



QP CODE: 24009039



24009039

Reg No :

Name :

B.Sc DEGREE (CBCS) SPECIAL REAPPEARANCE EXAMINATIONS, MARCH 2024

Fifth Semester

CORE COURSE - MM5CRT02 - DIFFERENTIAL EQUATIONS

Common for B.Sc Mathematics Model I, B.Sc Mathematics Model II Computer Science & B.Sc
Computer Applications Model III Triple Main

2021 Admission Only

918FE6FE

Time: 3 Hours

Max. Marks : 80

Part A

Answer any **ten** questions.

Each question carries **2** marks.

1. Solve the differential equation $x^5 y' + y^5 = 0$
2. Find the value of n for which the equation $(x + ye^{2xy})dx + nxe^{2xy}dy = 0$ is exact.
3. Find the orthogonal trajectory of $y^2 = cx$
4. Find the general solution of $y^{11} + 6y^1 + 9y = 0$
5. Find the general solution of $y^{11} - y = 0$, when $y_1(x) = e^x$
6. Find the general solution of the differential equation $y^{(4)} - 8y^{(2)} + 16y = 0$
7. Find the differential equation of the general solution $Ae^{3x} + Be^{5x}$
8. Write Legendre's equation.
9. Write the formula to find indicial equation.
10. Find P' , Q' and R' so that $PP' + QQ' + RR' = 0$ if
 $P = yz(b - a)$, $Q = zx(c - a)$, $R = xy(a - b)$ and verify it.
11. Generate a partial differential equation by eliminating the arbitrary function f from
 $z = f(x - y)$.
12. Give the general solution of Lagrange's first order partial differential equation.

(10×2=20)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Show that the function $y = e^{x^2} \int_0^x e^{-t^2} dt$ is a solution of the differential equation
 $y' = 2xy + 1$



14. Solve the differential equation $(x + y)dx - xdy = 0$
15. Solve the differential equation $(xy - 1)dx + (x^2 - xy)dy = 0$
16. Solve the differential equation $y'' + k^2y = 0$ where k is an unknown real constant.
17. Find the general solution of $y^{11} - 2y^1 + 2y = e^x \sin x$
18. Find the general solution of $y^{(3)} - 6y^{(2)} + 11y^{(1)} - 6y = 0$
19. Define Cauchy product of two power series. Find the Cauchy product of $\sum_{j=0}^{\infty} \frac{(-1)^j}{\sqrt{j+1}}$ and $\sum_{j=0}^{\infty} \frac{(-1)^j}{\sqrt{j+1}}$.
20. Find a power series solution of the differential equation $y' - y = 2$.
21. Find the general solution of $x(y - z)p + y(z - x)q = z(x - y)$

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. (i) Find the solution of initial value problem $y' - 2xy = 6xe^{x^2}$, $y(1) = 1$
(ii) Solve the differential equation $y^2 dx + (3xy - 1)dy = 0$
23. 1 Find the particular solution of $y^{11} + y = x \cos x$
2 Find the general solution of $x^2 y^{11} - 2xy^1 + 2y = xe^{-x}$
24. Use the method of Frobenius series to solve $2x^2 y'' + x(2x + 1)y' - y = 0$ about the regular singular point 0.
25. Find the equation of the integral surface of the differential equation $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$ which contains the line $z = 1, x + y = 0$

(2×15=30)