



QP CODE: 21100167

21100167

Reg No : .....

Name : .....

**BSc DEGREE (CBCS ) EXAMINATION, FEBRUARY 2021**

**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

4FC2E0D1

Time: 3 Hours

Max. Marks : 80

**Part A**

*Answer any ten questions.*

*Each question carries 2 marks.*

1. Solve the differential equation  $y' \sin y = x^2$
2. Determine whether the equation  $(1 + y^2 \sin 2x)dx - 2y \cos^2 x dy = 0$  is exact
3. Make the equation exact  $(x + 2) \sin y dx + x \cos y dy = 0$
4. Find the general solution of  $y^{11} - 4y^1 + 4y = 0$
5. Find a particular solution of  $y^{11} - 3y^1 + 2y = e^{-x}$
6. Find the general solution of the differential equation  $y^{(3)} + 3y^{(2)} + 3y^{(1)} + y = 0$
7. Find the differential equation of the general solution  $A + Be^{2x}$
8. Define a polynomial of degree  $n$ . Give an example.
9. Write Bessel's equation of order  $p$ .
10. Find functions  $P'$ ,  $Q'$  and  $R'$  so that  $PP'+QQ'+RR'=0$  if  $P = xz$ ,  $Q = -yz$ ,  $R = y^2 - x^2$  and verify it.
11. Generate a partial differential equation by eliminating the constants  $a$  and  $b$  from  $2z = (ax + y)^2 + b$ .
12. Define Lagrange's first order partial differential equation.

(10×2=20)





### Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Show that the function  $y = e^{x^2} \int_0^x e^{-t^2} dt$  is a solution of the differential equation  $y' = 2xy + 1$
14. Find the orthogonal trajectory of the family  $y = c(1 + \cos x)$
15. Solve the differential equation  $(x + y)dx - xdy = 0$
16. Solve the differential equation  $y'' - k^2y = 0$ ,  $k$  is an unknown real constant.
17. Find a particular solution of  $y^{11} - 2y^1 - 3y = 64xe^{-x}$
18. The equation  $(1 - x^2)y^{11} - 2xy^1 + 2y = 0$  has  $y_1 = x$  as a solution .Find the general solution
19. Find a power series solution of the differential equation  $y' = 2xy$ .
20. Define an ordinary point of a differential equation. Check whether 0 is an ordinary point of
  - a)  $(1 + x^2)y'' + xy' + y = 0$
  - b)  $y'' + (1 + x)y' - y = 0$ .
21. Find the general solution of  $x^2p + y^2q = (x + y)z$ .

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **15** marks.

22. (i) Solve the differential equation  $(y + 1) \frac{dy}{dx} + x(y^2 + 2y) = x$   
 (ii) Solve the initial value problem  $x \frac{dy}{dx} + y = (xy)^{\frac{3}{2}}$ ,  $y(1) = 4$
23. 1 Find the general solution of  $y^{(3)} - 3y^{(2)} + 2y^{(1)} = 10 + 42e^{3x}$   
 2 Find the solution of  $y^{(3)} - y^{(1)} = 1$  that satisfies the initial condition  $y(0) = y'(0) = y''(0) = 4$
24. The equation  $4x^2y'' - 8x^2y' + (4x^2 + 1)y = 0$  has only one Frobenius series solution. Find the general solution.
25. Find the equation of the integral surface of the differential equation  $(2xy - 1)p + (z - 2x^2)q = 2(x - yz)$  which passes through the line  $x = 1, y = 0$

(2×15=30)

