QP CODE: 22101916

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) SPECIAL SUPPLEMENTARY EXAMINATIONS, MAY 2022

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

2019 Admission Only

FB32F66E

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. Solve the differential equation $xy' = (1 - 2x^2)tany$
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 the general solution of $2y^{11} - 4y^1 + 8y = 0$
5. Find the general solution of $y^{11} - y = 0$, when $y_1(x) = e^x$
6. Finf the general solution of $y^{(3)} - 3y^{(2)} + 2y^{(1)} = 0$
7. Find the general solution of the differential equation $y^{(4)} + 5y^{(2)} + 4y = 0$
8. Define a power series in x.
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 $P = y^2, Q = -xy, R = x(z - 2y)$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. Is $x^2 p + y^2 q = z^2 + x^2$ a linear partial differential equation? Justify your answer.

(10×2=20)

Part B

*Answer any **six** questions.*

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

13. Show that the function $y = e^{x^2} \int_0^x e^{-t^2} dt$i is a solution of the differential equation $y' = 2xy + 1$

14. Solve the initial value problem
$(2xcosy + 3x^2y)dx + (x^3 - x^2 siny - y)dy = 0,\ y(0) = 2$

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

16. Find the solution of the differential equation $(y')^2 = x^2 y''$

17. Find the particular solution of $y^{11} - 2y^1 + y = 2x$ first by inspection and then by variation of parameters

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

19. Find a power series solution of the differential equation $y' + y = 1.$

20. Define an ordinary point of a differential equation. Check whether 0 is an ordinary point of Legendre's equation.

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 $\frac{dy}{dx} = \frac{2x+3y-1}{4x+4}$
ii)Verify that $(x^3 + y^3)dx - xy^2 dy = 0$ is homogeneous and then solve it.

23. Find the general solution of $y^{11} + 9y = 2sin3x + 4sinx - 26e^-2x + 27x^3$

24. Find two independent Frobenius series solutions of $xy'' + 2y' + xy = 0.$

25. Find the integral surface satisfying $(x^2 - a^2)p + (xy - aztan\alpha)q = xz - aycot\alpha$

(2×15=30)