Reg.No : | | | | | | | | | | | |

D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE – 1

SEMESTER EXAMINATIONS

APRIL – 2019 **15CMA2A**

CALCULUS

Time: 3 Hrs **Max. Marks: 75**

SECTION – A (10 X 2 =20)

Answer ALL the questions.

1. Write a statement about Leibnitz theorem.
2. Define JACOBIANS J (u_1, u_2, u_3).
3. Define Radius of curvature in polar coordinates.
4. Find the co ordinates of the centre of curvature of the curve $xy = 2$ at the point (2, 1)
5. Define Evolutes
6. Prove that the asymptotes of $x^2y^2 = c^2(x^2 + y^2)$ are the sides of a square.
7. Define Gamma function.
8. Find the reduction formula $\int \cot^n x \, dx$.
9. Define Double integration.
10. Find the area of the cardiod r = a (1+cosθ).

SECTION – B (5 X 5 =25)

Answer any FIVE of the following questions.

11. Find the n^{th} derivative of $x^2 \sin 5x$.
12. If $x = r\cos\theta, y = r\sin\theta$ find $\frac{\partial(x,y)}{\partial(r,\theta)}$
13. Show that the radius of curvature at any point of the catenary $y = c\cosh(\frac{x}{c})$ is equal to $\frac{y^2}{c}$
14. Prove that the (p-r) equation cardioid $r = a(1 - \cos\theta)$ is $\rho^2 = \frac{r^3}{2a}$
15. Find the asymptotes of $x^3 + 2x^2y - xy^2 - 2y^3 + 4y^2 + 2xy + y - 1 = 0$
16. Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$
17. Evaluate $\int_0^1 x^m (\log\frac{1}{x})^n \, dx$
18. Find the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

SECTION – C (3 X 10 =30)

Answer ALL the questions.

19. (a) 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 by Lagranges method.

(Or)

(b) Prove that the radius of curvature at any point of the cycloid $y = a(1 - \cos\theta)$ and $x = a(\theta + \sin\theta)$ is $4a\cos\frac{\theta}{2}$

20. (a) Find the asymptotes of $x^3 + 2x^2y - 4xy^2 - 8y^3 - 4x + 8y - 1 = 0$

(Or)

(b) Find the reduction formula $\int \sin^n\theta \, d\theta$

21. (a) State and prove that relationship between gamma and beta function.

(Or)

(b) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ the planes y+z=4 and z=0.

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