Exercise 9.1 : Solutions of Questions on Page Number : **382**

Q1 : Determine order and degree(if defined) of differential equation $\frac{d^4y}{dx^4}+\sin\left(y'''\right)=0$

Answer :

$\frac{d^4y}{dx^4}+\sin\left(y'''\right)=0$

$\Rightarrow y''''+\sin\left(y'''\right)=0$

The highest order derivative present in the differential equation is y''''. Therefore, its order is four.

The given differential equation is not a polynomial equation in its derivatives. Hence, its degree is not defined.

Answer needs Correction? **Click Here**

Q2 : Determine order and degree(if defined) of differential equation $y'+5y=0$

Answer :

The given differential equation is:

$y'+5y=0$

The highest order derivative present in the differential equation is y'. Therefore, its order is one.

It is a polynomial equation in y'. The highest power raised to y' is 1. Hence, its degree is one.

Answer needs Correction? **Click Here**

Q3 : Determine order and degree(if defined) of differential equation $\left(\frac{ds}{dt}\right)^4+3s\frac{d^2s}{dt^2}=0$

Answer :

$\left(\frac{ds}{dt}\right)^4+3\frac{d^2s}{dt^2}=0$

The highest order derivative present in the given differential equation is $\frac{d^2s}{dt^2}$. Therefore, its order is two.

It is a polynomial equation in $\frac{d^2s}{dt^2}$ and $\frac{ds}{dt}$. The power raised to $\frac{d^2s}{dt^2}$ is 1.

Hence, its degree is one.

Answer needs Correction? **Click Here**

Q4 : Determine order and degree(if defined) of differential equation $\left(\frac{d^2y}{dx^2}\right)^2+\cos\left(\frac{dy}{dx}\right)=0$

Answer :

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

The highest order derivative present in the given differential equation is $\frac{d^2y}{dx^2}$. Therefore, its order is 2.

The given differential equation is not a polynomial equation in its derivatives. Hence, its degree is not defined.

Answer needs Correction? **Click Here**

Q5 : Determine order and degree(if defined) of differential equation $\frac{d^2y}{dx^2}=\cos 3x+\sin 3x$

Answer :

$\frac{d^2y}{dx^2}=\cos 3x+\sin 3x$

$\Rightarrow \frac{d^2y}{dx^2}-\cos 3x-\sin 3x=0$

The highest order derivative present in the differential equation is $\frac{d^2y}{dx^2}$. Therefore, its order is two.

It is a polynomial equation in $\frac{d^2y}{dx^2}$ and the power raised to $\frac{d^2y}{dx^2}$ is 1.

Hence, its degree is one.

Answer needs Correction? **Click Here**

Q6 : Determine order and degree(if defined) of differential equation $(y''')^2+(y'')^3+(y')^4+y^5=0$

Answer :

$(y''')^2+(y'')^3+(y')+y^5=0$

The highest order derivative present in the differential equation is y'''. Therefore, its order is three.

The given differential equation is a polynomial equation in y''', y'', and y'.

The highest power raised to y''' is 2. Hence, its degree is 2.

Answer needs Correction? **Click Here**

Q7 : Determine order and degree(if defined) of differential equation $y'''+2y''+y'=0$

Answer :

$y'''+2y''+y'=0$

The highest order derivative present in the differential equation is y'''. Therefore, its order is three.

It is a polynomial equation in y''', y'' and y'. The highest power raised to y''' is 1. Hence, its degree is 1.

Answer needs Correction? **Click Here**

Q8 : Determine order and degree(if defined) of differential equation $y'+y=e^x$

Answer :

$y'+y=e^x$

$\Rightarrow y'+y-e^x=0$

The highest order derivative present in the differential equation is y'. Therefore, its order is one.

The given differential equation is a polynomial equation in y' and the highest power raised to y' is one. Hence, its degree is one.

Answer needs Correction? **Click Here**

Q9 : Determine order and degree(if defined) of differential equation $y''+(y')^2+2y=0$

Answer :

$y''+(y')^2+2y=0$

The highest order derivative present in the differential equation is y''. Therefore, its order is two.

The given differential equation is a polynomial equation in y'' and y' and the highest power raised to y'' is one.

Hence, its degree is one.

Answer needs Correction? **Click Here**

Q10 : Determine order and degree(if defined) of differential equation $y''+2y'+\sin y=0$

Answer :

$y''+2y'+\sin y=0$

The highest order derivative present in the differential equation is y''. Therefore, its order is two.

This is a polynomial equation in y'' and y' and the highest power raised to y'' is one. Hence, its degree is one.

Answer needs Correction? **Click Here**

Q11 : 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

Answer :

$\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{dy}{dx}\right)^2+\sin\left(\frac{dy}{dx}\right)+1=0$

The given differential equation is not a polynomial equation in its derivatives. Therefore, its degree is not defined.

Hence, the correct answer is D.

Answer needs Correction? **Click Here**

Q12 : The order of the differential equation

$2x^2\frac{d^2y}{dx^2}-3\frac{dy}{dx}+y=0$ is

(A) 2 (B) 1 (C) 0 (D) not defined

Answer :

$2x^2\frac{d^2y}{dx^2}-3\frac{dy}{dx}+y=0$

The highest order derivative present in the given differential equation is $\frac{d^2y}{dx^2}$. Therefore, its order is two.

Hence, the correct answer is A.

Answer needs Correction? **Click Here**

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