DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth SUBJECT : MATHS
DATE : DPP NO. : 2

Topic :-DIFFERENTIAL EQUATIONS

1. The solution of the differential equation $x\frac{dy}{dx} = 2y + x^3e^x$, where $y = 0$ when $x = 1$, is
   a) $y = x^3(e^x - e)$ b) $y = x^3(e - e^x)$ c) $y = x^2(e^x - e)$ d) $y = x^2(e - e^x)$

2. The solution of $(1 + x^2)\frac{dy}{dx} + 2xy - 4x^2 = 0$ is
   a) $3x(1 + y^2) = 4y^3 + c$ b) $3y(1 + x^2) = 4x^3 + c$
   c) $3x(1 - y^2) = 4y^3 + c$ d) $3y(1 + y^2) = 4x^3 + c$

3. A normal is drawn at a $P(x, y)$ of a curve. It meets the x-axis at Q. if PQ is of constant length k, then the differential equation describing such a curve is
   a) $y\frac{dy}{dx} = \pm\sqrt{k^2 - y^2}$ b) $x\frac{dy}{dx} = \pm\sqrt{k^2 - x^2}$ c) $y\frac{dy}{dx} = \pm\sqrt{y^2 - k^2}$ d) $x\frac{dy}{dx} = \pm\sqrt{x^2 - k^2}$

4. The solution of the differential equation $y_1y_3 = 3y_2^2$ is
   a) $x = A_1y^2 + A_2y + A_3$ b) $x = A_1y + A_2$ c) $x = A_1y^2 + A_2y$ d) None of these

5. If $x = A\cos 4t + B\sin 4t$, then $\frac{d^2x}{dt^2}$ is equal to
   a) $-16x$ b) $16x$ c) x d) $-x$

6. The order of the differential equation associated with the primitive $y = c_1 + c_2e^x + c_3e^{-2x+c_4}$, where c_1, c_2, c_3, c_4 are arbitrary constants, is
   a) 3 b) 4 c) 2 d) None of these

7. The differential equation of all parabolas whose axes are parallel to axis of x, is
   a) $\frac{d^3y}{dx^3} = 0$ b) $\frac{d^3x}{dy^3} = 0$ c) $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$ d) $\frac{d^2x}{dy^2} = 0$

8. The solution of the differential equation $(x^2 - yx^2)\frac{dy}{dx} + y^2 + xy^2 = 0$ is
   a) $\log\left(\frac{x}{y}\right) = \frac{1}{x} + \frac{1}{y} + c$ b) $\log\left(\frac{y}{x}\right) = \frac{1}{x} + \frac{1}{y} + c$
   c) $\log(xy) = \frac{1}{x} + \frac{1}{y} + c$ d) $\log(xy) + \frac{1}{x} + \frac{1}{y} = c$

9. The solution of the differential equation $x\,dy - y\,dx - \sqrt{x^2 - y^2}\,dx = 0$ is
   a) $y - \sqrt{x^2 + y^2} = cx^2$ b) $y + \sqrt{x^2 + y^2} = cx^2$
   c) $y + \sqrt{x^2 + y^2} = cy^2$ d) $x - \sqrt{x^2 + y^2} = cy^2$

10. Solution of $\frac{dy}{dx}=\frac{x\log x^2+x}{\sin y+y\cos y}$ is
a) $y\sin y=x^2\log x+c$ b) $y\sin y=x^2+c$
c) $y\sin y=x^2+\log x$ d) $y\sin y=x\log x+c$

11. If integrating factor of $x(1-x^2)dy+(2x^2y-y-ax^3)dx=0$ is $e^{\int Pdx}$, then P is equal to
a) $\frac{2x^2-ax^3}{x(1-x^2)}$ b) $2x^2-1$ c) $\frac{2x^2-1}{ax^3}$ d) $\frac{2x^2-1}{x(1-x^2)}$

12. The solution of the differential equation $\frac{dy}{dx}+\frac{y}{x}=x^2$, is
a) $y=\frac{x^2}{4}+C\,x^{-2}$ b) $y=x^{-1}+C\,x^{-3}$ c) $y=\frac{x^3}{4}+C\,x^{-1}$ d) $xy=x^2+C$

13. The differential equation of all circles passing through the origin and having their centres on the x-axis is
a) $x^2=y^2+xy\frac{dy}{dx}$ b) $x^2=y^2+3xy\frac{dy}{dx}$ c) $y^2=x^2+2xy\frac{dy}{dx}$ d) $y^2=x^2-2xy\frac{dy}{dx}$

14. If $y''-3y'+2y=0$ where $y(0)=1, y'(0)=0$, then the value of y at $x=\log 2$ is
a) 1 b) -1 c) 2 d) 0

15. The differential equation of all straight lines touching the circle $x^2+y^2=a^2$ is
a) $\left(y-\frac{dy}{dx}\right)^2=a^2\left[1+\left(\frac{dy}{dx}\right)^2\right]$ b) $\left(y-x\frac{dy}{dx}\right)^2=a^2\left[1+\left(\frac{dy}{dx}\right)^2\right]$
c) $\left(y-x\frac{dy}{dx}\right)=a^2\left[1+\frac{dy}{dx}\right]$ d) $\left(y-\frac{dy}{dx}\right)=a^2\left[1-\frac{dy}{dx}\right]$

16. The solution of the differential equation $(x^2-yx^2)\frac{dy}{dx}+y^2+xy^2=0$ is
a) $\log\left(\frac{x}{y}\right)=\frac{1}{x}+\frac{1}{y}+c$ b) $\log\left(\frac{y}{x}\right)=\frac{1}{x}+\frac{1}{y}+c$ c) $\log(xy)=\frac{1}{x}+\frac{1}{y}+c$ d) $\log(xy)+\frac{1}{x}+\frac{1}{y}=c$

17. The equation of the curve satisfying the equation $(xy-x^2)\frac{dy}{dx}=y^2$ and passing through the point $(-1,1)$ is
a) $y=(\log y-1)x$ b) $y=(\log y+1)x$ c) $x=(\log x-1)y$ d) $x=(\log x+1)y$

18. $y=2e^{2x}-e^{-x}$ is a solution of the differential equation
a) $y_2+y_1+2y=0$ b) $y_2-y_1+2y=0$ c) $y_2+y_1=0$ d) $y_2-y_1-2y=0$

19. The solution of $y'-y=1, y(0)=-1$ is given by $y(x)$, which is equal to
a) $-\exp(x)$ b) $-\exp(-x)$ c) -1 d) $\exp(x)-2$

20. The differential equation of the family of circles with fixed radius 5 unit and centre on the line $y=2$, is
a) $(x-2)^2y'^2=25-(y-2)^2$ b) $(x-2)y'^2=25-(y-2)^2$
c) $(y-2)y'^2=25-(y-2)^2$ d) $(y-2)^2y'^2=25-(y-2)^2$