

QP CODE: 19102566



Reg No :

Name :

BSc DEGREE (CBCS) EXAMINATION, OCTOBER 2019

Fifth Semester

Core Course - MM5CRT02 - DIFFERENTIAL EQUATIONS

(Common to B.Sc Computer Applications Model III Triple Main ,B.Sc Mathematics Model I,B.Sc Mathematics Model II Computer Science)

2017 Admission Onwards

86251D8E

Maximum Marks: 80

Time: 3 Hours

Part A

Answer any ten questions.

Each question carries 2 marks.

1. Solve the differential equation $x^5 y' + y^5 = 0$
2. Find the orthogonal trajectory of $x - y^2 = c$
3. Find the integrating factor of $(2x + \tan y)dx + (x - x^2 \tan y)dy = 0$
4. Write Euler's equidimensional equation
5. Find the general solution of the differential equation $y^{(4)} - 5y^{(2)} + 4y = 0$
6. Find the general solution of the differential equation $y^{(4)} - 8y^{(2)} + 16y = 0$
7. Find the differential equation of the general solution $A e^{-x} + B e^{-4x}$
8. Define sum and difference of two power series.
9. Define an ordinary point of a differential 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 $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0$.
12. Give a general definition for partial differential equation.

(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. Solve the initial value problem $x^2 y' + xy = 2x$, $y(1) = 1$
15. Show that the differential equation $(y \cos x + 2xe^y) + (\sin x + x^2 e^y - 1)y' = 0$ is exact and find its solution.
16. Solve the differential equation $y'' + k^2 y = 0$ where k is an unknown real constant.
17. Find the general solution of $y^{11} + y = \sin x$
18. Find $y_2(x)$ when $y_1(x) = e^{2x}$ solution of the differential equation $y^{11} - 4y^1 + 4y = 0$
19. Find a power series solution of the differential equation $y' + y = 0$.
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) Solve $(5x + 2y + 1)dx + (2x + y + 1)dy = 0$
ii) Solve $\frac{dy}{dx} = \frac{x \tan(y/x) + y}{x}$
23. Find the particular solution of $y^{11} - y^1 - 6y = e^{-x}$ first by undetermined coefficient and then by variation of parameters
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 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)