

Roll No. _____

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SIVS 189 A-2K14
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 Sections.

Section - A

Answer any **TEN** of the following.

(10×2=20)

1. Solve:

$$(e^y + 1)\cos x dx + e^y \sin x dy = 0$$

2. Show that the Equation

$$(ax + hy + g)dx + (hx + by + f)dy = 0 \text{ is exact.}$$

3. Solve:

$$(x + y + 1)\frac{dy}{dx} = 1$$

4. Find the general and singular solution of $y = Px + \frac{a}{P}$

5. Solve: $P^2 - 5P + 6 = 0$

6. Find the complementary function of $(D^3 - D^2 - D - 2)y = 0$

7. Solve: $(D^2 - 4)y = x^2$

8. Solve: $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} - 4y = x^2$

9. Find the part of the complementary function of $y'' - \cot x y' - (1 - \cot x)y = 0$
10. Find the complete solution of $\frac{d^2 y}{dx^2} - 3\frac{dy}{dx} + 2y = x^2 e^{3x}$.
11. Find the Wronskian w of the equation $y_2 + y = \sec x$.
12. Show that the equation $(2x^2 + 3x)\frac{d^2 y}{dx^2} + (6x + 3)\frac{dy}{dx} + 2y = (x + 1)e^x$ is exact.

Section - B

Answer any **three** of the following

(3×5=15)

13. Solve : $(x^2 + 2y^2)dx - xy dy = 0$
14. Solve : $x\frac{dy}{dx} + y = y^2 \log x$
15. Solve : $(1 + x^2)\frac{dy}{dx} + y = \tan^{-1} x$
16. Solve : $y^2 - 2px + y p^2 = 0$

Section - C

Answer any **three** of the following

(3×5=15)

17. Solve : $(D^3 - 3D + 2)y = 6 e^{3x} + \sin 2x$
18. Solve : $4x^2 \frac{d^2 y}{dx^2} + 4x \frac{dy}{dx} - y = 4x^2$
19. Solve : The simultaneous differential Equations $\frac{dx}{dt} + x = y + e^t$;
 $\frac{dy}{dt} + y = x + e^t$
20. Solve : $(3x^2 y^4 + 2xy)dx + (2x^3 y^3 - x^2)dy = 0$

Section - D

Answer any **two** of the following

(2×5=10)

21. Solve : $x^2 y'' + xy' - y = 2x^2$ ($x > 0$) given that $\frac{1}{x}$ is a part of complementary function and $y(1) = y'(1) = 0$.

22. Solve : by changing the dependent variable $\frac{d^2y}{dx^2} - 2 \tan x \frac{dy}{dx} - (a^2 + 1)y = e^x \cos x$ by reducing it to the Normal form.
23. Solve : $\frac{d^2y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^2 x = 2 \cos^5 x$ by changing the Independent variable.
24. Show that the equation $x^2(1+x)\frac{dy}{dx} + 2x(2+3x)\frac{dy}{dx} - 2(1+3x)y = 0$ is exact and hence solve.
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