



QP CODE: 22103520



22103520

Reg No :

Name :

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

NOVEMBER 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

F1FD79B4

Time: 3 Hours

Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Solve the differential equation $xy' = (1 - 2x^2) \tan y$
2. Determine whether the equation $(1 + y^2 \sin 2x)dx - 2y \cos^2 x dy = 0$ is exact
3. Find the integrating factor of $(2x^2 + y)dx + (x^2y - x)dy = 0$
4. Find the general solution of $y^{11} + y^1 + y = 0$
5. Find a particular solution of $y^{11} - y^1 - 6y = 20e^{-2x}$
6. Find the general solution of the differential equation $y^{(4)} - 8y^{(2)} + 16y = 0$
7. Find the general solution of $y^{(3)} - 3y^{(2)} + 4y^{(1)} - 2y = 0$
8. Define a power series in $x - a$.
9. Write Legendre's equation.
10. Find functions P' , Q' and R' so that $PP' + QQ' + RR' = 0$ if $P = 2y(z - 3)$, $Q = 2x - z$, $R = y(2x - 3)$ and verify it.
11. Generate a partial differential equation by eliminating the arbitrary function f from $z = f\left(\frac{xy}{z}\right)$.
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. Find particular solution of the differential equation $(x^2 - 1)y' = 1$, $y = 0$ when $x = 2$
14. Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$
15. Find the orthogonal trajectory of $y^2 = 4c(x + c)$
16. Solve the differential equation $xy'' - y' = 3x^2$
17. Verify that $y_1 = x^2$ is one solution of $x^2 y^{11} + xy^1 - 4y = 0$ and then find y_2 and the general solution
18. Find the general solution of $y^{(3)} - 6y^{(2)} + 11y^{(1)} - 6y = 0$
19. Find a power series solution of the differential equation $y' - y = 2$.
20. Locate and classify singular points on X-axis for the differential equation $x^3(x - 1)y'' - 2(x - 1)y' + 3xy = 0$.
21. Find the general solution of $x^2(y^3 - z^3)p + y^2(z^3 - x^3)q = z^2(x^3 - y^3)$.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. i) Solve $\frac{dy}{dx} = \frac{x+2y-3}{2x+y-3}$
ii) Solve $(x^2 - 2y^2)dx + xydy = 0$
23. 1 Find the particular solution of $y^{11} + y = \cot 2x$
2 find the general solution of $(1 - x)y^{11} + xy^1 - y = (1 - x)^2$
24. For the differential equation, $x^2 y'' + xy' + (x^2 - \frac{1}{4})y = 0$, show that $m_1 - m_2 = 1$, but that the equation has two independent Frobenius series solutions. Also find the solutions.
25. Find the equation of the integral surface of the differential equation $y^2(x - y)p + x^2(y - x)q = z(x^2 + y^2)$ which passes through the curve $xz = a^3, y = 0$.

(2×15=30)

