



QP CODE: 20100167

Reg No :

Name :

BSc DEGREE (CBCS) EXAMINATION, FEBRUARY 2020

Fifth Semester

Core Course - MM5CRT02 - DIFFERENTIAL EQUATIONS

B.Sc Computer Applications Model III Triple Main ,B.Sc Mathematics Model I,B.Sc Mathematics Model II

Computer Science

2017 Admission Onwards

51915010

Time: 3 Hours

Maximum 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 orthogonal trajectory of the family of curves $x^2 - y^2 = c^2$
3. Make the equation $ydx + (x^2y - x)dy = 0$ exact.
4. Write second order homogeneous linear differential equation with constant coefficient
5. Find a particular solution of $y^{11} - y^1 - 6y = 20e^{-2x}$
6. Find the general solution of $y^{11} - y = 0$, when $y_1(x) = e^x$
7. Find the differential equation of the general solution $Ae^x + Be^{-2x}$
8. Define radius of convergence of a power series.
9. Determine the nature of the point $x = 0$ for $xy'' + (\sin x)y = 0$.
10. Find functions P' , Q' and R' so that $PP'+QQ'+RR'=0$ if $P = y + zx$, $Q = -(x + yz)$, $R = (x^2 - y^2)z$ and verify it.
11. Generate a partial differential equation by eliminating the constants a and c from $x^2 + y^2 + (z - c)^2 = a^2$.



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 a curve in the xy plane that passes through (0, -2) and whose tangent line at a point (x, y) has slope $\frac{2x}{y^2}$

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

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

16. Solve $yy'' - (y')^2 = 0$

17. Find the general solution of $y^{(3)} - 6y^{(2)} + 11y^{(1)} - 6y = 0$

18. Find the general solution of the differential equation $y^{(4)} + 4y^{(3)} + 6y^{(2)} + 4y^{(1)} + y = 0$

19. Find a power series solution of the differential equation $y' = y$.

20. Define exponents of a differential equation at a regular singular point .

Prove that 0 is a regular singular point of the differential equation $xy'' + 2y' + xy = 0$ and then find the exponents for 0.

21. Find the general solution of $(\frac{b-c}{a})yzp + (\frac{c-a}{b})zxq = (\frac{a-b}{c})xy$

(6×5=30)

Part C

Answer any **two** questions.

Each question carries 15 marks.

22. (i) Find the solution of initial value problem $y' - 2xy = 6xe^{x^2}$, $y(1) = 1$

(ii) Solve the differential equation $y^2dx + (3xy - 1)dy = 0$

23. 1 find a particular solution of $y^{11} + y = \cot^2 x$

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

24. Verify that 0 is an ordinary point, and then find the power series solution of $y'' + xy' + y = 0$.



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)

