f(x) = ax2 = ax2 - bx + c2, b ≠ 0 and f(x) ≠ 0 for all x ∈ R. Then

(a) a + c2 < b (b) 4a + c2 > 2b (c) 9a - 3b + c2 < 0 (d) none of these

Q 145. Let f(3) = 4 and f' (3) = 5. Then [f (x)], where [.] denotes the greatest integer function, is

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

Q 146. If [x + [x]] ≤ 2 where [x] denotes the greatest integer ≤ x, then x lies in the interval,

(a) (–∞,1] (b) (–∞,2) (c) (-∞, 2] (d) (–∞,1)

Q 147. Let A = (3,4) and B is a variable point on the lines IxI = 6. If AB ≤ 4 then the number of positions of B with integral coordinates is

(a) 5 (b) 4 (c) 6 (d) 10

Q 148. Let A = (3, -4), B = (1, 2). P = (2k - 1, 2k + 1) is a variable point such that PA + PB is the minimum. Then k is

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

Q 149.Let f(x) be a function which can be expressed as a power series such that f(0) = p, f'(0) = pq, f"(0) = pq2,...,f"(0) = pqn,... where 

Then f(x) is equal to

(a) p (b) q (c) pepq (d) qepq

Q 150. If the angle between the trangents from the point (λ, 1) to the parabola y2 = 16x be  then A is

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

Q 151. The number of ways in which 9 flowers, of which 5 are identical and white, and the other four are of different colours, can be set on a garland so that no two of the coloured flowers are consecutive, is

(a) 60 (b) 120 (c) 180 (d) none of these

Q 152. If r, r0 be the inradius and an exradius respectively of an equilateral triangle then r : r0 is equal to

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

Q 153. The value ofis

(a) 1 +  (b) –(1 + ) (c) - (d) none of these ,

Q 154. If the two circles (x- 1)2 + (y - 3)2 = r2 and x2 + y2 - 8x + 2y + 8 = 0 intersect in two distinct points then

(a) r < 2 (b) r = 2 (c) r > 2 (d) 2 < r < 8

Q 155.The number of points with integral coordinates, exactly in the interior of the triangle with vertices (0, 0), (0, 21), (21, 0), is

(a) 133 (b) 190 (c) 233 (d) 105

Q 156. If= 0, n ≠ 0 then a is equal to

(a) 0 (b) 1 +  (c) n (d) n +

Q 157.A point on the line at a distance 3 from the plane x + y + z = 3 is

(a) (1,1,1) (b) (1 + , 1, 2 + 1) (c) (1, +1,2+1) (d) (1-,1,2-1)

Q 158.Two numbers are selected one by one without replacement at random from the set S = {1,2,3,4,5,6}. The probability that the smaller of the two numbers is less than 4 is

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

Q 159. Given f'(x) = 6 and f'(1) = 4, is

(a) 3 (b) –  (c)  (d) does net exist

Q 160. The domain of the function f(x) = for real x, is

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

Q 161. If f(x) = x2 + 2bx + 2c2 and g(x) = -x 2 - 2cx + b2 such that min f(x) > max g(x) then the relation between b and c is

(a) 0 < c < b (b) IcI <  |b| (c) IcI >  IbI (d) no real b and c

Q 162. The coefficient of x24 in (1 + x2)12 . (1 + x12).(1+ x24) is

(a) 12C6 + 3 (b) 12C6 + 1 (c) 12C6 (d) 12C6 + 2

Q 163. If the sum of the roots of the quadratic equation ax2 + bx + c = 0 is equal to the sum of the squares of their reciprocals thenare in

(a) GP (b) HP (c) AP (d) arithmetico-geometric progression

Q 164. Letand . is a unit vector such that and then  is equal to

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

Q 165. Let f'(x) = f(x) where f(0) = 1. If f(x) + g(x) = x2 thenis equal to

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

Q 166. Let a, b, c be distinct real numbers such that a2 - b = b2 - c = c2 -a. Then (a + b)(b + c)(c + a) equals

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

Q 167. The number of elements in the set S = {in + i-n : n is an integer} where i = ,is

(a) 3 (b) 1 (c) greater than 4 but finite (d) infinite

Q 168. If a0 = 1, a1 = 1 and a = an - 1. an- 2 + 1, n > 2, then

(a) a165 is odd, a166 is even (b) a165 is even, a166 is odd

(c) both a165,B166 are odd (d) both a165, a166 are even

Q 169. If P(B) = and ththen P (B ∩ C) is

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

Q 170. If f(x) = dt then f(x) increases in

(a) (0,∞) (b) (-∞, 0) (c) (2, 2) (d) no value of x

Q 171. Events A, B, C are mutually exclusive events such that P(A) = , P(B) =and P(C)= . The set of possible values or x is in the interval

(a)  (b)  (c) [0,1] (d) 

Q 172. If in a ΔABC, b = 3 cm, c = 4 cm and the length of the perpendicular from A to the side BC is 2 cm then the number of solutions of the triangle is

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

Q 173. The solution set of the equation [2x] = [x] + 3,0 ≤ x ≤, 4 where [x] = the greatest integer less than or equal to x, is

(a) {3} (b)  (c)  (d) [2, 3]

Q 174. The ratio in which the line segment joining the points whose position vectors areandis divided by the plane whose equation is , is

(a) 13:12 internally (b) 12 : 25 externally (c) 13:25 internally (d) 37:25 internally

Q 175. The value ofis equal to

(a) 2n + 1Cn (b) 2nCn-1 (c) 2nCn+1 (d) 2n + 1Cn -1

Q 176. The value of p for which one root of fhe quadratic. equation (p2 - 5p + 3)x 2 + (3p - 1 )x + 2 = 0 is twice as large as the other,

Q 177. If f(a + b - x) = f(x) thenis equal to

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

Q 178. The number of integral terms in the expansion of  is

(a) 25 (b) 26 (c) 24 (d) none of these

Q 179. nC,n+1 + + nCr-1 + 2 x nCr is equal to

(a) n+2Cr+1 (b) n+1Cr (c) n+1Cr + 1 (d) n+2Cr

Q 180. A focal chord of the parabola y3 = 16x touches thecircle (x - 6)2 + y2 = 2. Then the possible values of the siope of the chord are

(a) {–1, 1} (b) {–2, 2} (c)  (d) 

Q 181. The value of X so that the volume of the parallelopiped formed by the vectors and becomes minimum, is

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

Q 182. The sum of the radii of inscribed and circumscribed circles for an n-sided regular polygon of side a, is

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

Q 183. If IzI = 1 and w = (z ≠ –1) then Re(w) is

(a) 0 (b)  (c)  (d) 

Q 184. If z and w are two nonzero complex numbers such that IzwI = 1 and arg z - arg w =  then w is equal to

(a) -1 (b) i (c) – i (d) 1

Q 185. If the system of equations x + ay = az + y = ax + z = 0 has infinite solutions then a is

(a) -1 (b) 1 (c) 0 (d) no real value

Q 186. The origin, z1 and z2 are the vertices of an equilateral triangle where z1, zz are roots of the equation z2 + az + b = 0. Then

(a) a2 - 2b (b) a2 = 3b (c) a2 = 4b (d) a = b

Q 187. If I(m, n) = dt then I(m,n) is equal to

(a)  (b) 

(c)  (d) 

Q 188. Let f(x) = . The value of f(x) is always greater than or equal to

(a) 2tana (b) 1 (c) 2 (d) sec2α

Q 189. A function f:N → Z is defined by

f(n) = , when n is odd = – , when n is even. The function f is

(a) onto but not orte-one (b) onto and one-one

(c) neither onto nor one-one (d) one-one but not onto

Q 190. If f:[0, ∞) → [0, ∞) and f(x) =  then f is

(a) one-one and onto (b) one-one but not onto

(c) onto bui not one-one (d) neither one-one nor onto

Q 191. In [0,1] Lagrange's Mean-Value theorem is not applicable to

(a)  (b) 

(c) f(x) = x|x| (d) f(x) = |x|

Q 192. If  are three noncoplanar vectors then equals

(a)  (b)  (c)  (d) 0

Q 193. If the system of linear equations

x + 2ay + az = 0

x + 4cy + cz = 0

has a nonzero solution then a, b, c

(a) are in GP (b) are in HP (c) are in AP (d) satisfy a + 2b + 3c = 0

Q 94. If the equation λx2 – 2x + 3 = 0 has positive roots for some real λ then

(a) λ > 0 (b) λ >  (c) 0 ≤ λ ≤  (d) λ ≤ 

Q 195. If 2nC6 is the greatest coefficient in the expansion of (1 + x)2n, n e N, then

(a) 6 (b) 7 (c) 5 (d) 8

Q 196. The linesand are coplanar if k is

(a) 1 or - 1 (b) 0 or – 3 (c) 3 or - 3 (d) 0 or - 1

Q 197. The equation of the plane bisecting the obtuse angle between the planes x + y + z = 1 and x + 2y - 4z = 5 is

(a) ( - 1)x + ( - 2)y + ( + 4)z + 5 -  = 0

(b) ( + 1)x + ( + 2)y + ( + 4)z + 5 -  = 0

(c) (-+ 1)x + ( + 2)y + (- 4)z = 5 + 

(d) none of these

Q 198.Two gas companies G1 and G2, situated at (40, 0) and (0, 30) respectively (unit of distance = 1 km), offer to install equally priced gas ovens at a buyer's house. The company G1 adds a charge of Rs 40/km of aerial distance between the company and the buyer's house while it is Rs 60 in case of the company G2. Then the region where it is cheaper to install the oven from the gas company G1 is

(a) the interior of the circle (x + 32)2 + (y - 54)2 = 3600

(b) the interior of the circle (x - 54)2 + (y + 32)2 - 3600

(c) the exterior of the circle (x + 32)2 + (y - 54)2 = 3600

(d) the exterior of the circle (x - 54)2 + (y + 32)2 = 3600

**Answers**

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

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

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

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

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

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

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

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

81b 82a 83a 84b 85b 86a 87b 88a 89b 90b

91a 92d 93c 94a 95b 96b 97a 98c 99a 100a

101a 102b 103c 104c 105a 106c 107a 108a 109b 110b

111a 112b 113c 114b 115c 116d 117a 118c 119a 120a

121c 122d 123c 124b 125a 126b 127c 128a 129b 130a

131d 132a 133c 134a 135c 136b 137d 138c 139b 140a

141b 142b 143d 144b 145d 146b 147a 148c 149c 150b

151d 152d 153d 154d 155b 156d 157c 158d 159a 160a

161c 162d 163b 164c 165b 166b 167a 168c 169a 170b

171d 172c 173c 174b 175a 176d 177a 178b 179a 180a

181c 182a 183a 184c 185a 186b 187a 188a 189b 190b

191a 192a 193b 194c 195a 196b 197c 198c