SECTION – 3 : (Maximum Marks : 16)

- This section contains **TWO** questions
- Each question contains two columns, **Column I** and **Column II**
- **Column I** has **four** entries (A),(B), (C) and (D)
- **Column II** has **four** entries (P),(Q), (R) and (S)
- Match the entries in **Column I** with the entries in **Column II**
- One or more entries in **Column I** may match with one or more entries in **Column II**
- The ORS contains a 4 × 4 matrix whose layout will be similar to the one shown below :

(A) (P) (Q) (R) (S)
(B) (P) (Q) (R) (S)
(C) (P) (Q) (R) (S)
(D) (P) (Q) (R) (S)

- For each entry in **Column I**, darken the bubbles of all the matching entries. For example, if entry (A) in **Column I** matches with entries (P), (Q) and (R), then darken these three bubbles in the ORS. Similarly, for entries (B), (C) and (D).
- Marking scheme :

<u>For each entry in **Column I**</u>

+2 If only the bubble(s) corresponding to all the correct match(es) is (are) darkened
0 If none of the bubbles is darkened
−1 In all other cases

Space for Rough Work

21. Match The column

Column-I	Column-II
(A) The circle $x^2 + y^2 - 6x - 10y + C = 0$ does not intersect or touch the coordinate axes and has (1, 4) as its interior point. Exhaustive range of 'C' is	(P) $\left(-\frac{1}{2}, \frac{1}{4}\right)$
(B) If S (2, 3) & S′ (5, 1) are foci of ellipse & $x + 2y + 1 = 0$ is tangent to that ellipse then semi major axis lies in	(Q) (2, 4)
(C) Parabola $y = x^2 + 2ax + a$ passes through a fixed point $\forall a \in R$ then fixed point is	(R) (25, 29)
(D) The eccentricity of the ellipse $4x^2 + 9y^2 + 8x + 36y + 4 = 0$ is $\sqrt{a/b}$ then (a, b) is (a and b coprime)	(S) (5, 9)

Space for Rough Work

22. Match The column

Column-I	Column-II
(A) Number of triangles formed by 10 points in a plane of which 4 are collinear	(P) 210
(B) Number of quadrilaterals formed by 10 points in a plane of which 4 are collinear	(Q) 185
(C) Maximum number of points of intersection of six circles & 3 straight lines	(R) 69
(D) Number of points of intersection of diagonals of 10 sided Polygon which lies inside the polygon	(S) 116

Space for Rough Work

SECTION – 4 : (Maximum Marks : 72)

- This section contains **EIGHTEEN** questions
- The answer to each question is a **SINGLE DIGIT INTEGER** ranging from 0 to 9, both inclusive
- For each question, darken the bubble corresponding to the correct integer in the ORS
- Marking scheme :

+4 If the bubble corresponding to the answer is darkened
0 If none of the bubbles is darkened
–1 In all other cases

23. If number of ways of selecting 3 objects from 25 objects placed in a straight line such that at least two objects lie between any two of the selected objects is N, then sum of digits of N is

24. Consider seven digit number $x_1\, x_2 \ldots\ldots x_7$, where $x_1, x_2 \ldots\ldots, x_7, \neq 0$ having the property that x_4 is the greatest digit and all digits towards the left and right of x_4 are in decreasing order. Then total number of such number in which all digits are distinct is a, then find the sum of digits of a.

25. If length of the latus rectum of the parabola $25[(x-2)^2 + (y-3)^2] = (3x - 4y + 7)^2$ is λ, then 10λ is

26. The number of integral values of 'a' for which the point $(-2a, a + 1)$ lies in the smaller region bounded by the circle $x^2 + y^2 = 4$ & the parabola $y^2 = 4x$ is/are

Space for Rough Work

27. If the pair of straight line joining the origin to the intersection of the straight line $y = 3x + c$ and the curve $\frac{x^2}{1} + \frac{y^2}{4} = 1$ are at right angle to each other, then sum of all possible real values of c is

28. Four unit circles pass through the origin and have their centres on the coordinate axes. The area of the quadrilateral whose vertices are the points of intersection (in pairs) of the circles, is

29. If the curves $ax^2 + 4xy + 2y^2 + x + y + 5 = 0$ and $ax^2 + 6xy + 5y^2 + 2x + 3y + 8 = 0$ intersect at four con cyclic points then '9 + a' is

30. Normal to parabola $(y - 2)^2 = 4(x - 1)$ at (2, 4) is drawn meets parabola again at (a, b) then a + b is

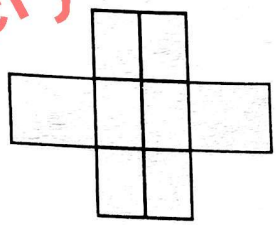
31. The circle with equation $x^2 + y^2 = 1$ intersects the line $y = 7x + 5$ at two distinct points A and B. Let C be the point at which the positive x-axis intersects the circle. The angle ACB is $\frac{a\pi}{b}$ (a and b coprime) then a + b =

Space for Rough Work

32. A variable circle C has the equation $x^2 + y^2 - 2(t^2 - 3t + 1)x - 2(t^2 + 2t)y + t = 0$, where t is a parameter. If the power of point P(a,b) w.r.t. the circle C is constant then the value of a + b is

33. A rhombus is inscribed in the region common to the two circles $x^2 + y^2 - 4x - 12 = 0$ and $x^2 + y^2 + 4x - 12 = 0$ with two of its vertices on the line joining the centres of the circles. The area of the rhombous is $k\sqrt{3}$, then value of k is

34. Six X's are to be placed in boxes of the figure such that each row contains at least one 'X'. If the number of different ways in which this can be done is a two digit number ba then a – b =



35. Number of ways of selecting 5 coins from unlimited number of coins of each of ₹1, ₹2 and ₹5 (coins of the same denomiation are alike), is k then greatest prime divisor of k is

Space for Rough Work

36. A closet has 5 pairs of different types of shoes. The number of ways in which 4 shoes can be drawn from it such that there will be no complete pair is λ then number of proper divisors of λ is

37. Number of divisors of the number $N = 2^3.3^5.5^7.7^9$ which are perfect square is k! then value of k is

38. If (5, 12) and (24, 7) are the focii of an ellipse passing through (0, 0), then the eccentricity of the conic is $\sqrt{\frac{\lambda}{\mu}}$ (λ and μ coprime). If $\sqrt{4\lambda - \mu} = k\sqrt{2}$, then value of k is

39. Number of real normals to the $y^2 - 4x = 0$ passing through (3, 4) is/are –

40. Length of chord of parabola $(y - 2)^2 = 4(x + 1)$ whose equation is $y = x$ is $\lambda\sqrt{2}$, then value of $2\lambda - 7$ is

Space for Rough Work