MATHEMATICS

Topic: Differential Equation

Q.1 A differential equation of first order and first degree is-

(A) $x\left(\frac{dy}{dx}\right)^2 - x + a = 0$ (B) $\frac{d^2y}{dx^2} + xy = 0$

(C) dy + dx = 0 (D) None of these

Q.2 The order and degree of differential equation $\sqrt{1-y^2}\,dx + y\sqrt{1-x^2}\,dy = 0$ are respectively-

(A) 1, 2 (B) 1, 1

(C) 2, 1 (D) 2, 2

Q.3 The order and degree of the differential equation $y = x\frac{dy}{dx} + \sqrt{a^2\left(\frac{dy}{dx}\right)^2 + b^2}$ is-

(A) 1, 2 (B) 2, 1

(C) 1, 1 (D) 2, 2

Q.4 The order and degree of the differential equation $\left[4+\left(\frac{dy}{dx}\right)^2\right]^{2/3} = \frac{d^2y}{dx^2}$ are-

(A) 2, 2 (B) 3, 3

(C) 2, 3 (D) 3, 2

Q.5 The order and the degree of differential equation $\frac{d^4y}{dx^4} - 4\frac{d^3y}{dx^3} + 8\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 4y = 0$ are respectively-

(A) 4, 1 (B) 1, 4

(C) 1, 1 (D) None of these

Q.6 The order and degree of differential equation $(xy^2 + x)\,dx + (y - x^2 y)\,dy = 0$ are-

(A) 1, 2 (B) 2, 1

(C) 1, 1 (D) 2, 2

Q.7 The degree of the differential equation $\frac{d^2y}{dx^2} + \sqrt{1+\left(\frac{dy}{dx}\right)^3} = 0$ is -

(A) 1 (B) 2

(C) 3 (D) 6

Q.8 The order of the differential equation whose solution is $y = a\cos x + b\sin x + ce^{-x}$ is-

(A) 3 (B) 2

(C) 1 (D) None of these

Q.9 The differential equation of all circles of radius a is of order-

(A) 2 (B) 3

(C) 4 (D) None of these

Q.10 The order of the differential equation of all circles of radius r, having centre on y-axis and passing through the origin is-

(A) 1 (B) 2

(C) 3 (D) 4

Q.11 The degree of the differential equation $\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^2 = x^2 \log\left(\frac{d^2y}{dx^2}\right)$ is-

(A) 1 (B) 2

(C) 3 (D) None of these

Q.12 The differential equation

$x\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^4 + y = x^2$ is of -

(A) degree 2 and order 2

(B) degree 1 and order 1

(C) degree 4 and order 3

(D) degree 4 and order 4

Q.13 Which of the following equation is linear?

(A) $\frac{dy}{dx} + xy^2 = 1$

(B) $x^2\frac{dy}{dx} + y = e^x$

(C) $\frac{dy}{dx} + 3y = xy^2$

(D) $x\frac{dy}{dx} + y^2 = \sin x$

Q.14 Which of the following equation is non- linear-

(A) $\frac{dy}{dx} = \cos x$ (B) $\frac{d^2y}{dx^2} + y = 0$

(C) $dx + dy = 0$ (D) $x\frac{dy}{dx} + \frac{3}{dy/dx} = y^2$

Q.15 Which of the following equation is linear ?

(A) $\left(\frac{d^2y}{dx^2}\right)^2 + x^2\left(\frac{dy}{dx}\right)^2 = 0$

(B) $y = \frac{dy}{dx} + \sqrt{1+\left(\frac{dy}{dx}\right)^2}$

(C) $\frac{dy}{dx} + \frac{y}{x} = \log x$

(D) $y\frac{dy}{dx} - 4 = x$

Q.16 y = 4 sin 3x is a solution of the differential equation-

(A) $\frac{dy}{dx} + 8y = 0$ (B) $\frac{dy}{dx} - 8y = 0$

(C) $\frac{d^2y}{dx^2} + 9y = 0$ (D) $\frac{d^2y}{dx^2} - 9y = 0$

Q.17 The differential equation of the family of curves represented by the equation $x^2 + y^2 = a^2$ is-

(A) $x + y\frac{dy}{dx} = 0$ (B) $y\frac{dy}{dx} = x$

(C) $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$ (D) None of these

Q.18 The differential equation of the family of curves $y^2 = 4a(x + a)$, where a is an arbitrary constant, is-

(A) $y\left[1+\left(\frac{dy}{dx}\right)^2\right] = 2x\frac{dy}{dx}$

(B) $y\left[1-\left(\frac{dy}{dx}\right)^2\right] = 2x\frac{dy}{dx}$

(C) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = 0$

(D) $\left(\frac{dy}{dx}\right)^3 + 3\frac{dy}{dx} + y = 0$

Q.19 The differential equation of all the non-vertical lines in the xy- plane is-

(A) $\frac{dy}{dx} - x = 0$ (B) $\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$

(C) $\frac{d^2y}{dx^2} = 0$ (D) $\frac{d^2y}{dx^2} + x = 0$

Q.20 The differential equation of the family of curves represented by the equation $(x - a)^2 + y^2 = a^2$ is-

(A) $2xy\frac{dy}{dx} + x^2 = y^2$

(B) $2xy\frac{dy}{dx} + x^2 + y^2 = 0$

(C) $xy\frac{dy}{dx} + x^2 = y^2$

(D) None of these

Q.21 The differential equation of all parabolas whose axes are parallel to y- axis is-

(A) $\frac{d^3y}{dx^3} = 0$ (B) $\frac{d^2x}{dy^2} = c$

(C) $\frac{d^3y}{dx^3} + \frac{d^2x}{dy^2} = 0$ (D) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = c$

Q.22 The differential equation of family of curve $y = Ae^x + Be^{-x}$, where A and B are arbitrarily constants, is

(A) $\frac{d^2y}{dx^2} + y = 0$

(B) $\frac{d^2y}{dx^2} = y$

(C) $y\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^2 = 0$

(D) None of these

Q.23 The differential equation for the line y = mx + c is (where c is arbitrary constant)-

(A) $\frac{dy}{dx} = m$ (B) $\frac{dy}{dx} + m = 0$

(C) $\frac{dy}{dx} = 0$ (D) None of these

Q.24 The differential equation of the family of curves $v = \frac{A}{r} + B$, where A & B are arbitrary constants, is-

(A) $\frac{d^2v}{dr^2} + \frac{1}{r}\frac{dv}{dr} = 0$

(B) $\frac{d^2v}{dr^2} - \frac{2}{r}\frac{dv}{dr} = 0$

(C) $\frac{d^2v}{dr^2} + \frac{2}{r}\frac{dv}{dr} = 0$

(D) None of these

Q.25 The general solution of the differential equation $\frac{dy}{dx} = \frac{x^2}{y^2}$ is-

(A) $x^3 - y^3 = c$ (B) $x^3 + y^3 = c$

(C) $x^2 + y^2 = c$ (D) $x^2 - y^2 = c$

Q.26 The general solution of the equation $(e^y + 1)\cos x\, dx + e^y \sin x\, dy = 0$ is-

(A) $(e^y + 1)\cos x = c$ (B) $(e^y - 1)\sin x = c$

(C) $(e^y + 1)\sin x = c$ (D) None of these

Q.27 The solution of the differential equation $dy = \sec^2 x\, dx$ is-

(A) $y = \sec x \tan x + c$ (B) $y = 2\sec x + c$

(C) $y = \frac{1}{2}\tan x + c$ (D) None of these

Q.28 The solution of the differential equation

$(1 + x^2)\frac{dy}{dx} = x$ is-

(A) $y = \tan^{-1} x + c$

(B) $y = -\tan^{-1} x + c$

(C) $y = \frac{1}{2} \log_e (1 + x^2) + c$

(D) $y = -\frac{1}{2} \log_e (1 + x^2) + c$

Q.29 The solution of $\frac{dy}{dx} = e^x (\sin x + \cos x)$ is-

(A) $y = e^x (\sin x - \cos x) + c$

(B) $y = e^x (\cos x - \sin x) + c$

(C) $y = e^x \sin x + c$

(D) $y = e^x \cos x + c$

Q.30 The solution of $\frac{dy}{dx} = x \log x$ is-

(A) $y = x^2 \log x - \frac{x^2}{2} + c$

(B) $y = \frac{x^2}{2} \log x - x^2 + c$

(C) $y = \frac{1}{2} x^2 + \frac{1}{2} x^2 \log x + c$

(D) None of these

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	C	B	A	C	A	C	B	A	A	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	D	A	B	D	C	C	A	B	C	A
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	A	B	A	C	A	C	D	C	C	D