B.Sc.DEGREE EXAMINATION,APRIL 2020
I Year I Semester
Differential Calculus

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. If y=log(ax+b).Find y_n.
2. Find the nth derivative of e^{ax}.
3. If x= r cosθ , y=rsin θ find $\frac{\partial(x,y)}{\partial(r,\theta)}$
4. Find the minimum value of $x^3+5y^2-6x+10y+12$.
5. Write down the cartesian formula for radius of curvature.
6. Find the radius of curvature at the point $(\frac{a}{4}, \frac{a}{4})$ to the curve $\sqrt{x}+\sqrt{y}=a$.
7. Show that the radius of curvature at the point θ $on\ the\ curve\ x=a(cos\ \theta+\theta sin\theta),\quad y=a(sin\theta-\theta cos\theta)\ is\ a\theta.$
8. Find the (p-r) equation for the curve $r\sin\theta+a=0$.
9. Define an asymptote of a curve.
10. State Leibnitz's theorem.
11. Find the asymptote of the curve $x^3+y^3=3axy$.
12. State the method of Lagrange's Multipliers.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Find the n^{th} derivative of $\frac{2x+1}{(2x-1)(2x+3)}$.
14. Show that the maximum value of $x^2y^2z^2$ subject to the constraint $x^2+y^2+z^2=a^2$ is $(\frac{a^2}{3})^3$
15. Calculate the first derivative of the curve $x^3+y^3=3axy$ at the point $x=y=\frac{3a}{2}$
16. Find the radius of curvature of the curve $r^2=a^2\cos2\theta$
17. Find the asymptote of the curve $y^3-2y^2x-yx^2+2x^3+x^2-6xy+5y^2-2y+2x+1=0$.
18. Find the nth derivative of e^x logx.
19. If u $=\frac{1}{x}$, $\vartheta = \frac{x^2}{y}$, $\omega = x+y+zy^2$ find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. If $y = \left(sin^{-1}x\right)^2$ Prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - n^2y_n = 0$ .Hence find the value of y_n at $x = 0$.
21. Find the minimum of $a^3x^2+b^3y^2+c^3z^2$ with the condition $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$.
22. Find the coordinates of the centre of curvature at the point $(2at, at^2)$ of the curve $x^2=4ay$
23. Find the pedal equation of the curve $r = a(1-\cos\theta)$.
24. Find the asymptotes of the curve $4(x^4+y^4)-17x^2y^2 -4x(4y^2-x^2) +2(x^2-2)=0$ and show that they passes through eight points of intersection of the curve with an ellipse.

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