INDIAN SCHOOL AL WADI AL KABIR
Dept. of Mathematics 2025 – 2026
Class XII – Mathematics
Work Sheet – Differential Equations

1	The degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^5 = \left(\frac{d^2y}{dx^2}\right)^2$ is: (a)4 (c)2 (b)32 (d)not defined [CBSE SQP 2023]
2	Degree of the differential equation $\sin x + \cos x\left(\frac{dy}{dx}\right) = y^2$ is: (a)2 (c)not defined (b)1 (d)0 [CBSE 2023]
3	If m and n respectively, are the order and the degree of the differential equation $\frac{d}{dx}\left[\left(\frac{dy}{dx}\right)\right]^4 =$ then m + n (a)1 (c)3 (b)2 (d)4 [CBSE SQP 2022]
4	The order and degree of the differential equation $\left[1+\left(\left(\frac{dy}{dx}\right)\right)^2\right]^3 = \frac{d^2y}{dx^2}$ respectively are (a)1, 2 (c)2, 1 (b)2, 3 (d)2, 6 (2024)
5	The degree of the differential equation $(y'')^2 + (y')^3 = x \sin(y')$ is : (a)1 (c)3 (b)2 (d)not defined (2024)
6	$x \log x \frac{dy}{dx} + y = 2\log x$ is an example of a : (a)variable separable differential equation. (b)homogeneous differential equation. (c)first order linear differential equation. (d)differential equation whose degree is not defined. (2024)
7	The order of the differential equation $\frac{d^4y}{dx^4} - \sin\left(\frac{d^2y}{dx^2}\right) = 5$ is; (a) 4 (c) 2 (b) 3 (d) Not defined (2024)
8	The integrating factor of the differential equation $(1-y^2)\frac{dx}{dy} + xy = ay, (-1 < y < 1)$ is; (a) $\frac{1}{y^2-1}$ (b) $\frac{1}{\sqrt{y^2-1}}$ (c) $\frac{1}{1-y^2}$ (d) $\frac{1}{\sqrt{1-y^2}}$ [CBSE 2023]

9	Write the sum of the order and the degree of the following differential equation: $\frac{d}{dx}\left(\frac{dy}{dx}\right) = 5$. [CBSE SQP Term-2 2022]
10	The degree of the differential equation $1 + \left(\frac{dy}{dx}\right)^2 = x$ is [CBSE 2020]
11	Find the order and the degree of the differential equation $x^2\frac{d^2y}{dx^2} = \left\{1 + \left(\frac{dy}{dx}\right)^{-2}\right\}^4$. [CBSE 2019]
12	Solve the differential equation: $ye^{\frac{x}{y}}dx = \left(xe^{\frac{x}{y}}dy + y^2\right)dy, (y \neq 0)$ [CBSE SQP 2023]
13	Find the general solution of the differential equation $(xy - x^2)dy = y^2dx$ [CBSE 2023]
14	Find the general solution of the differential equation: $(x^2 + 1)\frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$ [CBSE 2023]
15	Solve the differential equation: $ydx(x - y^2)dy = 0$ [CBSE SQP 2022]
16	Find the general solution of the following differential equation: $x\frac{dy}{dx} = y - xsin\left(\frac{y}{x}\right)$ [CBSE Term-2 SQP 2022]
17	Find the particular solution of the following differential equation, given that y = 0 when $x = \frac{\pi}{4}$ $\frac{dy}{dx} + ycot\, x = \frac{2}{1 + sin\, x}$ [CBSE Term-2 SQP 2022]
18	Find the particular solution of the differential equation $e^x\sqrt{1 - y^2}dx + \frac{y}{x}dy = 0$, given that y = 1, when x = 0. [CBSE 2014]
19	Find the particular solution of the differential equation given by $x^2\frac{dy}{dx} - xy = x^2cos^2\left(\frac{y}{2x}\right)$, given that when $x = 1, y = \frac{\pi}{2}$ (2024)
20	Find the particular solution of the differential equation given by $2xy + y^2 - 2x^2\frac{dy}{dx} = 0$, when x = 1. (2024)
21	Find the general solution of the differential equation : $y\,dx = (x + 2y^2)\,dy$ (2024)
22	Find the solution of the differential equation $\frac{dy}{dx} = x^3e^{-2y}$ [CBSE 2015]

Answers

1	(c) 2	2	(c) not defined
3	(c) 3	4	(C) 2, 1
5	(C) 3	6	(C) first order linear differential equation.
7	(A) 4	8	(d) $\frac{1}{\sqrt{1-y^2}}$
9	Order of differential equation = 2, Degree of differential equation = 1, sum = 2+1 = 3		
10	Degree = 2		
11	Order = order of the highest derivative = 2 Degree = Power of the highest order derivative = 1.		
12	$e^{\frac{x}{y}} = y + c$		
13	$y = x\log y + cx$		
14	$y(x^2+1) = \frac{x}{2}\sqrt{x^2+4} + 2\log\left[x + \sqrt{x^2+4}\right] + c$		
15	$xy = \frac{y^3}{3} + C$		
16	$\left(\operatorname{cosec}\frac{y}{x} - \cot\frac{y}{x}\right)x = C$		
17	$y\sin x = 2\left[x + \tan\left(\frac{\pi}{4} - \frac{x}{2}\right)\right] + c$		$y = \operatorname{cosec} x\left[2\left\{x + \tan\left(\frac{\pi}{4} - \frac{x}{2}\right)\right\} - \left(\frac{\pi}{2} + 2\tan\frac{\pi}{8}\right)\right]$
18	$xe^x - e^x = \sqrt{1-y^2} + c$		$\Rightarrow \sqrt{1-y^2} = e^x(x-1) + 1.$
19	$\tan\left(\frac{y}{2x}\right) = 1 + \frac{1}{2}ln\, x$		
20	$y^3 = 2x^3(3x+1)$		
21	$x + 2y^2 = ky$ where $k \in \mathbb{R}$		
22	$\frac{1}{2}e^{2y} = \frac{x^4}{4} + C$ $2e^{2y} = x_4 + C_1$		