DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth **SUBJECT : MATHS**
DATE : **DPP NO. : 9**

Topic :-DIFFERENTIAL EQUATIONS

1. A function $y = f(x)$ has a second order derivative $f'' = 6(x - 1)$. If its graph passes through the point (2,1) and at point the tangent to the graph is $y = 3x - 5$ then the function is

a) $(x - 1)^2$ b) $(x - 1)^3$ c) $(x + 1)^3$ d) $(x + 1)^2$

2. The solution of $\log\left(\frac{dy}{dx}\right) = ax + by$ is

a) $\frac{e^{by}}{b} = \frac{e^{ax}}{a} + c$ b) $\frac{e^{-by}}{-b} = \frac{e^{ax}}{a} + c$ c) $\frac{e^{-by}}{a} = \frac{e^{ax}}{b} + c$ d) None of these

3. For solving $\frac{dy}{dx} = 4x + y + 1$, suitable substitution is

a) $y = vx$ b) $y = 4x + v$ c) $y = 4x$ d) $y + 4x + 1 = v$

4. The differential equation $\frac{dy}{dx} = \frac{x(1 + y^2)}{y(1 + x^2)}$ represents a family of

a) Parabola b) Hyperbola c) Circle d) Ellipse

5. The differential equation of the system of all circles of radius r in the xy-plane, is

a) $\left[1 + \left(\frac{dy}{dx}\right)^3\right]^2 = r^2\left(\frac{d^2y}{dx^2}\right)^2$ b) $\left[1 + \left(\frac{dy}{dx}\right)^3\right]^2 = r^2\left(\frac{d^2y}{dx^2}\right)^3$

c) $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = r^2\left(\frac{d^2y}{dx^2}\right)^2$ d) $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = r^2\left(\frac{d^2y}{dx^2}\right)^3$

6. The differential equation of the family of parabola with focus as the origin and the axis as x-axis, is

a) $y\left(\frac{dy}{dx}\right)^2 + 4x\frac{dy}{dx} = 4y$ b) $-y\left(\frac{dy}{dx}\right)^2 = 2x\frac{dy}{dx} - y$

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

7. The equation of curve through point (1,0) which satisfies the differential equation $(1 + y^2)dx - xy\,dy = 0$ is

a) $x^2 + y^2 = 4$ b) $x^2 - y^2 = 1$ c) $2x^2 + y^2 = 2$ d) None of these

8. The equation of the curve through the point (3, 2) and whose slope is $\frac{x^2}{y+1}$, is

a) $\frac{y^2}{2}+y=\frac{x^3}{3}+5$ b) $y+y^2-x^3-21$ c) $y^2+2y=\frac{2x^3}{3}-10$ d) $\frac{y^2}{2}+y=\frac{x^3}{3}-5$

9. The equation of the curve through the point (1,0) and whose slope is $\frac{y-1}{x^2+x}$, is

a) $2x+(y-1)(x+1)=0$ b) $2x-(y-1)(x+1)=0$

c) $2x+(y-1)(x-1)=0$ d) None of these

10. If $y(t)$ is a solution of $(1+t)\frac{dy}{dt}-ty=1$and $y(0)=-1$, then $y(1)$ is equal to

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

11. The order of the differential equation of all tangent lines to the parabola $y=x^2$ is

a) 1 b) 2 c) 3 d) 4

12. The differential equation for the family of curves $x^2+y^2-2ay=0$, where a is an arbitrary constant, is

a) $2(x^2-y^2)y'=xy$ b) $2(x^2+y^2)y'=xy$ c) $(x^2-y^2)y'=2xy$ d) $(x^2+y^2)y'=2xy$

13. The solution of $\frac{dy}{dx}+1=\text{cosec }(x+y)$ is

a) $\cos(x+y)+x=c$ b) $\cos(x+y=c$

c) $\sin(x+y)+x=c$ d) $\sin(x+y)+\sin(x+y)=c$

14. The solution of the differential equation $9y\frac{dy}{dx}+4x=0$ is

a) $\frac{y^2}{9}+\frac{x^2}{4}=c$ b) $\frac{y^2}{4}+\frac{x^2}{9}=c$ c) $\frac{y^2}{9}-\frac{x^2}{4}=c$ d) $y^2-\frac{x^2}{9}=c$

15. The differential equation of the rectangular hyperbola whose axes are the asymptotes of the hyperbola, is

a) $y\frac{dy}{dx}=x$ b) $x\frac{dy}{dx}=-y$ c) $x\frac{dy}{dx}=y$ d) $x\,dy+y\,dx=c$

16. A particular solution of $\log\left(\frac{dy}{dx}\right)=3x+4y,\ y(0)=0$ is

a) $e^{3x}+3e^{-4y}=4$ b) $4e^{3x}-3e^{-4y}=3$ c) $3e^{3x}+4e^{-4y}=7$ d) $4e^{3x}+3e^{-4y}=7$

17. The differential equation $\frac{d^2y}{dx^2}=2$ represents

a) A parabola whose axis is parallel to x-axis b) A parabola whose axis is parallel to y-axis

c) A circle d) None of the above

18. If $x\frac{dy}{dx}=y(\log y-\log x+1)$, then the solution of the equation is

a) $\log\left(\frac{x}{y}\right)=cy$ b) $\log\left(\frac{y}{x}\right)=cx$ c) $x\log\left(\frac{y}{x}\right)=cy$ d) $y\log\left(\frac{x}{y}\right)=cx$

19. The general solution of $y^2dx+(x^2-xy+y^2)dy=0$ is

a) $\tan^{-1}\left(\frac{y}{x}\right) = \log y + c$

b) $2\tan^{-1}\left(\frac{x}{y}\right) + \log x + c = 0$

c) $\log(y + \sqrt{x^2 + y^2}) + \log y + c = 0$

d) $\sinh^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$

20. The equation of the curve satisfying the differential equation $y_2(x^2 + 1) = 2xy_1$ passing through the point $(0,1)$ and having slope of tangent at $x = 0$ as 3 is

a) $y = x^3 + 3x + 1$ b) $y = x^3 - 3x + 1$ c) $y = x^2 + 3x + 1$ d) $y = x^2 - 3x + 1$

PE