B.Sc. DEGREE EXAMINATION,NOVEMBER 2018
I Year I Semester
Core Major - Paper II
DIFFERENTIAL CALCULUS

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

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

Answer any **TEN** questions

1. Find y_n if y= e^{2x} sin3x.
2. State Leibnitz theorem.
3. State the necessary and sufficient condition for a function to be maximum or minimum.
4. If x= $rcos\theta$, y=$rsin\theta$. Find J $\left(\frac{x,y}{r,\theta}\right)$
5. Define Curvature.
6. Obtain the radius of curvature for $y^2 = x^3 + 8$ at (-2,0).
7. Find the p-r equation of r=a(1-cosθ)
8. Write the formula for finding radius of curvature of the curve r=f(θ).
9. Define asymptote.
10. Find the asymptotes of $(x-y)(x+y)(x+3y-7)-(2x-3y+1)=0$
11. Obtain the n^{th}derivative of log(4-x^2).
12. Find the pedal equation of r=aθ.

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

Answer any **FIVE** questions

13. Find D^n(Sinx Sin2x Sin3x)
14. Find the maximum and minimum of $x^2 + y^2 + 6x + 12$
15. Prove that the radius of curvature for x=$a(cos\theta + \theta sin\theta)$, $y = a(sin\theta - cos\theta)$ is aθ.
16. Obtain the coordinates of the centre of curvature of the curve xy=2 at the point (2,1).
17. Find the asymptotes of $x^3 + y^3 = 3axy$.
18. Find y_n for given $y = \frac{3}{(x+1)(2x-1)}$
19. Find the pedal equation of $r^2 = a^2 cos2\theta$.

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

Answer any **THREE** questions

20. If $y = e^{asin^{-1}x}$ then show that $\left(1-x^2\right) y_{n+2} - (2n+1)\, x y_{n+1} - \left(n^2+a^2\right) y_n = 0$
21. If $u = a^3x^2 + b^3y^2 + c^3z^2$ where $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$. Find the minimum value of u.
22. Show that the radius of curvature at (a,0) on the curve $y^2 = \frac{a^2(a-x)}{x}$ is $\frac{a}{2}$.
23. Find the centre of curvature and circle of curvature at $(\frac{a}{4}, \frac{a}{4})$ on $\sqrt{x} + \sqrt{y} = \sqrt{a}$.
24. Show that the four asymptotes of the curve $\left(x^2-y^2\right)(y^2-4x^2) + 6x^3 - 5x^2y - 3xy^2 + 2y^3 + 3xy - 1 = 0$ cut the curve again in eight points which lie on a circle of unit radius.

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