SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - I
20UMACT1002 - Differential Calculus

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Find Y_n where $Y = \dfrac{x^2}{(x-1)^2(x+2)}$
2. Prove that $x\,\dfrac{d^2y}{dx^2} + 2\dfrac{dy}{dx}$ - $xy = 0$ if $xy = ae^x + be^{-x}$
3. Find the maximum or minimum values of $2(x^2$ - $y^2)$ - $x^4 + y^4$.
4. Obtain the Cartesian formula for the radius of curvature.
5. Find the coordinates of the center of curvature of the curve $xy = 2$ at the point (2, 1)
6. Prove that (p-r) equation of the cardioid
   $r = a(1 - \cos\theta)$ is $p^2 = \dfrac{r^3}{2a}$
7. Find the rectilinear asymptotes of the curve
   $y^2\ (x^2$ - $y^2)$ - $2ay^3 + 2a^3\ x = 0$
8. Find the asymptotes of $(x+y)^2\ (x+2y+2) = x$ + $9y$ - 2

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Obtain the nth differential coefficient of $\cos^5\theta\ \sin^7\theta$.
10. If $u = a^3x^2 + b^3y^2 + c^3z^2$ where $\dfrac{1}{x} + \dfrac{1}{y} + \dfrac{1}{z} = 1$.
    Find the minimum value of u
11. i) What is the radius of curvature of the curve $x^4 + y^4 = 2$ at the point (1,1)?
    ii) Find ρ at the point 't' of the curve $x = a(cost + tsint)$; $y = a(sint - tcost)$
12. Find the evolute of the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$
13. Find the rectilinear asymptotes of
    $2x^4$ - $5x^2y^2 + 3y^4 + 4x^3$ - $6y^3 + x^2 + y^2$ - $2xy + 1 = 0$

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