QP CODE: 24035577

24035577

Reg No : .....

Name : .....

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

2017 Admission Onwards

60AA9734

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. Find the integrating factor of the differential equation $x^4 \frac{dy}{dx} + 2x^3 y = 1$.
2. Find the differential equation of the one parameter family of curve $y = xsin(x + c)$.
3. Define homogeneous function.Is $g(x, y) = \frac{1}{\sqrt{(x^2+y^2)}}$ is a homogeneous function.
4. Find the general solution of $2y^{11} - 4y^1 + 8y = 0$.
5. Write linear ordinary differential equation of order n with constant coefficients.
6. Find the general solution of the differential equation $y^{(4)} - 8y^{(2)} + 16y = 0$.
7. Find the differential equation of the general solution A e^x+ B e^{-2x}
8. Check whether 0 is an ordinary point of the differential equation $(1 + x^2)y'' + xy' + y = 0$.
9. Write the formula to find indicial equation.
10. Find functions P', Q' and R' so that PP'+QQ'+RR'=0 if $P = x^2, Q = y^2, R = z(x + y)$ and verify it.
11. Generate a partial differential equation by eliminating the arbitrary function f from $z = x + y + f(xy)$.
12. How can we find the integral surface of a linear partial differential equation, that passes through a curve given by $x = x(t), y = y(t), z = z(t)$

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Find the particular solution of the differential equation $y' = xe^x, y = 3$ when $x = 1$.

14. Find a particular solution of the differential equation that satisfy the initial condition $y' = 2sinxcosx,\ y = 1$ when $x = 0$.

15. Solve the equation $(1 + y)\frac{dy}{dx} = 1 - x$.

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

17. Solve the initial value problem $y^{11} - y^1 + 4y = x$, y(1) =2 and $y^1(1) = 1$.

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

19. Use ratio test to check the convergence of the series $\sum_{j=0}^{\infty} j!\, x^j$. Find the radius of convergence.

20. Find a power series solution of the differential equation $y' = 2xy$.

21. Find the general solution of $(x + z)p + yq = z + y^2$.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. i) Solve the differential equation $(x^2 + 2y')y'' + 2xy' = 0$ with initial condition $y(0) = 1$ and $y'(0) = 0$
    ii) Solve the differential equation $2yy'' = 1 + (y')^2$

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

24. Locate and classify singular points on the X-axis for the differential equations:
    a) $x^3(x - 1)y'' - 2(x - 1)y' + 3xy = 0$
    b) $x^2(x^2 - 1)y'' - x(1 - x)y' + 2y = 0$
    c) $x^2(x^2 - 1)^2y'' - x(1 - x)y' + 2y = 0$

25. Find the integral surface satisfying $x(x^2 + 3y^2)p - y(3x^2 + y^2)q = 2z(y^2 - x^2)$.

(2×15=30)