1. The equation of the curve satisfying the equation $(xy - x^2)\frac{dy}{dx} = y^2$ and passing through the point (–1, 1) is
(1) $y = (\log y - 1)x$
(2) $y = (\log y + 1)x$
(3) $x = (\log x - 1)y$
(4) $x = (\log x + 1)y$

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

3. The real value of m for which the substitution $y = u^m$ will transform the differential equation $2x^4y\frac{dy}{dx} + y^4 = 4x^6$ into a homogeneous equation is equal to
(1) 1
(2) 1.5
(3) 2
(4) 2.5

4. The solution of the equation $(1 - x^2)\frac{dy}{dx} - xy = 1$ is {Where C is an arbitrary constant. (|x|>1) }
(1) $y\sqrt{x^2 - 1} = -\log\left(x + \sqrt{x^2 - 1}\right) + C$
(2) $2y\sqrt{x^2 - 1} = c + \log\left(x - \sqrt{x^2 - 1}\right)$
(3) $y\sqrt{x^2 - 1} = c - \log\left(x + \sqrt{x^2 - 1}\right)^2$
(4) $x\sqrt{y^2 - 1} = c + \log\left(y - \sqrt{y^2 - 1}\right)$

5. If $y(t)$ is a solution of $(1 + t)\frac{dy}{dt} - ty = 1$ and $y(0) = -1$, then $y(-5)$ is equal to ______

6. The solution of differential equation $(1 + y^2) + \left(x - e^{\tan^{-1}y}\right)\frac{dy}{dx} = 0$ is
(1) $2xe^{\tan^{-1}y} = e^{2\tan^{-1}y} + k$
(2) $2xe^{\tan^{-1}y} = e^{\tan^{-1}y} + k$
(3) $xe^{\tan^{-1}y} = e^{\tan^{-1}y} + k$
(4) $xe^{\tan^{-1}y} = e^{\tan^{-1}y} - k$

7. If $y = y(x)$ is the solution of the differential equation, $\frac{dy}{dx} + 2y\tan x = \sin x, y\left(\frac{\pi}{3}\right) = 0$, then the maximum value of the function $y(x)$ over R is equal to :
(1) 8
(2) $\frac{1}{2}$
(3) $-\frac{15}{4}$
(4) $\frac{1}{8}$

8. The solution of the differential equation $\frac{dy}{dx} = \frac{y}{2y\log y + y - x}$ is
(1) $xy = 2y^2 log y + c$
(2) $3xy = 2y^2 log y + c$
(3) $3xy = -3y^2 log y + c$
(4) $xy = y^2 log y + c$

9. The solution of the differential equation $\frac{dy}{dx} + x(2x + y) = x^3(2x + y)^3 - 2$ is (C being an arbitrary constant)
(1) $\frac{1}{2x + xy} = x^2 + 1 + Ce^x$
(2) $\frac{1}{(2x+y)^2} = x^2 + 1 + Ce^{x^2}$
(3) $\frac{1}{2x + y} = x + 1 + Ce^{-x^2}$
(4) $\frac{1}{(2x+y)^2} = x^2 + 1 + C$

10. The solution of the initial value problem $(2\ln x)\frac{dy}{dx} + \frac{y}{x} = \frac{1}{y}\cos x,\ y > 0,\ x > 1$ and $y\left(\frac{3\pi}{2}\right) = 0$ is given by which of the following options?
(1) $y = a\sqrt{\frac{1 - \sin x}{\ln x}}$
(2) $y = a\sqrt{\frac{1 + \sin x}{\ln x}}$
(3) $y = a\sqrt{\frac{1 - \cos x}{\ln x}}$
(4) $y = a\sqrt{\frac{1 + \cos x}{\ln x}}$