J R   I P E   M O D E L   P A P E R

Sub : MATHS - IB   **Max. Marks:75**

I.   Answer all the following : $10 \times 2 = 20$

1. Find the ratio in which line joining (0,0) and (-2,1) is divided by the line 2x +3y =5

2. Find the equation of the straight line parallel to the line 2x + 3y + 7 = 0 and passing through the point (5, 4)

3. Find the ratio in which YZ – plane divides the line joining A (2, 4, 5) and B(3, 5, -4). Also find the point of intersection.

4. Reduce the equation x + 2y – 3z – 6 = 0 of the plane to the normal form

5. Find the value of $\lim\limits_{x \to \frac{\Pi}{2}} \dfrac{\cos x}{\left(x - \dfrac{\pi}{2} \right)}$

6. $f(x) = \begin{cases} \dfrac{\sin 2x}{x} \end{cases}$ if $x \neq 0$, f(x) = 2 at x=0 , is f(x) continuous at 0 ?

7. Find the derivatives of the function $Cos^{-1}\left(4x^3 - 3x\right)$

8. Find the derivative of $\dfrac{\cos x}{\sin x + \cos x}$

9. If $y = x^2 + 3x + 6, x = 10,$ $\triangle x = 0.01$ then find the values of dy , $\triangle y$

10. Vierfy Role's theorem for the function x2 - 1 on [-1, 1]

II.   Answer any five of the following : $5 \times 4 = 20$

11. A(5, 3) and B(3, –2) are two fixed points, find the equation of Locus of P, so that area of triangle PAB is 9

12. When the axes are rotated through an angle 45⁰ the transformed equation of a curve is $17x^2 - 16xy + 17y^2 = 225$ .Find the original equation of curve.

13. Find the value of p, if the following lines
3x + 4y = 5, 2x + 3y = 4, p x + 4y = 6 are concurrent

14. Find the value of $\lim\limits_{x \to 0} \dfrac{\sin(a+bx) - \sin(a-bx)}{x}$

15. Find the derivative of function $\sqrt{x+1}$ from first principle.

16. Find angle between curves x+y+2=0 and $x^2 + y^2 - 10y = 0$

17. For cube volume is increasing at a rate if $8 \, cm^3/\sec$ then find rate of increase in its total surface area when its side is 12 cm

III.   Answer any five of the following :
   5 × 7 = 35

18. Find the circum center of the triangle whose vertices are (-2,-1), (6, -1) and (2, 5)

19. Show that the lines joining the origin to the points of intersection of the curve $x^2 - xy + y^2 + 3x + 3y - 2 = 0$ and the straight line $x - y - \sqrt{2} = 0$ are mutually perpendicular

20. If the second degree equation $s = ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

    intwo variables x and y represents a pair of straight lines, then prove that
    i) abc + 2fgh – af² – bg² – ch² = 0
    ii) $h^2 \ge ab, g^2 \ge ac, f^2 \ge bc$

21. Find the direction cosines of two lines which are connected by the relations
    $l - 5m + 3n = 0$ and $7l^2 + 5m^2 - 3n^2 = 0$.

22. If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x - y)$ then prove that $\dfrac{dy}{dx} = \sqrt{\dfrac{1-y^2}{1-x^2}}$

23. If the tangent at any point on the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ intersects the coordinate axes in A and B, then show that the length AB is a constant

24. From a rectangular sheet of dimensions 30cm x 80 cm four square of side x cm are removed at the corners and sides are turned up so as to form an open rectangular box. Find the value of x so that the volume of the box is greatest