EXERCISE – I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. The order and degree of the differential equation

$\left(1+3\frac{dy}{dx}\right)^{\frac{2}{3}} = 4\frac{d^3y}{dx^3}$ are

(A) $1, \frac{2}{3}$ (B) 3, 1 (C) 1, 2 (D) 3, 3

2. The degree and order of the differential equation of the family of all parabolas whose axis is x-axis are respectively

(A) 2, 1 (B) 1, 2 (C) 3, 2 (D) 2, 3

3. The order and degree of the differential equation

$\sqrt[3]{\frac{dy}{dx}} - 4\frac{d^2y}{dx^2} - 7x = 0$ are a and b, then a + b is

(A) 3 (B) 4 (C) 5 (D) 6

4. 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

(A) 0 (B) 1 (C) 2 (D) more than 2

5. The value of the constant 'm' and 'c' for which y = mx + c is a solution of the differential equation

$D^2y - 3Dy - 4y = -4x$

(A) is m = – 1, c = 3/4 (B) is m = 1, c = 3/4
(C) no such real m, c (D) is m = 1, c = –3/4

6. The differential equation of the family of curves represented by $y = a + bx + ce^{-x}$
(where a, b, c are arbitrary constants) is

(A) $y''' = y'$ (B) $y''' + y'' = 0$

(C) $y''' - y'' + y' = 0$ (D) $y''' + y'' - y' = 0$

7. The differential equation whose solution is $Ax^2 + By^2 = 1$, where A and B are arbitrary constants is of-

(A) first order and first degree
(B) second order and first degree
(C) second order and second degree
(D) first order and second degree

8. The differential equation whose solution is $(x-h)^2 + (y-k)^2 = a^2$ is (where a is a constant)

(A) $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3 = a^2\left(\frac{d^2y}{dx^2}\right)^2$ (B) $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3 = a^2\frac{d^2y}{dx^2}$

(C) $\left[1+\left(\frac{dy}{dx}\right)\right]^3 = a^2\left(\frac{d^2y}{dx^2}\right)^2$ (D) none of these

9. If $y = e^{(K+1)x}$ is a solution of differential equation $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0$, then k equals

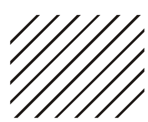
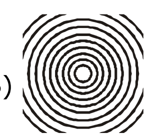
(A) –1 (B) 0 (C) 1 (D) 2

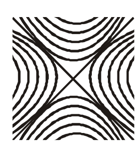
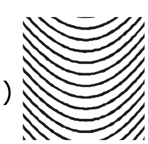
10. The differential equation for the family of curves $x^2 + y^2 - 2ay = 0$, where a is an arbitrary constant is

(A) $(x^2 - y^2)y' = 2xy$ (B) $2(x^2 + y^2)y' = xy$

(C) $2(x^2 - y^2)y' = xy$ (D) $(x^2 + y^2)y' = 2xy$

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

(A)  (B) 

(C)  (D) 

12. The solution to the differential equation $y\ell ny + xy' = 0$, where y(1) = e, is

(A) $x(\ell ny) = 1$ (B) $xy(\ell ny) = 1$

(C) $(\ell ny)^2 = 2$ (D) $\ell ny + \left(\frac{x^2}{2}\right)y = 1$

13. A curve passing through (2, 3) and satisfying the differential equation $\int_0^x ty(t)dt = x^2y(x), (x > 0)$ is

(A) $x^2 + y^2 = 13$ (B) $y^2 = \frac{9}{2}x$

(C) $\frac{x^2}{8} + \frac{y^2}{18} = 1$ (D) xy = 6

14. The equation of the curve passing through origin and satisfying the differential equation $\frac{dy}{dx} = \sin(10x + 6y)$ is

(A) $y = \frac{1}{3}\tan^{-1}\left(\frac{5\tan 4x}{4 - 3\tan 4x}\right) - \frac{5x}{3}$

(B) $y = \frac{1}{3}\tan^{-1}\left(\frac{5\tan 4x}{4 + 3\tan 4x}\right) - \frac{5x}{3}$

(C) $y = \frac{1}{3}\tan^{-1}\left(\frac{3 + \tan 4x}{4 - 3\tan 4x}\right) - \frac{5x}{3}$ (D) none of these

15. If $x\frac{dy}{dx} = y(\log y - \log x + 1)$, then the solution of the equation is

(A) $\log\left(\frac{x}{y}\right) = cy$ (B) $\log\left(\frac{y}{x}\right) = cx$

(C) $x\log\left(\frac{y}{x}\right) = cy$ (D) $y\log\left(\frac{x}{y}\right) = cx$

16. A curve passes through the point $\left(1, \frac{\pi}{4}\right)$ & its slope at any point is given by $\frac{y}{x} - \cos^2\left(\frac{y}{x}\right)$. Then the curve has the equation

(A) $y = x\tan^{-1}\left(\ell n\frac{e}{x}\right)$ (B) $y = x\tan^{-1}(\ell n + 2)$

(C) $y = \frac{1}{x}\tan^{-1}\left(\ell n\frac{e}{x}\right)$ (D) none

17. The solution of the differential equation $(2x - 10y^3)\frac{dy}{dx} + y = 0$ is

(A) $x + y = ce^{2x}$ (B) $y^2 = 2x^3 + c$

(C) $xy^2 = 2y^5 + c$ (D) $x(y^2 + xy) = 0$

18. Solution of differential equation $(1 + y^2)dx + (x - e^{\tan^{-1}y})dy = 0$ is

(A) $ye^{\tan^{-1}x} = \tan^{-1}x + c$ (B) $xe^{\tan^{-1}y} = \frac{1}{2}e^{2\tan^{-1}y} + c$

(C) $2x = e^{\tan^{-1}y} + c$ (D) $y = xe^{-\tan^{-1}x} + c$

19. The general solution of the differential equation, $y' + y\phi'(x) - \phi(x).\phi'(x) = 0$ where $\phi(x)$ is a known function is

(A) $y = ce^{-\phi(x)} + \phi(x) - 1$ (B) $y = ce^{\phi(x)} + \phi(x) + K$

(C) $y = ce^{-\phi(x)} - \phi(x) + 1$ (D) $y = ce^{-\phi(x)} + \phi(x) + K$

20. The solution of the differential equation, $e^x(x + 1)dx + (ye^y - xe^x)dy = 0$ with initial condition f(0) = 0, is

(A) $xe^x + 2y^2e^y = 0$ (B) $2xe^x + y^2e^y = 0$

(C) $xe^x - 2y^2e^y = 0$ (D) $2xe^x - y^2e^y = 0$

21. The solution of the differential equation $ydx + (x + x^2y)dy = 0$ is

(A) $\frac{1}{xy} + \log y = c$ (B) log y = cx

(C) $-\frac{1}{xy} = c$ (D) $-\frac{1}{xy} + \log y = c$

22. The solution of $y^5x + y - x\frac{dy}{dx} = 0$ is

(A) $x^4/4 + 1/5(x/y)^5 = C$ (B) $x^5/5 + (1/4)(x/y)^4 = C$

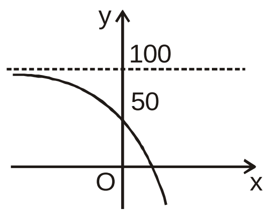
(C) $(x/y)^5 + x^4/4 = C$ (D) $(xy)^4 + x^5/5 = C$

23. The solution of $\frac{xdy}{x^2+y^2} = \left(\frac{y}{x^2+y^2} - 1\right)dx$ is

(A) $y = x\cot(c-x)$ (B) $\cos^{-1} y/x = -x + c$

(C) $y = x\tan(c-x)$ (D) $y^2/x^2 = x\tan(c-x)$

24. Which one of the following curves represents the solution of the initial value problem Dy = 100 – y where y(0) = 50

(A)


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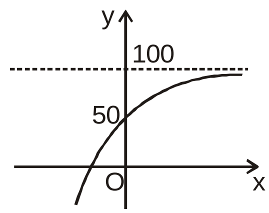

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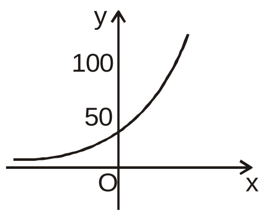

(D)