

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.

M.Sc. END SEMESTER EXAMINATION APRIL/NOV - 2021

SEMESTER – III

20PAMCT3008 – Differential Equations

Total Duration : 3 hrs	Total Mark : 75
MCQ : 30 min	MCQ : 15
Descriptive : 2 Hrs. 30 Mins.	Descriptive : 60

Section B

Answer any **Six** questions (6 x 5 =30)

1. Prove that $x J'_n(x) = n J_n(x) - x J_{n+1}(x)$
2. Find the singular points of the equation $x^2 y'' - 5y' + 3x^2 y = 0$
3. Solve $y'' + 4y = \cos x$
4. Compute four successive approximation of $y' = 1 + xy$ and $y(0) = 1$
5. State and prove Existence theorem for second order.
6. If φ_1, φ_2 are any two solutions of $L(y) = 0$ and c_1, c_2 are any two constants then prove that $\varphi = c_1 \varphi_1 + c_2 \varphi_2$ is also a solution of $L(y) = 0$.
7. Find the characteristics of the equation $pq = z$ and determine the integral surface which passes through the straight line $x = 1, z = y$.
8. Solve the equation $(D^2 + 3DD' + 2D'^2)u = x + y$.

Section C

Part A

Answer any **Two** questions (2 x 10 =20)

9. Find two linearly independent power series solution
 $y'' + x^3 y' + x^2 y = 0$
10. Find the complete integral of $(p^2 + q^2)y = qz$ using charpit's method.

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11. Reduce the Tricomi equation $u_{xx} + xu_{xx} = 0$, $x \neq 0$ for all x, y to canonical form.
12. Use Picard's method to obtain a solution of the differential equation $\frac{dy}{dx} = x^2 - y$, $y(0) = 0$. Find at least the fourth approximation to each solution.

Part B
Compulsory Question (1 x 10 = 10)

13. Derive the Legendre equation.