6 Differential Equation

1. The solution of the equation $(2y-1)dx-(2x+3)dy=0$ is

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

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

2. The solution of $\frac{dy}{dx}+y=e^{-x}$, $y(0)=0$ is

(A) $y=e^{-x}(x-1)$ (B) $y=xe^{x}$

(C) $y=xe^{-x}+1$ (D) $y=xe^{-x}$

3. What is the degree of the differential equation $\left(1+\frac{dy}{dx}\right)^4=\left(\frac{d^2y}{dx^2}\right)^2$?

(A) 1 (B) 2

(C) 4 (D) 8

4. What is the solution of the differential equation $\frac{dy}{dx}=e^{x-y}\left(e^{y-x}-e^{y}\right)$?

(A) $y=x-e^{x}+C$ (B) $y=x+e^{x}+C$

(C) $y=e^{x-y}-e^{y}+C$ (D) None of these

5. What is the solution of the differential equation $\frac{dy}{dx}=xy+x+y+1$?

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

(C) $y=x^2+x+C$ (D) $\log(y+1)=x^2+x+C$

6. What is the general solution of $(1+e^{x})y\,dy=e^{x}dx$?

(A) $y^2=\log\left[C^2\left(e^{x}+1\right)^2\right]$

(B) $dy=\log\left[C\left(e^{x}+1\right)\right]$

(C) $y^2=\log\left[C\left(e^{x}+1\right)\right]$

(D) None of these
(where C is a constant of integration)

7. What is the degree of the differential equation? $y=x\frac{dy}{dx}+\left(\frac{dy}{dx}\right)^{-1}$

(A) 1 (B) 2

(C) – 1 (D) Degree does not exist

8. The differential equation for which $\sin^{-1}x+\sin^{-1}y=c$, is given by

(A) $\sqrt{1-x^2}dx+\sqrt{1-y^2}dy=0$

(B) $\sqrt{1-x^2}dy+\sqrt{1-y^2}dx=0$

(C) $\sqrt{1-x^2}dy-\sqrt{1-y^2}dx=0$

(D) $\sqrt{1-x^2}dx-\sqrt{1-y^2}dy=0$

9. Solution of the differential equation $\frac{dx}{x}+\frac{dy}{y}=0$ is

(A) $xy=C$ (B) $x+y=C$

(C) $\log x\ \log y=C$ (D) $x^2+y^2=C$

10. What is the solution of the differential equation $\frac{dy}{dx}+\sqrt{\frac{1-y^2}{1-x^2}}=0$?

(A) $\sin^{-1}y+\sin^{-1}x=C$

(B) $\sin^{-1}y-\sin^{-1}x=C$

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

(D) $2\sin^{-1}y-\sin^{-1}x=C$

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

(A) 1 (B) 2

(C) 3 (D) 6

12. What is the solution of the differential equation $3e^x \tan y\, dx + (1+e^x)\sec^2 y\, dy = 0$?

(A) $(1+e^x)\tan y = C$

(B) $(1+e^x)^3 \tan y = C$

(C) $(1+e^x)^2 \tan y = C$

(D) $(1+e^x)\sec^2 y = C$

(Where, C is a constant of integration)

13. The solution $\frac{dy}{dx} + 1 = \text{cosec}(x+y)$ 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. $y = A \cos \omega t + B \sin \omega t$ is a solution of the differential equation

(A) $\frac{d^2y}{dt^2} - \omega^2 y = 0$ (B) $\frac{d^2y}{dt^2} - \omega y = 0$

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

15. $y = ae^x + be^{-x}$ satisfies the differential equation

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

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

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

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

16. What does the differential equation $y\frac{dy}{dx} + x = A$ represent?

(A) A set of circles having centre on the y-axis
(B) A set of circles having centre on the x-axis
(C) A set of ellipses
(D) A pair of straight lines
(wher A is a constant)

17. If $\frac{dy}{dx} = 1 + x + y + xy$ and $y(-1) = 0$, what is the value of $y(x)$?

(A) $e^{\frac{(1+x)^2}{2}} - 1$ (B) $e^{\frac{(1-x)^2}{2}}$

(C) $\log(1+x) - 1$ (D) $\log(1-x)$

18. $y = ae^{mx} + be^{-mx}$ satisfies which of the following differential equation?

(A) $\frac{dy}{dx} - my = 0$

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

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

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

19. The solution of the differential equation

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

(A) $y(1+x^2) = C + \tan^{-1} x$

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

(C) $y \log(1+x^2) = C + \tan^{-1} x$

(D) $y(1+x^2) = C + \sin^{-1} x$

20. What is the degree of the following differential equation ?

$\left(\frac{d^3y}{dx^3}\right)^{2/3} + 4 - 3\frac{d^2y}{dx^2} + 5\frac{dy}{dx} = 0$

(A) 1 (B) 2
(C) 3 (D) 4

21. What is the equation of the curve whose slope at any point is equal to $2x$ and which passes through the origin?

(A) $y(1-x) = x^2$ (B) $y^2(1+x^2) = x^4$

(C) $y^2 = (x+1)^2$ (D) $y = x^2$

22. The solution of $2(y+3) - xy\frac{dy}{dx} = 0$ with $y = -2$ where $x = 1$, is

(A) $y + 3 = x^2$ (B) $x^2(y+3) = 1$

(C) $x^4(y+3) = 1$ (D) $x^2(y+3)^3 = e^{y+2}$

23. The solution of $\frac{dy}{dx} + y\tan x = \sec x$ is

(A) $y\sec x = \tan x + C$

(B) $y\tan x = \sec x + C$

(C) $\tan x = y\tan x + C$

(D) $x\sec x = \tan y + C$

24. An integrating factor of the differential equation $x + \frac{dy}{dx} + y\log x = xe^x x^{-\frac{1}{2}\log x}$, $(x,\ 0)$ is

(A) $x^{\log x}$ (B) $\left(\sqrt{x}\right)^{\log x}$

(C) $\left(\sqrt{e}\right)^{(\log x)^2}$ (D) e^{x^2}

25. What does the equation $x\ dy = y\ dx$ represent?

(A) A family of circles

(B) A family of parabolas

(C) A family of hyperbolas

(D) A family of straight lines

26. What is the order of the differential equation $\frac{dy}{dx} + y = \frac{1}{\left(\frac{dy}{dx}\right)}$?

(A) – 1 (B) 0

(C) 1 (D) 2