



Student's Name : _____

Question Number	I	II	III	Total
Mark				

Question I: Choose the correct answer

(1) The differential equation $xy \frac{d^5y}{dx^5} + \sqrt{x+y} \frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^6 = 0$ is of

- (a) order 5 and nonlinear (b) order 6 and nonlinear (c) order 5 and linear (d) None of the previous

(2) The value of k that makes $k(y^2 + 2x)dx + (4y - 6xy)dy = 0$ exact is

- (a) -6 (b) 6 (c) -3 (d) None of the previous

(3) The function $f(x, y) = \frac{\sqrt{x^2+xy}}{x^5+y^4x}$ is homogeneous of degree

- (a) 4 (b) -4 (c) $-\frac{9}{2}$ (d) None of the previous

(4) To solve the differential equation $x \frac{dy}{dx} + 5y = 9x^2y^{-2}$ we use the substitution

- (a) $u = y^3$ (b) $u = y^{-3}$ (c) $u = \frac{y^{-2}}{x}$ (d) None of the previous

(5) The one parameter family of solutions for $\frac{dy}{dx} = y^2 - 4$ is $y = 2\left(\frac{1+ce^{4x}}{1-ce^{4x}}\right)$. The solution $y = 2$ for this differential equation is a

- (a) trivial solution (b) member of the family of solutions (c) singular solution (d) None of the previous

Question II: A. Determine the region of the $xy - plane$ for which the differential equation has a unique solution

$$\frac{dy}{dx} = x \ln(y + 2)$$

B. Find the integrating factor for the following linear differential equation

$$x dy + (3 + 3y - x) dx = 0.$$

Question III: A. Solve the following differential equations:

1.

$$(xy^2 - \cos x \sin x)dx + y(x^2 - 1)dy = 0$$

2.

$$\frac{dy}{dx} = \tan(y - x + 2) + 1$$

B. Solve the Initial Value Problem

$$xdx + (y - 2x)dy = 0, \quad y(1) = 0.$$

Good Luck 😊