1. The order of the differential equation whose general solution is given by

$y = P_1\cos(75x + P_2) - (P_3 + P_4 + P_5)\ (100)^{(x+P_6)} + P_7 \tan(5x - P_8)$

(1) 8 (2) 6 (3) 4 (4) 5

2. The order and degree of the differential equation

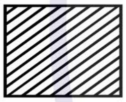
$\sqrt{\frac{d^2y}{dx^2}} = \sqrt[3]{\frac{dy}{dx}+3}$ are respectively

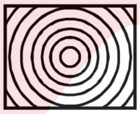
(1) 2 and 3 (2) 2 and 2
(3) 2 and 6 (4) 2 and 1

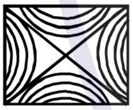
3. A function f(x) satisfying $\int_0^1 f(tx)\,dt = n\ f(x)$, where x > 0 is :-

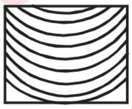
(1) $f(x) = cx^{1-n/n}$ (2) $f(x) = c.x^{n/n-1}$
(3) $f(x) = cx^{1/n}$ (4) $f(x) = c.x^{(1-n)}$

4. The general sloution of the diff. equation $\frac{dy}{dx}=\frac{1-x}{y}$ is a family of curves which looks most like which of the following ?

(1) 

(2) 

(3) 

(4) 

5. The order and the degree of the differential equalion whose general solution is $y = c(x - c)^2$ are respectively

(1) 1, 1 (2) 1, 2 (3) 1, 3 (4) 2, 1

6. Solution of the equation

$\sec^2x \tan y dx + \sec^2y \tan x dy = 0,\ y\left(\frac{\pi}{4}\right) = \frac{\pi}{3}$ is:-

(1) $|\tan x \tan y| = \sqrt{3}$

(2) $\tan x \tan y = \sqrt{3}$

(3) $|\tan x| = \sqrt{3}\ |\tan y|$

(4) None of these

7. Solution of the differential eq^n.

$\frac{dy}{dx} - 2\frac{y}{x} = x^3$ is :-

(1) $2y = x^6 + cx^2$ (2) $2y = cx^2 - x^6$
(3) $2y = cx^2 + x^4$ (4) None of these

8. Equation of the curve satisfying

$xdy - ydx = \sqrt{x^2 - y^2}\ dx;\ y(1) = 0$ is :-

(1) $y = x^2\sin(\log x)$ (2) $y^2 = x(x - 1)^2$
(3) $y^2 = x^2(x - 1)$ (4) $y = x\sin(\log x)$

9. The degree of the differential equation $y_2^{3/2} - y_1^{1/2} - 4 = 0$ is-

(1) 6 (2) 3 (3) 2 (4) 4

10. Which of the following equation is linear-

(1) $\left(\frac{d^2y}{dx^2}\right)^2 + x^2\left(\frac{dy}{dx}\right)^2 = 0$

(2) $y = \frac{dy}{dx} + \sqrt{1+\left(\frac{dy}{dx}\right)^2}$

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

(4) $y\ \frac{dy}{dx} - 4 = x$

11. The solution of $y\,dx - x\,dy + 3x^2 y^2 e^{x^3}\,dx = 0$ is-

(1) $\frac{x}{y} + e^{x^3} = C$ (2) $\frac{x}{y} - e^{x^3} = 0$

(3) $-\frac{x}{y} + e^{x^3} = C$ (4) None of these

12. Which of the following equations is a linear equation of order 3 ?

(1) $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2}\frac{dy}{dx} + y = x$

(2) $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} + y^2 = x^2$

(3) $x\ \frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} = e^x$

(4) $\frac{d^2y}{dx^2} + \frac{dy}{dx} = \log x$

13. A particular solution of $\log\frac{dy}{dx} = 3x + 4y,\ y(0) = 0$ is-

(1) $e^{3x} + 3e^{-4y} = 4$ (2) $4e^{3x} - e^{-4y} = 3$
(3) $3e^{3x} + 4e^{4y} = 7$ (4) $4e^{3x} + 3e^{-4y} = 7$

14. The solution of $x^3\frac{dy}{dx} + 4x^2\tan y = e^x \sec y$ satisfying $y(1) = 0$ is-
(1) $\tan y = (x-2)\,e^x \log x$
(2) $\sin y = e^x(x-1)x^{-4}$
(3) $\tan y = (x-1)e^x x^{-3}$
(4) $\sin y = e^x(x-1)x^{-3}$

15. The solution of $(x-y^3)dx + 3xy^2dy = 0$ is
(1) $\log x + \frac{x}{y^3} = k$ (2) $\log x + \frac{y^3}{x} = k$
(3) $\log x - \frac{x}{y^3} = k$ (4) $\log xy - y^3 = k$

16. The general solution of the differential equation $\frac{dy}{dx} + \sin\left(\frac{x+y}{2}\right) = \sin\left(\frac{x-y}{2}\right)$ is-
(1) $\log\tan\left(\frac{y}{2}\right) = c - 2\sin x$
(2) $\log\tan\left(\frac{y}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$
(3) $\log\tan\left(\frac{y}{2}+\frac{\pi}{4}\right) = c - 2\sin x$
(4) $\log\tan\left(\frac{y}{4}+\frac{\pi}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$

17. The solution of $\frac{dz}{dx} + \frac{z}{x}\log z = \frac{z}{x^2}.(\log z)^2$ is-
(1) $\left(\frac{1}{\log z}\right)x = 2 - x^2c$ (2) $\left(\frac{1}{\log z}\right)x = \frac{1}{2} + x^2c$
(3) $\left(\frac{1}{\log z}\right)x = x^2c$ (4) None of these

18. Number of values of $m \in N$ for which $y = e^{mx}$ is a solution of the differential equation $D^3y - 3D^2y - 4Dy + 12y = 0$, is
(1) 0 (2) 1
(3) 2 (4) more than 2

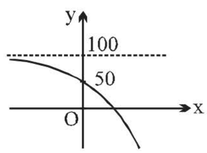
19. The value of the constant 'm' and 'c' for which $y = mx + c$ is a solution of the differential equation $D^2y - 3Dy - 4y = -4x$.
(1) is $m = -1;\ c = 3/4$ (2) is $m = 1;\ c = -3/4$
(3) no such real m, c (4) is $m = 1;\ c = 3/4$

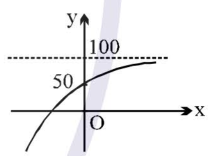
20. Consider the two statements
Statement-1: $y = \sin kt$ satisfies the differential equation $y'' + 9y = 0$.
Statement-2: $y = e^{kt}$ satisfy the differential equation $y'' + y' - 6y = 0$
The value of k for which both the statements are correct is
(1) – 3 (2) 0 (3) 2 (4) 3

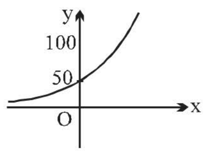
21. The differential equation corresponding to the family of curves $y = e^x(ax+b)$ is
(1) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - y = 0$
(2) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$
(3) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$
(4) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - y = 0$

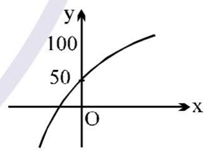
22. The x-intercept of the tangent to a curve is equal to the ordinate of the point of contact. The equation of the curve through the point (1, 1) is
(1) $y e^{\frac{x}{y}} = e$ (2) $x e^{\frac{x}{y}} = e$
(3) $x e^{\frac{y}{x}} = e$ (4) $y e^{\frac{y}{x}} = e$

23. Which one of the following curves represents the solution of the initial value problem
$Dy = 100 - y$, where $y(0) = 50$

(1) 

(2) 

(3) 

(4) 

24. A function $y = f(x)$ satisfies
$(x+1).f'(x) - 2(x^2+x)f(x) = \frac{e^{x^2}}{(x+1)}$, $\forall\ x > -1$
If $f(0) = 5$, then $f(x)$ is
(1) $\left(\frac{3x+5}{x+1}\right).e^{x^2}$ (2) $\left(\frac{6x+5}{x+1}\right).e^{x^2}$
(3) $\left(\frac{6x+5}{(x+1)^2}\right).e^{x^2}$ (4) $\left(\frac{5-6x}{x+1}\right).e^{x^2}$

25. If $\int_a^x t\,y(t)dt = x^2 + y(x)$ then y as a function of x is

(1) $y = 2 - (2 + a^2)e^{\frac{x^2-a^2}{2}}$

(2) $y = 1 - (2 + a^2)e^{\frac{x^2-a^2}{2}}$

(3) $y = 2 - (1 + a^2)e^{\frac{x^2-a^2}{2}}$

(4) none

26. If $\frac{dy}{dx} = y + 3 > 0$ and y(0) = 2, then y(ln 2) is equal to :-

(1) 13 (2) –2 (3) 7 (4) 5

27. The curve that passes through the point (2, 3), and has the property that the segment of any tangent to it lying between the coordinate axes is bisected by the point of contact, is given by :

(1) $\left(\frac{x}{2}\right)^2 + \left(\frac{y}{3}\right)^2 = 2$ (2) $2y - 3x = 0$

(3) $y = \frac{6}{x}$ (4) $x^2 + y^2 = 13$

28. Consider the differential equation $\frac{dy}{dx} = \frac{y^3}{2(xy^2 - x^2)}$:

Statement 1 : The substitution $z = y^2$ transforms the above equation into a first order homogenous differential equation.

Statement 2 : The solution of this differential equation is $y^2 e^{-\frac{y^2}{x}} = C$.

(1) Statement 1 is false and statement 2 is true.
(2) Both statements are true.
(3) Statement 1 is true and statement 2 is false.
(4) Both statements are false.

29. If a curve passes through the point $\left(2, \frac{7}{2}\right)$ and has slope $\left(1 - \frac{1}{x^2}\right)$ at any point (x, y) on it, then the ordinate of the point on the curve whose abscissa is – 2 is :

(1) $-\frac{5}{2}$ (2) $\frac{5}{2}$ (3) $-\frac{3}{2}$ (4) $\frac{3}{2}$

30. The equation of the curve passing through the origin and satisfying the differential equation $(1 + x^2)\frac{dy}{dx} + 2xy = 4x^2$ is :

(1) $(1 + x^2)\,y = x^3$
(2) $3(1 + x^2)\,y = 4x^3$
(3) $3(1 + x^2)\,y = 2x^3$
(4) $(1 + x^2)\,y = 3x^3$

ANSWER KEY

Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	4	1	1	2	3	1	3	4	1	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	1	3	4	2	2	2	2	3	2	1
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	2	1	2	2	1	3	3	2	3	2