



QP CODE: 22100167



22100167

Reg No :

Name :

**B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS,
JANUARY 2022
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

2017 Admission Onwards

F936F50F

Time: 3 Hours

Max. Marks : 80

Part A

Answer any ten questions.

Each question carries 2 marks.

1. Find the general solution of the differential equation $y' = xe^{x^2}$
2. Solve the differential equation $y' - y \tan x = 0$
3. Determine whether the equation $(\sin x \tan y + 1)dx - \cos x \sec^2 y dy = 0$ is exact.
4. Find the general solution of $y^{11} + 4y^1 - 5y = 0$
5. Find a particular solution of $y^{11} - 2y^1 + y = 6e^x$
6. Find the general solution of $y^{(3)} - 3y^{(2)} + 2y^{(1)} = 0$
7. Find the differential equation of the general solution $Ae^{3x} + Be^{5x}$
8. Define interval of convergence of a power series.
9. State Isaac Newton's general binomial theorem.
10. Find functions P' , Q' and R' so that $PP' + QQ' + RR' = 0$ if $P = x(y^2 + z)$, $Q = -y(x^2 + z)$, $R = z(x + y)$ and verify it.
11. Generate a partial differential equation by eliminating the arbitrary function f from $z = xy + f(x^2 + y^2)$.
12. Give an example of a partial differential equation in three independent variables

(10×2=20)





Part B

Answer any **six** questions.

Each question carries **5** marks.

- 13. Solve the differential equation $\sin 2x \frac{dy}{dx} = y + \tan x$
- 14. Solve the differential equation $xy' = 2x + 3y$
- 15. Solve the differential equation $ydx + (2x - ye^y)dy = 0$
- 16. Solve $yy'' + (y')^2 = 0$
- 17. Find the particular solution of $y^{11} + 2y^1 + 5y = e^{-x} \sec 2x$
- 18. Find the general solution of the differential equation $y^{(4)} + 2y^{(3)} - 2y^{(2)} - 6y^{(1)} + 5y = 0$
- 19. Define an ordinary point of a differential equation. Check whether 0 is an ordinary point of
a) $y'' + xy' + y = 0$ b) $y'' - y' + xy = 0$.
- 20. Define exponents of a differential equation at a regular singular point .
Prove that 0 is a regular singular point of the differential equation $4x^2y'' - 8x^2y' + (4x^2 + 1)y = 0$ and then find the exponents for 0.
- 21. Find the general solution of $(y(x + y) + az)p + (x(x + y) - az)q = z(x + y)$
(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

- 22. i) Show that the family of ellipse $\frac{x^2}{a^2+c} + \frac{y^2}{b^2+c} = 1$ is self orthogonal.
ii) Find the orthogonal trajectory of family of circle $(x - c)^2 + y^2 = c^2$
- 23. The equation $x^2y^{11} + xy^1 + (x^2 - 1/4)y = 0$ is a special case of Bessel"s equation .Verify that $y_1(x) = x^{-1/2} \sin x$ is a solution for $x > 0$ and find the general solution
- 24. Use the method of Frobenius series to solve $2xy'' + (x + 1)y' + 3y = 0$
- 25. Find the equation of the integral surface of the differential equation $(x - y)p + (y - x - z)q = z$, which passes through the circle $z = 1, x^2 + y^2 = 1$.
(2×15=30)

