**Practice Worksheet**

**Type – 1**

**One−Option−Correct Questions**

Q 1. If the polynomial function f(x) = ax3 + bx2 + cx + d has extrema at x = a and x = 2a then

(a) a, b, c are in AP (b) a, b, c are in GP (c) 6a, 4b, 9c are in AP (d) 6a, 4b, 9c are in GP

Q 2. If fix) = |x| + |cos x| then

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

Q 3. If the perpendicular bisectors of the sides AB and AC of the ΔABC meet at the middle point of the median AD then cos B is equal to

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

Q 4. If A = and A2 = then

(a) α = a2 + b2, β = a2 - b2 (b) α = 2ab, β = a2 + b2

(c) α = a2 + b2, β = 2ab (d) α = a2 + b2, β = ab

Q 5. Let AB be a chord of the parabola y = 4ax. If the pole of AB with respect to the parabola be (2a, 3a) then the length of AB is

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

Q 6. The equation of a diameter of a circle passing through the origin is x + y = 1 and the greatest distance of any point of the circle from the diameter is V5. Then an equation of the circle is

(a) x2 + y2 - 2x + 4y = 0 (b) x2 + y2 - 4x + 2y = 0

(c) x2 + y2 + 4x - 2y = 0 (d) x2 + y2 + 2x + 4y = 0

Q 7. The area of the region in the Argand plane in which z can belong, satisfying the inequalities 1 ≥

|z - 1| ≤ 4 and z + > 2, is

(a) 15π (b) π (c) π (d) none of these

Q 8. Let φ(x) = dx The function φ(x) is

(a) monotonic increasing in [0, π] (b) monotonic increasing in

(c) monotonic decreasing in [0, 2π] (d) monotonic decreasing in

Q 9. Let A={1,2,3,...,50) and B = {2,4,6,..., 100). The number of elements (x, y) ∈ A x B such that x + y = 50 is

(a) 24 (b) 25 (c) 50 (d) 75

Q 10. A word has 4 identical letters and some different letters. If the total number of words that can be made with the letters of the word be 210 then the number of different letters in the word is

(a) 3 (b) 5 (c) 4 (d) 7

Q 11. ax2 + bx + c - 0 is an equation whose sum of roots exceeds 2 but the product of roots is less than 2. Then

(a) a(b + c) < 0 (b) b + c < 0 (c) a + b + c > 0 (d) a + b < 0

Q 12. If a, B be the positive roots of a quadratic equation such that |α - β| = 1 andthen the quadratic equation is

(a) x2 + 3x + 2 = 0 (b) x2 - 3x + 2 = 0 (c) x2 - 3x - 4 = 0 (d) x2 - x + 2 = 0

Q 13. If λ > 0 such that the system of equations

x + y - 2z = 0

λx - 2y + z = 0,

x + 3y - λz = 0

has infinite number of solutions then λ is

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

Q 14. The value ofis

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

Q 15. If the centroid of an equilateral triangle ABC in the Argand plane be at z = 1, the vertex C is at z = ω = and A B, C are in the anticlockwise sense then the vertex A is at

(a) 2 = -2ω (b) z = 3 + ω (c) z = 0 (d) z = ω2

Q 16. If f(x) is not differentiable finitely at x = 2 and f(x) + g(x) is differentiable finitely at x = 2 then

(a) g(x) must be differentiable finitely at x = 2 (b) g(x) must be continuous at x = 2

(c) g(x) may not be differentiable at x = 2 (d) g(x) cannot be differentiable at x = 2

Q 17. If the equation of a family of curves be y = acos(x + b), where a, b are arbitrary constants, and y'= etc., then their differential equation is

(a) y" = y (b) y" = yy' (c) y" + y = 0 (d) y" = y + y'

Q 18. A function y = f(x) is invertible only when

(a) f(x) is monotonic increasing (b) f(x) is bijective

(c) f(x) is monotonic decreasing (d) f(x) is injective

Q 19. The function f(x) = |sin x| (-π ≤ x ≤ 2π) is

(a) continuous everywhere (b) differentiable everywhere

(c) monotonic increasing (d) invertible

Q 20. The distance through which the point (1, 2, 3) is to be translated parallel to the lineto reach the plane x + y + z = 2 is

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

Q 21. If the point (a, a + 1) belongs to the interior of the region bounded by the curve y =and the x-axis then a belongs to

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

Q 22. The vertex of the parabola x2 = 2(2x + y) is

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

Q 23. The value of dx is equal to

(a)  (b)  (c) π (d) 

Q 24. In a ΔABC, the value of

sin A cos B cos C + sin B cos C cos A + sin C cos A cos B is equal to

(a) cos A cos B cos C (b) sin A sin B sin C (c) 0 (d) none of these

Q 25. If the lines ax + by + c = 0 and x + y + 1 = 0 meet at the point (cos θ, sin θ) for some θ then |b - c|, |c - a| and |a - b| are sides of a triangle which is

(a) isosceles (b) scalene (c) equilateral (d) right-angled

Q 26. Let ABC be an eauilateral triangle whose orthocentre is the origin O. If

 then is

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

**One-or-More-Options-Correct Questions**

Q 27. The equation of a common tangent to the circle x2 + y2 = 2a2 and the parabola y2 = 8a x is

(a) y = x - 2a (b) y + x + 2a = 0 (c) y= x + 2a (d) y+ x = 2a

Q 28. If amp, where|z1| ≠ [z2| ≠ IZ3| then the points representing z1, z2 and z3 are

(a) concyclic (b) collinear

(c) vertices of a right-angled triangle (d) vertices of an isosceles right-angled triangle

Q 29. If f(x) = then f(x) is

(a) continuous at x = 1 (b) differentiable at x = 1

(c) discontinuous at x = 3 (d) nondifferentiable at x = 3

Q 30. In a triangle ABC in which C > ,

(a) tan A tan B > 1 (b) cos A + cos B + cos C > 1

(c) tan A tan B < 1 (d) cos A + cos B + cos C < 1

**Comprehension-Type Questions**

According to Fermat's theorem, np - n= M(p) = a multiple of p when p is a prime number and n ∈ N.

It is also known that the highest index of power of a prime number p

which divides n! is equal to + ... where [x] = greatest integer

less than or equal to x.

Q 31. If n(> 2) is a prime number which is coprime with a, b and a + b then an - 2 .b - an - 3. b2 + an - 4. b3 -...+ abn - 2 is equal to

(a) M(n) - 1 (b) M(n) + 1 (c) M(n) (d) none of these

Q 32. 17 22 - 1 is a multiple of

(a) 16 (b) 44 (c) 46 (d) 27

Q 33. The highest power of 7 which divides 1000 ! is

(a) 7164 (b)7162 (c) 7167 (d) 7142

**Matching Questions**

**One or more may match with the same.**

Q 34. Three lines OA, OB and OC through the origin O have direction ratios *l*, 2,1; 1, m, 2 and 2,1, n respectively.

(i) OB IOC if (a) *l*mn + 9 =2(*l*+ m + n)

(ii) OC is perpendicular to the plane (b) m + 2n = - 2

AOB if

(iii) OA lies in the plane BOC if (c) *l* = m = n = -

(iv) OA OB and OC form three (d) n = - 2(*l* + 1) = –

mutually perpendicular lines if

Q 35. (i) If **a** = 1 and **a** is nonreal then the value of (a) 1

α5n + 1 + α5n + 7 + α5n + 13 + α5n + 19 is equal to

(ii) In ABC, if sin A, sin B, sin C are in AP then (b) 4

3tan. tanis equal to

(iii) Let f:R >> Rsuchthat |f(x)- f(y)| < |x = y|3 (c) -1

for x, y ∈ R. Also, f(2) = 4. Thenf(4) equals

(iv) The greatest value of f(x) = (d) 2

for x ∈ R is

**Complete the following statements.**

Q 36. Normals are drawn from the point P with slopes m1, m2, m3 to the parabola y2 = 4x. If the locus of P when m1m2 = k is part of the parabola itself then the value of k is

Q 37. Let F(x) = f(x) . g(x) . h(x). At some point x0, it is given that F '(x0) = 21F(x0), f'(x0) = 4f(x0), g'(x0) = -7g(x0) and h'(x0) = kh(x0). Then k is

**Assertion-Reason Type**

Q 38. Two tangents to the parabola x2 = 6y meet at the point.

STATEMENT-1: The tangents are perpendicular to each other.

because

STATEMENT-2: Mutually perpendicular tangents to the parabola meet on the line 2y + 3 = 0.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for

Statement-1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is Not a correct explanation for Statement-1

(c) Statement-1 is True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

**Answers**

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

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

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

31b 32c 33a

34. (i) b (ii) d (iii) a (iv) c

35. (i) c (ii) a (iii) b (iv) d

36. 2

37. 24

38. a