

# JEE Chapter 19 CD

AI24BTECH11028 - Ronit Ranjan

## C. MCQ WITH ONE CORRECT ANSWER

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

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

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

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

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

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

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

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

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

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

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

- a)  $3$                       c)  $2$   
b)  $1$                       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

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

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

$$\int_{-\frac{\sqrt{3}}{2}}^{\frac{\sqrt{3}}{2}} f(x) dx \text{ is} \quad (3)$$

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

- 10) If  $y = y(x)$  satisfies the differential equation

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

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

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

## D. MCQ WITH ONE OR MORE THAN CORRECT ANSWER

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

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

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

- a) order 1                                      c) order 2  
b) degree 3                                      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

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

- a)  $y\left(\frac{\pi}{4}\right) = \frac{\pi^2}{8\sqrt{2}}$                                       c)  $y\left(\frac{\pi}{4}\right) = \frac{\pi^2}{18}$   
b)  $y\left(\frac{\pi}{3}\right) = \frac{\pi^2}{9}$                                       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  $(1, \frac{\pi}{6})$ . 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

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