25010005

QP CODE: 25010005

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) SPECIAL REAPPEARANCE EXAMINATIONS, FEBRUARY 2025

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

2022 Admission Only

E27AE445

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. Solve the differential equation $y' - ytanx = 0$
2. Find the integrating factor of the differential equation $x^4 \frac{dy}{dx} + 2x^3 y = 1$
3. Find the integrating factor of $(2x^2 + y)dx + (x^2 y - x)dy = 0$
4. Find a particular solution of $y^{11} - 2y^1 + y = 6e^x$
5. Write linear ordinary differential equation of order n with constant coefficients.
6. Find the general solution of the differential equation $y^{(3)} + 3y^{(2)} + 3y^{(1)} + y = 0$
7. Find the differential equation of the general solution A e^x+ B e^{-2x}
8. Define a rational function. Give an example.
9. Write Legendre's equation.
10. Find functions P', Q' and R' so that PP'+QQ'+RR'=0 if $P = x^2(y^3 - z^3), Q = y^2(z^3 - x^3), R = z^2(x^3 - y^3)$ and verify it.
11. Generate a partial differential equation by eliminating the arbitrary function f from .
12. Define the order of a partial differential equation with an example

(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. Show that the differential equation $(ycosx + 2xe^y) + (sinx + x^2e^y - 1)y' = 0$ is exact and find its solution.

15. Solve the differential equation $(x^2 - 3y^2)dx + 2xydy = 0$

16. Solve the differential equation $y'' + k^2y = 0$ where k is an unknown real constant.

17. Find the general solution of $x^2y^{11} + 3xy^1 + 10y = 0$

18. If $y_1(x) = x$ is a solution of $x^2y^{11} + 2xy^1 - 2y = 0$ then find the general solution

19. Define regular singular point of a differential equation. Find the regular singular points of Legendre's equation.

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 $y^2p + xyq = x(z - 2y).$

(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. 1 Find the particular solution of $y^{11} + y = cot2x$
2 find the general solution of $(1 - x)y^{11} + xy^1 - y = (1 - x)^2$

24. Find power series solution of the differential equations
a) $y' + y = 1$ b) $y' - y = 2$ c) $y' - y = 0.$

25. Find the equation of the integral surface of the differential equation
$2y(z - 3)p + (2x - z)q = y(2x - 3)$ which passes through the circle $z = 0, x^2 + y^2 = 2x.$

(2×15=30)