MATHEMATICS PAPER IB.- MAY 2010.

COORDINATE GEOMETRY (2D&3D & CALCULUS.

TIME : 3hrs **Max. Marks.75**

Note: This question paper consists of three sections A,B and C.

SECTION A

VERY SHORT ANSWER TYPE QUESTIONS. **10X2 =20**

Noe : Attempt all questions. Each question carries 2 marks.

1. Find the equation of the straight line passing through (-4, 5) and cutting off equal nonzero intercepts on the coordinate axes.

2. Transform the equation x + y +1= 0 into normal form.

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. Find the equations of the plane passing through the point (1,1,1) and parallel to the plane x + 2y + 3z – 7 = 0

5. Find $\lim_{x\to 0}\left(\frac{\sqrt{1+x}-1}{x}\right)$

6. Find $\lim_{x\to\infty}\frac{8|x|+3x}{3|x|-2x}$

7. Show that the function $f(x)=\begin{cases}\frac{\sin 2x}{x} & if\ \ x\neq 0\\ & if\ x=0\end{cases}$ continuous at 0 .

8. $If\quad \mathrm{f}(x)=x^2 2^x \log x,\ \text{find } \mathrm{f}^1(x)$

9. Find Δy and dy for the function y = log x when x =3 and Δx =0.003.

10. Find the equation of the normal to the curve $y = 5x^4$ at the point (1, 5)

SECTION B

SHORT ANSWER TYPE QUESTIONS. **5X4 =20**

Note : Answer any FIVE questions. Each question carries 4 marks.

11. The ends of the hypotenuse of a right angled triangle are (0, 6) and (6, 0). Find the equation of locus of its third vertex.

12. When the axes are rotated through an angle 45°, the transformed equation of a curve is $17x^2 - 16xy + 17y^2 = 225.$ Find the original equation of the curve.

13. If 3a + 2b + 4c = 0, then show that the equation ax + by + c = 0 represents a family of concurrent straight lines and find the point of concurrency.

14. Find the derivatives of the following functions $f(x) = \sin 2x$ from the first principles.

15. If $y = ax^{n+1} + bx^{-n}$ then Prove that $x^2y = n(n+1)y$.

16. The radius of a circular plate is increasing in length at 0.01 cm/sec. What is the rate at which the area is increasing, when the radius is 12 cm.

17. Show that for the function $f = \log(x^2 + y^2)$, $f_{xx} + f_{yy} = 0$

SECTION C

LONG ANSWER TYPE QUESTIONS. **5X7 =35**

Note: Answer any Five of the following. Each question carries 7 marks.

18. Find the circumcentre of the triangle whose sides are x + y = 0, 2x +y +5= 0 and x -y = 2.

19. Show that the area of the triangle formed by the lines $ax^2 + 2hxy + by^2 = 0$ and lx + my + n =0 is $\frac{n^2\sqrt{h^2 - ab}}{|am^2 - 2hlm + bl^2|}$ sq. units.

20. Find the values of k, if the lines joining the origin to the points of intersection of the curve $2x^2 - 2xy + 3y^2 + 2x - y - 1 = 0$ and the line x + 2y = k are mutually perpendicular.

21. show that the angle between the lines whose direction cosines are given by the equations 3l + m + 5n = 0 and 6mn – 2nl + 5lm = 0 is $\cos^{-1}\left(\frac{1}{6}\right)$.

22. Find the derivative $\frac{dy}{dx}$ of the function $y = \frac{(1-2x)^{\frac{2}{3}}(1+3x)^{\frac{-3}{4}}}{(1-6x)^{\frac{5}{6}}(1+7x)^{\frac{-6}{7}}}$

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. Show that when the curved surface of right circular cylinder inscribed in a sphere of radius R is maximum, then the height of the cylinder is $\sqrt{2}R$.

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