1. The degree of the differential equation $2\left(\frac{d^2y}{dx^2}\right)+2\left(\frac{dy}{dx}\right)=x\sin\left(\frac{d^2y}{dx^2}\right)$

(1) 1
(2) 2
(3) 3
(4) Not defined

2. Consider the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}=k\frac{d^2y}{dx^2}$, find the degree and the order of differential equation -

(1) $2, 2$
(2) $3, 2$
(3) $2, 3$
(4) None of these

3. The order of the differential equation of the family of curves $y=k_1 2^{k_2 x}+k_3 3^{x+k_4}$ is (where, k_1, k_2, k_3, k_4 are arbitrary constants)

(1) 4
(2) 5
(3) 3
(4) 6

4. The order of differential equation of all parabolas having directrix parallel to x-axis is

(1) 3
(2) 1
(3) 4
(4) 2

5. If the order of the differential equation of the family of circles touching the x-axis at the origin is k, then $2k$ is equal to

6. The solution to the differential equation $\frac{\mathrm{dy}}{\mathrm{dx}}=\mathrm{e}^{3\mathrm{x}-2\mathrm{y}}+\mathrm{x}^2\mathrm{e}^{-2\mathrm{y}}$ is

(1) $\mathrm{e}^{2\mathrm{y}}=\mathrm{e}^{3\mathrm{x}}+\mathrm{x}^3+\mathrm{C}$
(2) $3\mathrm{e}^{2\mathrm{y}}=2\left(\mathrm{e}^{3\mathrm{x}}+\mathrm{x}^3\right)+\mathrm{c}$
(3) $\mathrm{e}^{3\mathrm{x}+2\mathrm{y}}=\mathrm{x}^3+\mathrm{c}$
(4) None of these

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

(1) $2x+(y-1)(x+1)=0$
(2) $2x-(y-1)(x+1)=0$
(3) $2x+(y-1)(x-1)=0$
(4) None of these

8. The solution of the differential equation $\frac{dy}{dx}+\frac{y}{x}=\frac{1}{(1+\ln x+\ln y)^2}$ is (where, c is an arbitrary constant)

(1) $xy\left[1+(\ln(xy))^2\right]=\frac{x^2}{2}+c$
(2) $1+(\ln(xy))^2=\frac{x^2}{2}+y+c$
(3) $\mathrm{xy}\ (1+\ln(xy))=\frac{x^2}{2}+c$
(4) $\mathrm{xy}\ (1+\ln(xy))=\frac{x}{2}+c$

9. The general solution of the differential equation $\frac{dy}{dx}+\sin\left(\frac{x+y}{2}\right)=\sin\left(\frac{x-y}{2}\right)$ is (where c is an arbitrary constant)

(1) $\ln\ \tan\left(\frac{y}{2}\right)=c-2\sin x$
(2) $\ln\ \tan\left(\frac{y}{4}\right)=c-2\sin\left(\frac{x}{2}\right)$
(3) $\ln\ \tan\left(\frac{y}{2}+\frac{\pi}{4}\right)=c-2\sin x$
(4) $\ln\ \tan\left(\frac{y}{4}+\frac{\pi}{4}\right)=c-2\sin\left(\frac{x}{2}\right)$

10. Let $\mathrm{y}=\mathrm{y(x)}$ be solution of the differential equation $\log_e\left(\frac{dy}{dx}\right)=3x+4y$, with $\mathrm{y}(0)=0$. If $y\left(-\frac{2}{3}\log_e 2\right)=\alpha\log_e 2$ then the value of α is equal to:

(1) $-\frac{1}{4}$
(2) $\frac{1}{4}$
(3) 2
(4) $-\frac{1}{2}$