

Roll No. _____

[Total No. of Pages : 3

SIVS 191 A-15
B.A./B.Sc. IVth Semester Degree Examination
Mathematics
(Differential Equation - I)
Paper - 4.2

Time : 3 Hours

Maximum Marks : 60

Instructions to Candidates :

Answer **All** the Sections.

SECTION - A

Answer any **Ten** of the following.

(Marks : $10 \times 2 = 20$)

1. Solve $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$.
2. Solve $\frac{dy}{dx} + \frac{y}{x} = 1$.
3. Find the I.F. of $y(8x - 9y)dx + 2x(x - 3y)dy = 0$.
4. Show that $(4x + 3y + 1)dx + (3x + 2y + 1)dy = 0$ is exact.
5. Solve $P^2 - P - 6 = 0$.
6. Solve $\frac{d^2 y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$.
7. Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = 0$.
8. Solve $\frac{d^2 y}{dx^2} + \frac{dy}{dx} + y = e^{-x}$.

9. Find the general and singular solution of $y = px + \sin^{-1} p$
10. Find the part of complementary function of the equation $\frac{d^2 y}{dx^2} - 2(1 + \frac{1}{x}) \frac{dy}{dx} + (1 + \frac{2}{x})y = (1 - \frac{2}{x})e^{2x}$.
11. Find wronskian W of the equation $\frac{d^2 y}{dx^2} + y = \tan x$.
12. Show that the equation $x^2(1+x) \frac{d^2 y}{dx^2} + 2x(2+3x) \frac{dy}{dx} + 2(1+3x)y = 0$ is exact.

SECTION - B

Answer any Three of the following.

(Marks : 3×5=15)

13. Solve $xdy - ydx = \sqrt{x^2 + y^2} dx$.
14. Solve $\frac{dy}{dx} + \frac{y}{x} \log y = \frac{y}{x^2} (\log x)^2$.
15. Solve $x \frac{dy}{dx} + y = y^2 \log x$
16. Solve $(xy \sin xy + \cos xy)ydx + (xy \sin xy - \cos xy)xdy = 0$.

SECTION - C

Answer any Three of the following.

(Marks : 3×5=15)

17. Solve $y = x + 2 \tan^{-1} p$.
18. Solve $\frac{d^3 y}{dx^3} + y = 3 + e^{-x} + 5e^{2x}$.
19. Solve $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + 9y = 3x^2 + \sin(3 \log x)$.

20. Solve the simultaneous differential equations $\frac{dx}{dt} + 7x - y = 0$ and $\frac{dy}{dt} + 2x + 5y = 0$.

SECTION - D

Answer any **Two** of the following.

(Marks : 2×5=10)

21. Solve $x^2 \frac{d^2y}{dx^2} - (x^2 - 2x) \frac{dy}{dx} + (x - 2)y = x^2 e^x, (x > 0)$ by finding a part of the C.F.
22. Solve $\cos x \frac{d^2y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^3 x = 2 \cos^5 x$ by changing the independent variable.
23. Solve by changing the dependent variable $x^2 \frac{d^2y}{dx^2} - 2x(1+x) \frac{dy}{dx} + 2(1+x)y = x^3 (x > 0)$.
24. Solve $x^2 y_2 + xy_1 - y = x^2 e^x, (x > 0)$ by the method of variation of parameter.

□