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NCERT Class 12- Mathematics: Chapter – 9 Differential Equations Part 17

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Question 76: Fill in the blanks of the following (i to xi)

(i) The degree of the differential equation $\frac{d^2y}{dx^2} + e^{\frac{dy}{dx}} = 0$ is _____.

Answer: Not defined

(ii) The degree of the differential equation $\sqrt{1 + \left(\frac{dy}{dx}\right)^2} = x$ is _____.

Answer: Not defined

(iii) The number of arbitrary constants in the general solution of a differential equation of order three is _____.

Answer: (3)

(iv) $\frac{dy}{dx} + \frac{y}{x \log x} = \frac{1}{x}$ is an equation of the type _____.

Answer: $\frac{dy}{dx} + py = Q$

(v) General solution of the differential equation of the type $\frac{dx}{dy} + P_1 x = Q_1$ is given by _____.

Answer:

$$x \cdot e^{\int P_1 dy} = \int Q_1 \{e^{\int P_1 dy}\} dy + C$$

(vi) The solution of the differential equation $\frac{xdy}{dx} + 2y = x^2$ is_____.

Answer:

$$y = \frac{x^2}{4} + Cx^{-2}$$

(vii) The solution of $(1 + x^2) \frac{dy}{dx} + 2xy - 4x^2 = 0$ is_____.

Answer:

$$y = \frac{4x^3}{3(1+x^2)} + C(1+x^2)^{-1}$$

(viii) The solution of the differential equation $ydx + (x + xy)dy = 0$ is _____.

Answer:

$$xy = Ae^{-y}$$

(ix) General solution of $\frac{dy}{dx} + y = \sin x$ is _____.

Answer:

$$y = \frac{1}{2}(\sin x - \cos x) + C.e^{-x}$$

(x) The solution of differential equation $\cot y dx = x dy$ is _____.

Answer:

$$x = C \sec y$$

(xi) The integrating factor of $\frac{dy}{dx} + y = \frac{1+y}{x}$ is _____.

Answer:

$$e^x . e^{-\log x} = \frac{e^x}{x}$$

Question 77: State True or False for the following:

(i) Integrating factor of the differential of the form $\frac{dx}{dy} + p_1 x = Q_1$ is given by $e^{\int p_1 dy}$.

Answer: True

(ii) Solution of the differential equation of the type $\frac{dx}{dy} + p_1 x = Q_1$ is given by $x.I.F. = (I.F) Q_1 dy$.

Answer: True

(iii) Correct substitution for the solution of the differential equation of the type $\frac{dy}{dx} f(x, y)$, where $f(x, y)$ is a homogeneous function of zero degree is $y = vx$.

Answer: True

(iv) Correct substitution for the solution of the differential equation of the type $\frac{dx}{dy} g(x, y)$ where $g(x, y)$ is a homogeneous function of the degree zero is $x = vy$.

Answer: True

(v) Number of arbitrary constants in the particular solution of a differential equation of order two is two.

Answer: False

(vi) The differential equation representing the family of circles $x^2 + (y-a)^2 = a^2$ will be of order two.

Answer: False

(vii) The solution of $\frac{dy}{dx} = \left(\frac{y}{x}\right)^{\frac{1}{3}}$ is $y^{\frac{3}{2}} - x^{\frac{2}{3}} = C$

Answer: True

(viii) Differential equation representing the family of curves $y = e^x (A \cos x + B \sin x)$ is

$$\frac{d^2 y}{dx^2} - \frac{2dy}{dx} + 2y = 0$$

Answer: True

(ix) The solution of the differential equation $\frac{dy}{dx} = \frac{x+2y}{x}$ is $x + y = kx^2$.

Answer: True

(x) Solution of $\frac{xdy}{dx} = y + x \tan \frac{y}{x}$ is $\sin\left(\frac{y}{x}\right) = cx$

Answer: True

(xi) The differential equation of all non-horizontal lines in a plane is $\frac{d^2 x}{dy^2} = 0, \frac{d^2 y}{dx^2} = 0$

Answer: True