**Maxima and Minima**

Q 1. If xy = a2 and S = b2x + c2y where a, b and c are constants then the minimum value of S is

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

Q 2. The global minimum value of f(x) = x4 – x2 – 2x + 6 is

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

Q 3. The maximum value of f(x) = 3 cos2x + 4 sin2x + is

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

Q 4. If a > b > 0, the minimum value of a sec θ - b tan θ is

(a) b – a (b)  (c)  (d) 

Q 5. The number of values of x where the function f(x) = cos x + attains its maximum is

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

Q 6. The function has

(a) one point of minimum in the interval (0, π/2)

(b) one point of maximum in the interval (0, π/2)

(c) no point of maximum, no point of minimum in the interval (0, π/2)

(d) two points of maxima in the interval (0, π/2)

Q 7. Let f(x) = ex sin x be the equation of a curve. If at x = a, 0 ≤ a ≤ 2π, the slope of the tangent is the maximum then the value of a is

(a) π/2 (b) 3π/2 (c) π (d) π/4

Q 8. Let the tangent to the graph of y = f(x) at the point x = a be parallel to the x-axis, and let f'(a – h) > 0 and f'(a + h) < 0, where h is a very small positive number. Then the ordinate of the point is

(a) a maximum (b) a minimum

(c) both a maximum and a minimum (d) neither a maximum nor a minimum

Q 9. Let f(x) = x3 + 3x2 – 9x + 2. Then

(a) f(x) has a maximum at x = 1

(b) f(x) has neither a minimum nor a maximum at x = -3

(c) f(x) has a minimum at x = 1 (d) none of these

Q 10. If f(x)= a loge |x| = bx2 + x has extremums at x = 1 and x = 3 then

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

Q 11. The maximum value of is

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

Q 12. The maximum ordinate of a point on the graph of the function f(x) = sin x(1 + cos x) is

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

Q 13. If θ + φ then sin θ . sin φ has a maximum value at θ =

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

Q 14. Let f(x) = x3 – 6x2 + 12x – 3. Then at x = 2, f(x) has

(a) a maximum (b) a minimum

(c) both a maximum and a minimum (d) neither a maximum nor a minimum

Q 15. Let f(x) = (x – p)2 + (x –q)2 + (x – r)2. Then f(x) has a minimum at x = λ, where λ is equal to

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

Q 16. Let f(x) = 1 + 2x2 + 22x4 + …. + 210x20. Then f(x) has

(a) more than one minimum (b) exactly one minimum

(c) at least one maximum (d) none of these

Q 17. Let . If it has a maximum at x = -3 then a is

(a) -1 (b) 16 (c) 1 (d) none of these

Q 18. Let f(x) be a function such that f'(a) ≠ 0. Then at x = a, f(x)

(a) cannot have a maximum (b) cannot have a minimum

(c) must have neither a maximum nor a minimum (d) none of these

Q 19. Let the function f(x) be defined as below.

f(x) = sin-1λ + x2, 0 < x < 1

2x , x ≥ 1

f(x) can have a minimum at x = 1 if the value of λ is

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

Q 20. Let x be a number which exceeds its square by the greatest possible quantity. Then x is equal to

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

Q 21. The sum of two nonzero numbers is 8. The minimum value of the sum of their reciprocals is

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

Q 22. In a ΔABC, ∠B = 90° and b + a = 4. The area of the triangle is the maximum when ∠C is

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

Q 23. The point (0, 3) is nearest to the curve x2 = 2y at

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

Q 24. If λ, μ be real numbers such that x3 − λx2 + μx – 6 = 0 has its roots real and positive then the minimum value of μ is

(a)  (b) 11 (c) 0 (d) none of these

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

Q 25. Let f(x) = x + x-1. Then

(a) f(x) has a maximum but no minimum (b) f(x) has no maximum but a minimum

(c) f(x) has a maximum and a minimum (d) max f(x) < min f(x)

Q 26. Let f(x) = ax3 + bx2 + cx + 1 have extrema at x = α, β such that αβ < 0 and f(α). f(β) < 0. Then the equation f(x) = 0 has

(a) three equal real roots (b) three distinct real roots

(c) one positive root if f(α) < 0 and f(β) > 0 (d) one negative root if f(α) > 0 and f(β) < 0

Q 27. The critical point(s) of f(x) = is (are)

(a) x = 0 (b) x = 2 (c) x = 4 (d) none of these

Q 28. The value of x for which the function has an extremum is

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

Q 29. Let f(x) = x3 + 3x2 + 2x + 2. Then, at x = -1

(a) f(x) has a maximum (b) f(x) has a minimum (c) f'(x) has a maximum (d) f'(x) has a minimum

Q 30. The function has a

(a) minimum at x = 2 if λ = 16 (b) maximum at x = 2 if λ = 16

(c) maximum for no real value of λ (d) point of inflection at x = 1 if λ = -1

Q 31. Let f(x) = (x – 1)4 . (x – 2)n, n ∈ N. Then f(x) has

(a) a maximum at x = 1 if n is odd (b) a maximum x = 1 if n is even

(c) a minimum at x = 2 if n is even (d) a maximum at x = 2 if n is odd

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

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

**21b 22c 23c 24a 25cd 26bcd 27abc 28bc 29d 30acd**

**31ac**