QP CODE: 23135623

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, OCTOBER 2023

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

BEA19B33

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. Verify that ce^{kx} is a solution of the differential equation $y' = ky$
2. Find the integrating factor of $xy' - 3y = x^4$
3. Make the equation exact $(x+2)sinydx + xcosydy = 0$
4. Find the general solution of $y^{11} - 3y^1 + y = 0$
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 $y^{(4)} + 5y^{(2)} + 4y = 0$
7. Find the differential equation of the general solution A e^{3x} +B e^{-x}
8. State Isaac Newton's general binomial theorem.
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 $z = f(\frac{xy}{z})$.
12. Define Lagrange's first order partial differential equation.

(10×2=20)

Part B

*Answer any **six** questions.*

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

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

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

15. Find the orthogonal trajectoy of the family of curves $y = e^{cx}$

16. Solve the differential equation $(x + y)dx - (x - y)dy = 0$

17. Find the general solution of $y^{11} - y^1 - 2y = 4x^2$ that satisfies y(0) =0 and $y^1(0) = 1$

18. Find the general solution of the equation $y^{(4)} - 5y^{(2)} + 4y = sinx$

19. Define a real analytic function. Give an example. Also state three properties of real analytic functions.

20. Locate and classify singular points on X-axis for the differential equation $x^2(x^2 - 1)y'' - x(1 - x)y' + 2y = 0.$

21. Find the general solution of $yz(b - c)p + zx(c - a)q = xy(a - b).$

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. i) Solve the equation $x^2y'' = 2xy' + (y')^2$ using the method of reduction of order.
ii) Solve the differential equation $xy'' + y' = 4x$

23. 1 Find the particular solution of $y^{11} + y = xcosx$
2 Find the general solution of $x^2y^{11} - 2xy^1 + 2y = xe^{-x}$

24. Solve $y'' + y = 0$ by power series method.

25. Find the equation of the integral surface of the differential equation $x^2p + y^2q + z^2 = 0$ which passes through the hyperbola $xy = x + y, z = 1.$

(2×15=30)