CHAPTER-9

DIFFERENTIAL EQUATIONS

01 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	Solution of differential equation $xdy - ydx = Q$ represents: (a) a rectangular hyperbola (b) parabola whose vertex is at the origin (c) straight line passing through the origin (d) a circle whose centre is at the origin	1
2.	Given the differential equation $\frac{dy}{dx} = \frac{6x^2}{2y+cosy}$ y(1) = π (a) Solution is $y^2 - siny = -2x^3 + c$ (b) Solution of $y^2 + siny = 2x^3 + c$ (c) $C = \pi^2 + 2$ (d) $C = \pi^2 - 2$	1
3.	The differential equation of all parabolas whose axis of symmetry is along the axis of the x-axis is of order (a) 3 (b) 1 (c) 2 (d) none of these	1
4.	The degree of the equation satisfying the relation $\sqrt{1+x^2} + \sqrt{1+y^2} = \lambda x(\sqrt{1+y^2} - y(\sqrt{1+x^2}$ (a) 1 (b) 2 (C) 3 (d)4	1
5.	The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right) + \left(\frac{dy}{dx}\right)^{\frac{1}{4}} + x^{\frac{1}{5}} = 0$ Respectively are (a) 2 and not defined (b) 2 and 2 (c)2 and 3 (d)3 and 3	1
6.	Integrating factor of the differential equation $\frac{dy}{dx} + ytanx - secx = 0$ *is* (a) $cosx$ (b) $secx$ (c) e^{cosx} (d) e^{secx}	1
7.	The number of arbitrary constants in the particular solution of a differential equation of third order is: (a) 3 (b) 2	1

	(c) 1 (d) 0	
8.	The differential equation satisfied by $y = \frac{A}{x} + B$ is (A, B are parameters) (a) $x^2y_1 = y$ (b) $xy_1 + 2y_2 = 0$ (c) $xy_2 + 2y_1 = 0$ (d) none	1
9.	The curve for which the slope of the tangent at any point is equal to the ratio of the abscissa to the ordinate of the point is: (a)Ellipse (b)Parabola (C) Circle (d) Rectangular hyperbola	1
10.	The order of differential equations of all circles of given radius 4 (a) 3 (b) 2 (c) 1 (d) 0	1
11.	The differentilequation y log y dx – xdy =0 is (i) variable separable differential equation (ii) homogeneous differential equation (iii)First order linear differential equation (iv) none of these	1
12.	The integrating factor of the differential equation $x\frac{dy}{dx} + y = x^3$ **is** (i) x (ii) logx (iii) i/x (iv0 none of these	1
13.	The degree of the differential equation $x^2+(\frac{dy}{dx})^2=5$ i (i) 2 (ii) 3 iii) 1 (iv)none of these	1
14.	A solution of the differential equation $(\frac{dy}{dx})^2-x\frac{dy}{dx}+ y = 0$ is (i)y=2 (ii) y=2x (iii) y=2x-4 (iv)none of these	1
15.	The integrating factor of $\frac{dy}{dx}- y=1$ is (i) e^x (ii) e^{-x}(iii) $-e^{-x}$ (iv) none of these	1
16.	The sum of the order and degree of the differential equation $\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^3$ =siny is (i)1 (ii)2 (iii) 3 (iv) 4	1
17.	What is the product of the order and degree of the differential equation $\frac{d^2y}{dx^2} siny+\left(\frac{dy}{dx}\right)^3$cosy = $\sqrt{y}$	1

	(i)3 (ii) 2 (iii) 6 (iv) not defined	
18.	The solution of the differential equation $2x\frac{dy}{dx}$ - y = 3 represents a family of (i) Straight lines (ii) circles (iii) parabolas (iv) ellipses	1
19.	The general solution of the differential equation $xdy-(1+x^2)\ dx=x$ is (i)$y= 2x+ x^3/3 + C$ (ii) $y= 2\log x+ x^3/2 + C$ (iii)$y= 2x+ x^2/3 + C$ $y= x^2/2 + C$ (iv) none of these	1
20.	The solution of $\frac{dy}{dx}$ - y = 1 , y(0) = 1 is given by (i)$xy=-e$(ii)$xy=-e^{-x}$ (iii)$xy=-1$ (iv) $y=2e^x-1$	1
21.	The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{dy}{dx}\right)^2+\sin\left(\frac{dy}{dx}\right)+1=0$, is a)3 b)2 c)1 d)not defined	1
22.	The degree of the differential equation $x=1+\frac{dy}{dx}+\frac{1}{2!}\left(\frac{dy}{dx}\right)^2+\frac{1}{3!}\left(\frac{dy}{dx}\right)^3+$ ……,is a)3 b)1 c)not defined d)none of these	1
23.	The order of the differential equation $\left(\frac{d^2r}{dt^2}\right)^2+3\left(\frac{dr}{dt}\right)^3+4=0$ is a)2 b)1 c)3 d)4	1
24.	The differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{2}{3}}=\left(y+\frac{dy}{dx}\right)^{\frac{1}{2}}$ is of a)second order ,fourth degree b)first order, fourth degree c)second order, third degree d)second order ,second degree	1
25.	The number of arbitrary constants in the general solution of a differential equation of fourth order are a)0 b)2 c)3 d)4	1
26.	The order of the differential equation whose general solution is given by $y=(c_1+c_2)\sin(x+c_3)-c_4e^{x+c_5}$ is a)5 b)4 c)3 d)2	1
27.	The solution of the differential equation $\frac{dy}{dx}+\sqrt{\frac{1-y^2}{1-x^2}}=0$ is	1

	a) $\tan^{-1} x + \cot^{-1} x = C$ b) $\sin^{-1} x + \sin^{-1} y = C$ c) $\sec^{-1} x + \text{cosec}^{-1} x = C$ d) none of these	
28.	The number of arbitrary constants in the particular solution of a differential equation of third order are a)3 b)2 c)1 d)0	1
29.	Which of the following is a homogeneous differential equation? (A) $(4x+6y+5)\,dy-(3y+2x+4)\,dx=0$ (B) $(xy)dx-(x^3+y^3)\,dy=0$ (C) $(x^3+2y^2)\,dx+2xy\,dy=0$ (D) $y^2dx+(x^2-xy-y^2)dy=0$	1
30.	The Integrating Factor of the differential equation $x\frac{dy}{dx} - y = 2x^2$ is (A) e^{-x} (B) e^{-y} (C)1/x (D) x.	1
31.	The sum of order and degree of the differential equation $x^3\left(\frac{d^2y}{dx^2}\right)^2 + x\left(\frac{dy}{dx}\right)^4 = 0$ is (a) 6 (b) 2 (c) 4 (d) 3	1
32.	The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/4} + x^{1/5} = 0$ respectively are (a) 2 and 4 (b) 2 and 2 (c) 2 and 3 (d) 3 and 3	1
33.	Which of the following is a second order differential equation? (a) $(y')^2 + x = y^2$ (b) $y'y'' + y = sinx$ (c) $y''' + (y'')^2 + y = 0$ (d) $y' = y^2$	1
34.	The numbers of arbitrary constant in the general solution of a differential equation of fourth order are: (a) 0 (b) 2 (c) 3 (d) 4	1
35.	The numbers of arbitrary constant in the particular solution of a differential equation of second order are: (a) 0 (b) 2 (c) 3 (d) 4	1
36.	A differential equation of the form $\frac{dy}{dx} = F(x,y)$ where $F(x,y)$ is a homogeneous function of degree zero. Differential equation of the form $\frac{dy}{dx} = f(\frac{x}{y})$ is a homogeneous differential equation of degree : (a) 0 (b) 1 (c) 2 (d) not defined	1
37.	The integrating factor of differential equation $\cos x\frac{dy}{dx} + ysinx = 1$ is (a) cos x (b) tan x (c) sec x (d) sin x	1
38.	The solution of differential equation x dy-y dx=0 represents (a) a rectangular hyperbola (b) parabola whose vertex is at origin (c) straight line passing through origin (d) a circle whose centre is at origin	1
39.	A function F(x,y) is a homogeneous function of degree n,if (a) $f(x,y) = x^n f\left(\frac{y}{x}\right)$ (b) $f(x,y) = y^n g\left(\frac{x}{y}\right)$	1

	(c) Both a and b (d) $f(x,y) = x^{-n} f\left(\frac{y}{x}\right)$	
40.	For what value of n is the following a homogeneous differential equation : $\frac{dy}{dx} = \frac{x^3 - y^n}{x^2 y + x y^2}$ (a) 4 (b) 3 (c) 2 (d) 1	1
41.	The order and degree of the differential equation $x^2 \frac{d^2y}{dx^2} = \left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^4$ is A. 1, 1 B. 2, 4 C. 2, 1 1, 4	1
42.	The order and degree of the differential equation $x^3 \left(\frac{d^2y}{dx^2}\right)^2 + x\left(\frac{dy}{dx}\right)^4 = 0$ is A. 2, 1 B. 2, 2 C. 4, 2 2, 2	1
43.	The degree of the differential equation $\frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^2 = 2x^2 \log\left(\frac{d^2y}{dx^2}\right)$ is A. 2 B. 1 C. Not Defined 3	1
44.	The order and degree of the differential equation $\left(\frac{d^4y}{dx^4}\right)^2 = \left\{x + \left(\frac{dy}{dx}\right)^2\right\}^3$ is A. 2, 2 B. 2, 4 C. 2, 6 4, 2	1
45.	The sum of the degree and the order of the following differential equation: $\frac{d}{dx}\left[\left(\frac{d^2y}{dx^2}\right)^4\right] = 0$ is A. 6 B. 3 C. 5 4	1
46.	The sum of the order and degree of the following differential equation: $y = x\left(\frac{dy}{dx}\right)^3 + \frac{d^2y}{dx^2}$ is A. 5 B. 4 C. 3 2	1
47.	The integrating factor of the differential equation $x\frac{dy}{dx} - 2y = 2x^2$ is A. $\frac{1}{x}$ B. $\frac{1}{x^2}$ C. lnx e^x	1
48.	The integrating factor of the differential equation $(y - x)dy = (1 + y^2)dx$ is A. $e^{\tan^{-1} x}$ B. $e^{\tan^{-1} y}$ C. $\tan^{-1} x$ $\tan^{-1} y$	1
49.	The number of arbitrary constants in the general solution of a fourth order differential	1

	equation is A. 0 B. 2 C. 3 4	
50.	The number of arbitrary constants in the particular solution of a fourth order differential equation is A. 0 B. 2 C. 3 4	1
51.	Determine the order of differential equation $$\frac{d^4y}{dx^4} + \tan(y'') = 5$$ (A) 4 (B) 2 (C) 1 (D) Not Defined	1
52.	Check which of the given function is a solution of the following differential equation $y'' - y' = 0$ (A) $y = \sqrt{1+x^2}$ (B) $y = e^x + 1$ (C) $xy = \log y + C$ (D) $y - \cos y = x$	1
53.	The number of arbitrary constants in the general solution of a differential equation of third order are 0 (B) 2 (C) 4 (D) 3	1
54.	Find the degree of the following differential equation $\left(\frac{d^2y}{dx^2}\right)^2 + \cos\left(\frac{dy}{dx}\right) = 0$ (A) 2 (B) 1 (C) (D) Not Defined	1
55.	A homogeneous differential equation of the form $\frac{dy}{dx} = f(\frac{y}{x})$ can be solved by making the substitution (A) $y = vx$ (B) $v = yx$ (C) $x = vy$ (D) $y = v$	1
56.	The Integrating factor of the differential equation $(1+x^2)\frac{dy}{dx} + 2xy = \frac{1}{1+x^2}$ is (A) $1 - x^2$	1

	(B)$\frac{1}{1+x^2}$ (C) $1+x^2$ (D)e^{1+x^2}	
57.	The general solution of the differential equation $e^x dy + (ye^x + 2x)dx = 0$ is (A)$xe^y + x^2 = C$ (B) $xe^y + y^2 = C$ (C) $ye^x + x^2 = C$ (D) $ye^y + x^2 = C$	1
58.	The Integrating factor of the differential equation $x\frac{dy}{dx} - y = 2x^2$ is (A) e^{-x} (B) e^{-y} (C) $\frac{1}{x}$ (D) x	1
59.	The general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is (A)$e^x + e^{-y} = C$ (B) $e^x + e^y = C$ (C) $e^{-x} + e^y = C$ (D) $e^{-x} + e^{-y} = C$	1
60.	The number of arbitrary constants in the particular solution of a differential equation of fifth order are 5 (B) 2 (C) 3 (D) 0	1
61.	The order of the differential equation $2x^2d^2y/dx^2 - 3dy/dx + y = 0$ is (a)2 (b)1 (c)0 (d)not defined	1
62.	The degree of differential equation $1+(\frac{dy}{dx})^2 = x$ is (a)1 (b)2 (c)3 (d)not defined	1
63.	The order and degree of the differential equation $X\sqrt{1-y^2}dx + y\sqrt{1-x^2}dy$ = 0 are respectively. (a)1 and 1 (b)1 and 2	1

	(c)2 and 1 (d)1 and 3	
64.	The order and degree (if defined) of the differential equation $d^2y/dx^2 + x(d\frac{dy}{dx})^2 = 2x^2\log(d^2y/dx^2)$ (a)2 and 3 (b)2 and 1 (c)2 and not defined (d) None of these	1
65.	The number of arbitrary constants in the particular solution of a differential equation of second order is(are) (a)0 (b)1 (c)2 (d)3	1
66.	The differential equation $Y\frac{dy}{dx} + x = C$ represents (a)family of hyperbolas (b)family of parabolas (c)family of ellipses (d)family of circles	1
67.	Which of the following is not a homogeneous function of x and y (a)$x^2 + 2xy$ (b)$2x - y$ (c)$\cos^2(\frac{y}{x}) + \frac{y}{x}$ (d)sinx -cosy	1
68.	If the slope of the tangent to the curve at any point P(x,y)is $\frac{y}{x}$-$\cos^2\frac{y}{x}$, then the equation of a curve passing through $(1,\frac{\pi}{4})$ is (a)$\tan(\frac{y}{x}) + \log x = 1$ (b)$\tan(\frac{y}{x}) + \log y = 1$ (c)$\tan(\frac{x}{y}) + \log x = 1$ (d)$\tan(\frac{x}{y}) + \log y = 1$	1 1
69.	The integrating factor of $(\sin x)\frac{dy}{dx} + (2\cos x)y = \sin x\cos x$ is (a)secx (b)$(\sin x)^2$ (c)$(\operatorname{cosec} x)^2$ (d)$(\tan x)^2$	1
70.	The general solution of the differential equation $e^{2x}\frac{dy}{dx} + 3e^{2x}y = 1$ is (a)$ye^{3x} = e^x + C$ (b)$ye^{3x} = e^{-x} + C$ (c)$ye^{3x} = -e^x + C$ (d)$ye^x = e^{3x} + C$	1

ANSWERS:

Q. NO	ANSWER	MARKS
1.	c	1
2.	b	1
3.	c	1
4.	a	1
5.	a	1
6.	b	1
7.	d	1
8.	c	1
9.	d	1
10.	b	1
11.	i	1
12.	i	1
13.	iii	1
14.	iii	1
15.	ii	1
16.	iii	1
17.	ii	1
18.	i	1
19.	iv	1
20.	iv	1
21.	D	1
22.	C	1
23.	A	1
24.	A	1
25.	D	1
26.	C	1
27.	B	1
28.	D	1
29.	D	1
30.	C	1
31.	C	1
32.	A	1
33.	B	1
34.	D	1
35.	A	1
36.	B	1
37.	C	1
38.	C	1
39.	C	1
40.	B	1
41.	Order $= 2$, Degree $= 1$	1
42.	Order $= 2$, Degree $= 2$	1
43.	Degree $=$ Not Defined	1

44.	Order $= 4$, Degree $= 2$	1
45.	$\frac{d}{dx}\left[\left(\frac{d^2y}{dx^2}\right)^4\right] = 0$ $\Rightarrow 4.\left(\frac{d^2y}{dx^2}\right)^3 . \frac{d^3y}{dx^3} = 0$ $\Rightarrow \left(\frac{d^2y}{dx^2}\right)^3 \frac{d^3y}{dx^3} = 0$ Order $= 3$, Degree $= 1$ Order + Degree $= 3 + 1 = 4$	1
46.	Order + Degree $= 2 + 1 = 3$	1
47.	$x\frac{dy}{dx} - 2y = 2x^2$ $\Rightarrow \frac{dy}{dx} - \frac{2y}{x} = 2x \ldots (i)$ $\frac{dy}{dx} + Py = Q \ldots (ii)$ On comparison, we get $P = -\frac{2}{x}, Q = 2x$ Integrating Factor (I. F) $= e^{\int p dx} = e^{\int \frac{-2dx}{x}} = e^{-2\log\lvert x\rvert} = e^{\log\lvert\frac{1}{x^2}\rvert} = \frac{1}{x^2}$	1
48.	$(\tan^{-1} y - x)dy = (1 + y^2)dx$ $\Rightarrow (\tan^{-1} y - x) = (1 + y^2)\frac{dx}{dy}$ $\Rightarrow \frac{dx}{dy} = \frac{(\tan^{-1} y - x)}{(1 + y^2)}$ $\Rightarrow \frac{dx}{dy} + \frac{x}{1 + y^2} = \frac{\tan^{-1} y}{1 + y^2} \ldots (i)$ $\frac{dx}{dy} + Px = Q \ldots (ii)$ On comparison, we get $P = \frac{1}{1 + y^2}, Q = \frac{\tan^{-1} y}{1 + y^2}$ Integrating Factor (I. F) $= e^{\int p dy} = e^{\int \frac{dy}{1+y^2}} = e^{\tan^{-1} y}$	1
49.	4	1
50.	0	1
51.	A	1
52.	B	1
53.	D	1
54.	D	1
55.	A	1
56.	C	1
57.	C	1
58.	C	1
59.	A	1
60.	D	1

61.	(a)	1
62.	(b)	1
63.	(a)	1
64.	(c)	1
65.	(a)	1
66.	(d)	1
67.	(d)	1
68.	(a)	1
69.	(b)	1
70.	(a)	1