

B Sc DEGREE END SEMESTER EXAMINATION - JULY 2021**SEMESTER 4 : COMPUTER APPLICATION****COURSE : 19U4CRCMT5 : DIFFERENTIAL EQUATIONS***(For Regular - 2019 Admission)*

Time : Three Hours

Max. Marks: 75

PART A**Answer any 10 (2 marks each)**

1. Solve $\tan \theta dr + 2r d\theta = 0$.
2. Solve the linear differential equation $\frac{dy}{dx} - y = e^{2x}$.
3. Solve the differential equation $(x - 4)y^4 dx - x^3 (y^2 - 3) dy = 0$.
4. Show that the solutions $\sin x$ and $\cos x$ of $\frac{d^2y}{dx^2} + y = 0$ are linearly independent.
5. Show that x and x^2 are linearly independent solutions of the differential equation $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0$.
6. Find the general solution of $\frac{d^3y}{dx^3} - 4 \frac{d^2y}{dx^2} + \frac{dy}{dx} + 6y = 0$.
7. Find the particular integral of the equation $\frac{d^2y}{dx^2} + 4y = \cos 2x$.
8. Locate and classify the singular points of the differential equation $2x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + (x - 5)y = 0$.
9. Locate and classify the singular points of the differential equation $(x^2 - 3x) \frac{d^2y}{dx^2} + (x + 2) \frac{dy}{dx} + y = 0$.
10. Form the partial differential equation by eliminating the constants a and b from $z = ax + by + ab$.
11. Verify that $z = f(x^2 + y^2)$ is a solution of $y \frac{\partial z}{\partial x} - x \frac{\partial z}{\partial y} = 0$.
12. Solve $p + q = x + y + z$.

(2 x 10 = 20)**PART B****Answer any 5 (5 marks each)**

13. Solve $2xy \frac{dy}{dx} - y^2 + x^2 = 0$.
14. Solve the differential equation $(2x^2 + y)dx + (x^2y - x)dy = 0$.
15. Verify that $y=x$ is a solution of $(x^2 + 1) \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0$, and then find a linearly independent solution by reducing the order.
16. Solve the initial value problem $\frac{d^2y}{dx^2} + 4 \frac{dy}{dx} + 4y = 0$, $y(0) = 3$, $y'(0) = 7$.
17. Find the general solution of $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 3y = 0$.
18. Find the power series solution of the differential equation $\frac{dy}{dx} - y = 0$ in powers of x .
19. Form the partial differential equation by eliminating the arbitrary function f from $z = f(x - y)$.
20. Find the general integral of the linear partial differential equation $y^2p - xyq = x(z - 2y)$.

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. Solve the initial value problem $(2x + 3y + 1)dx + (4x + 6y + 1)dy = 0$. $y(-2) = 2$.
22. Solve the differential equation $y'' + y = \sec x$ by the method of variation of parameters.
23. Find the power series solution in powers of x of the differential equation $\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.
24. i) Form the partial differential equation from $z = xy + f(x^2 + y^2)$ by eliminating the arbitrary function.
ii) Solve $(y + zx)p - (x + yz)q = x^2 - y^2$.

(10 x 3 = 30)