JEE Chapter 19 CD

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C. MCQ with one correct answer

1) A solution of the differential equation $(1999-2Marks)$

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

a) $y = 2$
b) $y = 2x - 4$
c) $y = 2x$
d) $y = 2x^2 - 4$

2) If $x^2 + y^2 = 1$, then $(2000S)$

a) $yy" - 2\left(y'^2\right) + 1 = 0$
b) $yy" + \left(y'^2\right) + 1 = 0$
c) $yy" - \left(y'^2\right) - 1 = 0$
d) $yy" + 2\left(y'^2\right) + 1 = 0$

3) If $y(t)$ is a solution of $(1+t)\frac{dy}{dt} - ty = 1$ and $y(0) = -1$, then $y(1)$ is equal to $(2003S)$

a) $-\frac{1}{2}$
b) $e - \frac{1}{2}$
c) $e + \frac{1}{2}$
d) $\frac{1}{2}$

4) If $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x$, $y(0) = 1$, then y$\left(\frac{\pi}{2}\right)$ $(2004S)$

a) $\frac{1}{3}$
b) $-\frac{1}{3}$
c) $\frac{2}{3}$
d) 1

5) If $y = y(x)$ and it follows the relation $x\cos y + y\cos x = \pi$ then $y''(0) =$ $(2005S)$

a) 1
b) -1
c) $\pi - 1$
d) $-\pi$

6) The solution of primitive integral equation $\left(x^2 + y^2\right)dy = xy\,dx$ is $y = y(x)$. If $y(1) = 1$ and $x_0 = e$, then x_0 is equal to $(2005S)$

a) $\sqrt{2\left(e^2 - 1\right)}$
b) $\sqrt{3e}$
c) $\sqrt{2\left(e^2 + 1\right)}$
d) $\sqrt{\frac{e^2+1}{2}}$

7) For the primitive integral equation $ydx + y^2dy = x\,dy$; $x \in \mathbb{R}, y > 0, y = y(x), y(1) = 1$, then $y(-3)$ is $(2005S)$

a) 3
b) 1
c) 2
d) 5

8) The differential equation $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{y}$ determines a family of circles with $(2005S)$
(a) variable radii and a fixed centre at $(0, 1)$
(b) variable radii and a fixed centre at $(0, -1)$
(c) fixed radius 1 and variable centres along the x-axis
(d) fixed radius 1 and variable centres along the y-axis

9) The function $y = f(x)$ is the solution of the differential equation $(JEEAdv.2014)$

$$\frac{dy}{dx} + \frac{xy}{x^2 - 1} = \frac{x^4 + 2x}{\sqrt{1 - x^2}} \tag{2}$$

in $(-1, 1)$ satisfying $f(0) = 0$. Then

$$\int_{-\frac{\sqrt{3}}{2}}^{\frac{\sqrt{3}}{2}} f(x)\,dxis \tag{3}$$

a) $\frac{\pi}{3} - \frac{\sqrt{3}}{2}$
b) $\frac{\pi}{6} - \frac{\sqrt{3}}{4}$
c) $\frac{\pi}{3} - \frac{\sqrt{3}}{4}$
d) $\frac{\pi}{6} - \frac{\sqrt{3}}{2}$

10) If $y = y(x)$ satisfies the differential equation $(JEEAdv.2018)$

$$8\sqrt{x}\left(\sqrt{9 + \sqrt{x}}\right)dy = \left(\sqrt{4 + \sqrt{9 + \sqrt{x}}}\right)^{-1} dx,\ x > 0 \tag{4}$$

and y(0) = $\sqrt{7}$, then y(256) =

a) 3
b) 16
c) 9
d) 80

D. MCQ with one or more than correct answer

1) The order of the differential equation whose general solution is given by $y = (C_1 + C_2)\cos(x + C_3) - C_4e^{x+C_5}$, where C_1, C_2, C_3, C_4, C_5 are arbitrary constants, is $(1998-2Marks)$

a) 5
b) 3
c) 4
d) 2

2) The differential equation representing the family of curves $y^2 = 2c\left(x + \sqrt{c}\right)$, where c is a positive parameter, is of (1999 – 3*Marks*)

a) order 1
b) degree 3
c) order 2
d) degree 4

3) A curve $y = f(x)$ passes through $(1, 1)$ and at $P(x, y)$, the tangent cuts the x-axis and y-axis at A and B respectively such that $BP : AP = 3 : 1$, then (2006 – 5M, –1)

(a) equation of curve is $xy' - 3y = 0$
(b) normal at $(1, 1)$ is $x + 3y = 4$
(c) curve passes through $\left(2, \frac{1}{8}\right)$
(d) equation of curve is $xy' + 3y = 0$

4) If $y(x)$ satisfies the differential equation $y' - y\tan x = 2x\sec x$ and $y(0) = 0$, then (2012)

a) $y\left(\frac{\pi}{4}\right) = \frac{\pi^2}{8\sqrt{2}}$
b) $y\left(\frac{\pi}{3}\right) = \frac{\pi^2}{9}$
c) $y\left(\frac{\pi}{4}\right) = \frac{\pi^2}{18}$
d) $y\left(\frac{\pi}{3}\right) = \frac{4\pi}{3} + \frac{2\pi^2}{3\sqrt{3}}$

5) A curve passes through the point $\left(1, \frac{\pi}{6}\right)$. Let the slope of the curve at each point (x, y) be $\frac{y}{x} + \sec\left(\frac{y}{x}\right), x > 0$. Then the equation of the curve is (*JEEAdv*.2013)

a) $\sin\left(\frac{y}{x}\right) = \log x + \frac{1}{2}$
b) $\sec\left(\frac{2y}{x}\right) = \log x + 2$
c) $\cos\sec\left(\frac{y}{x}\right) = \log x + 2$
d) $\cos\left(\frac{2y}{x}\right) = \log x + \frac{1}{2}$