B.Sc. DEGREE EXAMINATION,NOVEMBER 2019
I Year I Semester
Differential Calculus

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

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

Answer any **TEN** questions

1. Find the nth differential coefficient of log(ax+b).
2. Find $\frac{du}{dx}$ when u = x^2 + y^2 where y = $\frac{1-x}{x}$.
3. If x= rcosθ and y=rsinθ find$\frac{\partial(u,v)}{\partial(r,\theta)}$.
4. Define the Jacobian.
5. Fine the radius of the curvature of the curve $\sqrt{x} + \sqrt{y} = 1$ at ($\frac{1}{4}$, $\frac{1}{4}$).
6. Find the radius of curvatures for the curves y =e^x at the point where it crosses the y – axis.
7. Find the P –r equation of the curve r = asinθ.
8. Define critical points.
9. Define asymptotes to the curve.
10. Prove that the asymptotes of x^2y^2 = $c^2(x^2+y^2)$ are the side of a square.
11. Write down the Leibinitz's formula.
12. Find Cartesian formula for the radius of curvature.

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

Answer any **FIVE** questions

13. If x = sinθ; y = cos pθ, prove that $(1-x^2)y_2 - xy_1 + p^2y = 0$
14. If u = xyz and v = xy+ yz + zx and w = x+y+z find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.
15. Prove that the radius of curvature at any point of the cycloid $x = a(t + sint)$ and $y = a(1 - cost)$ is $4a\ cos\ \frac{t}{2}$
16. Find the asymptotes of the curve $y^3 - 6xy^2 + 11x^2y - 6x^3 + x + y = 0$.
17. Find the rectilinear asymptotes of 8x^2 + 10xy -3y^2 -2x +4y -2 =0.
18. Find the asymptotes of $(x + y)(x - 2y - 4)(x - y) = 3x + 7y - 6$.

19. Find the nth derivative of $\frac{2x+1}{(2x-1)(2x+2)}$.

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

Answer any **THREE** questions

20. If y = acos (logx) +bsin (logx) prove that x^2y_{n+2}+ (2n+1) xy_{n+1}+ (n^2+1) y_n= 0.
21. Show that the maximum value of $x^2y^2z^2$ subject to the constraints $x^2+y^2+z^2 = a^2$ is $(a^2/3)^{3.}$
22. Find the radius of curvature of the curve $r^n = a^n cos\ n\theta$.
23. Find the radius of curvature of the curve $r^2 = a^2 \sin 2\theta$.
24. Determine 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 pass through the point of intersection of the curve with the ellipse $x^2+4y^2 = 4$.

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