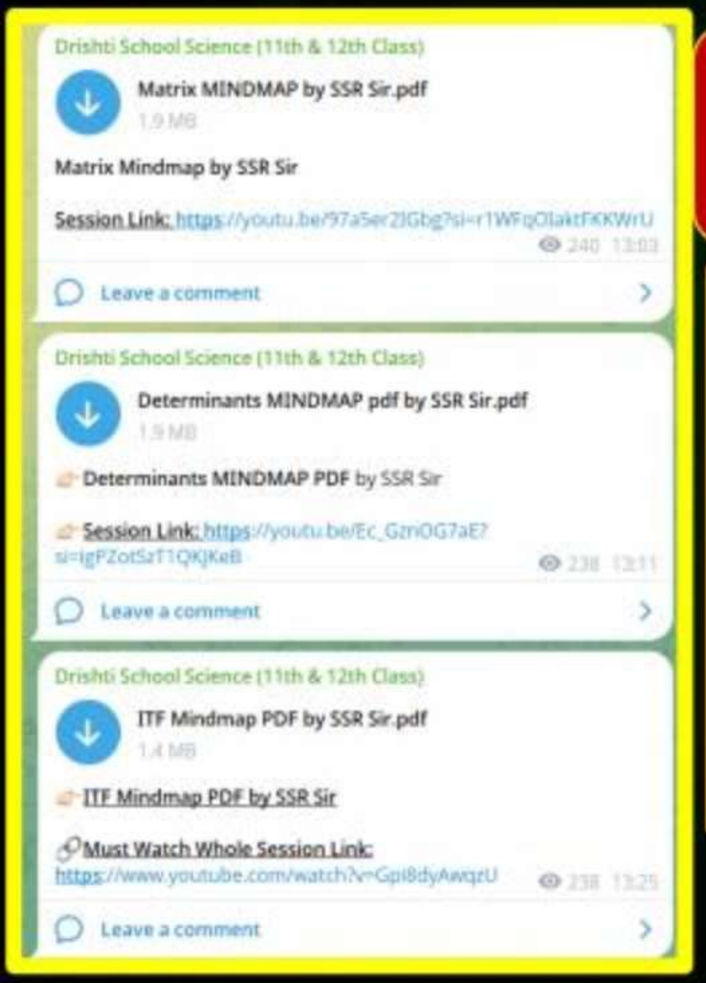
Differential Equation

ONE SHOT

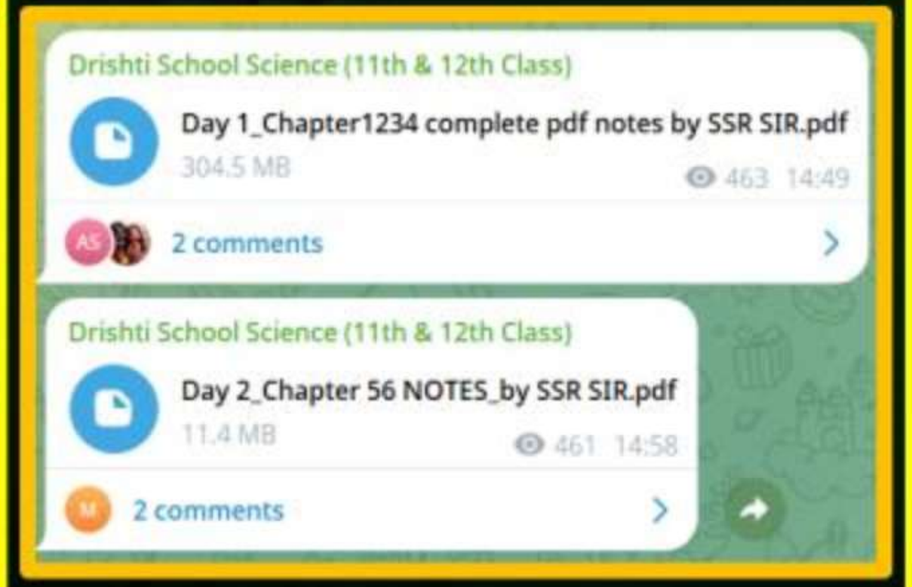
FULL CHAPTER



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Topics

TO BE COVERED

1. Basic definition
2. Order and degree of DE
3. Formation of DE
4. Method of DE
5. Variable and separable method
6. Reducible to variable and separable method
4. Homogeneous Method
2. Linear differential Equations



ABOUT DE

- Weightage in CUET: 10-15 marks (15-20)

- What resources you should follow:
- BPPT 5.0 + 6.0 only
- This PPT Content

- Importance of Chapter:
  - Easy chapter

Last chap

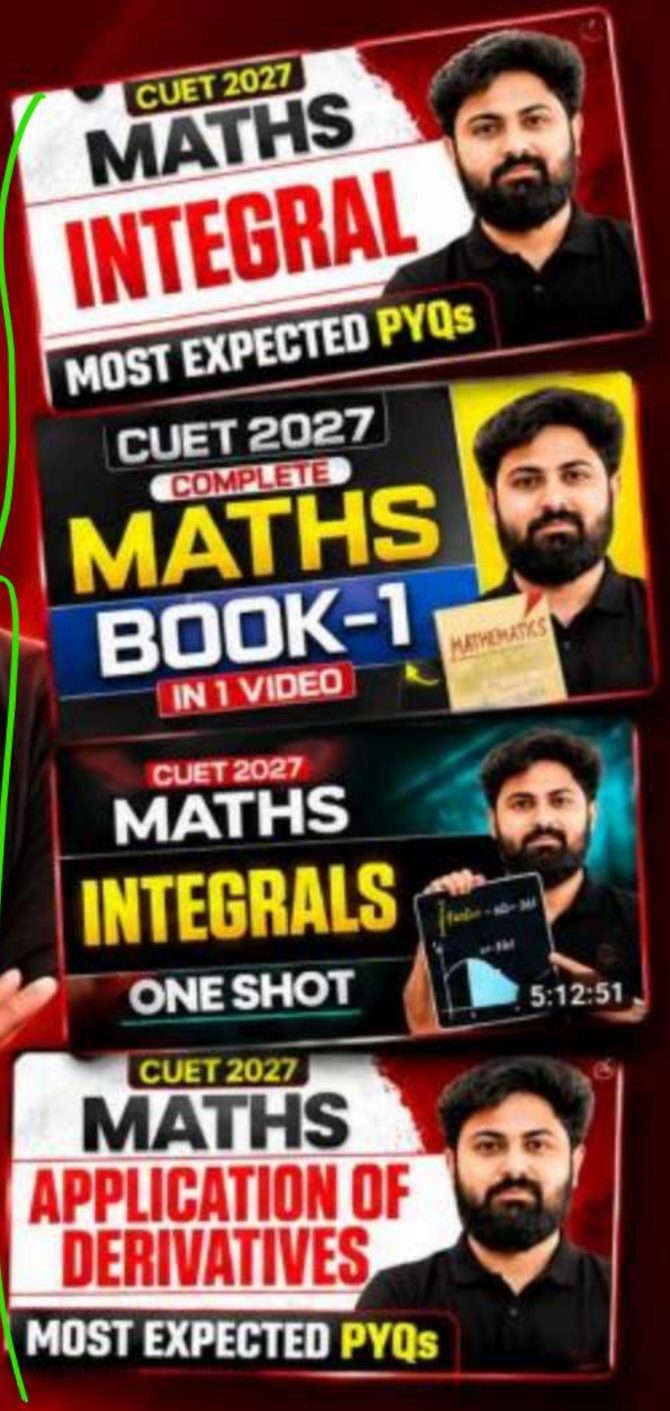
Integral

By- SSR Sir

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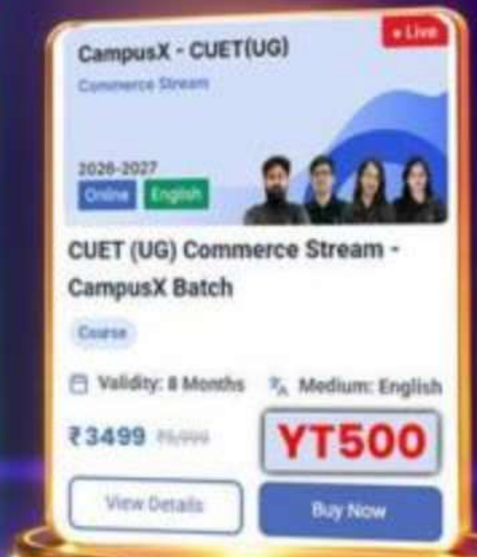


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Constant & Arbitrary Constants

"Values fixed"

↓

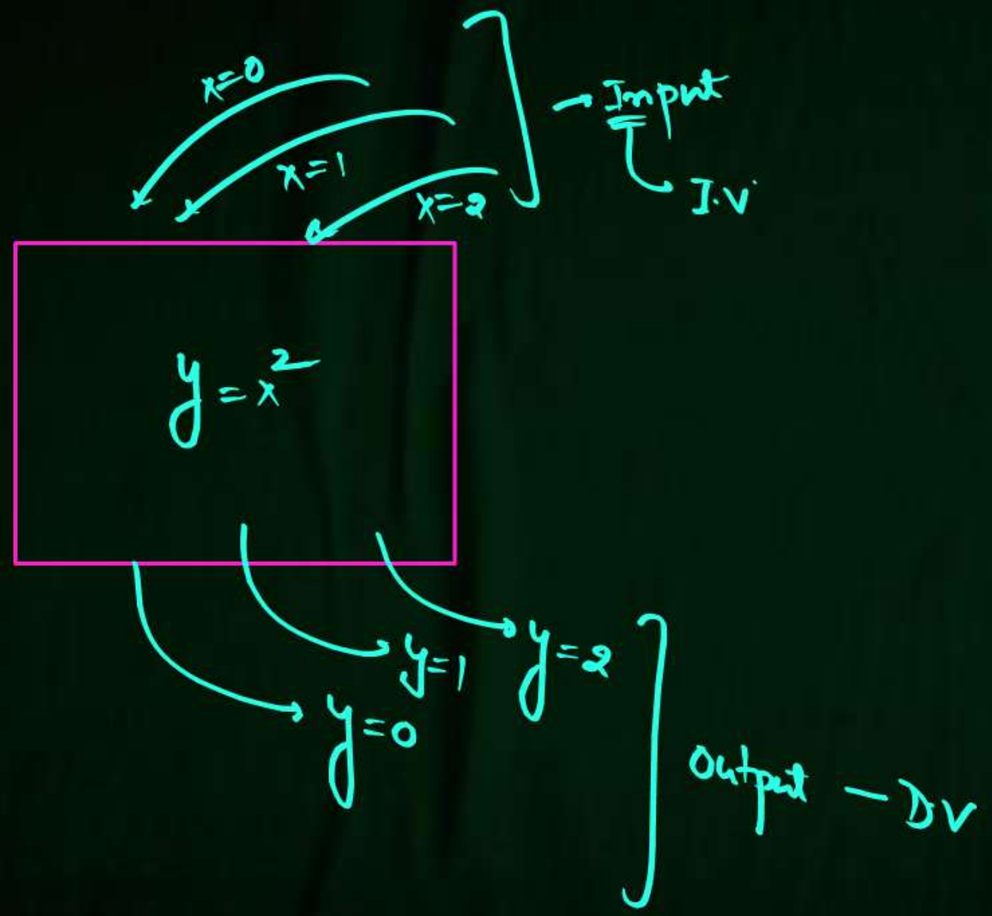
1, 2, 3, $\frac{1}{2}$, $\sqrt{2}$ ...

Values not fixed

↳ C, A, B, ...

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Dependent & Independent Variables



$y = f(x)$

DV

x: IV

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Implicit & Explicit Function

If we Can't separate

fun of x & y

↓

$x^3y^2 + x^2y^2 + \sin xy = 0$

Ex: Separation

If we Can separate fun of x & y

$y = x$

$y = x^2 + 5$

$y = \sin x + \cos x$

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General & Particular Curve

General Curve: $y = x + c$

$c = 0 \Rightarrow y = x$

$c = 1 \Rightarrow y = x + 1$

$c = 2 \Rightarrow y = x + 2$

Particular Curve

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Derivative & Order of Derivatives

$y = f(x)$

No of times diff Have been Done.

$\left(\frac{dy}{dx}\right)$ — Order of derivative : 1

$\frac{d^2y}{dx^2}$ → " " = 2

$\frac{d^3y}{dx^3}$ → " " = 3

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Differential Equations

↳ An Eqn formed by the derivatives.

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

$$\sqrt{\frac{dy}{dx}} = \sin x + \left(\frac{d^2y}{dx^2}\right)^2$$

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ORDER of Differential Equations

- → Maximum no of differentiation have been done in any DE
- → Keep in Mind: For order – DE need not to be polynomial
- → ORDER of DE always defined

eg. $\sin\left(\frac{d^4y}{dx^4}\right) = e^{\frac{d^5y}{dx^5}}$ (4), (5)

Order: 5

Eg: $\left(\frac{dy}{dx}\right)^5 + \left(\frac{d^2y}{dx^2}\right)^4 + \left(\frac{d^3y}{dx^3}\right)^3 + \frac{d^4y}{dx^4} = x$ (1), (2), (3), (4)

Order: 4

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DEGREE of Differential Equations

→ Highest power of maximum order derivative
→ Keep in Mind: For Degree – DE MUST be polynomial in derivatives
→ If DE is not polynomial in derivative: Degree will be not defined

Eg. $\frac{d^3y}{dx^2} + \left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^3y}{dx^3}\right)^4 \sin x + \left(\frac{dy}{dx}\right)^5 = 0$

$\frac{d^3y}{dx^2}$ → 2 ; $\left(\frac{d^3y}{dx^3}\right)^2$ → 3 ; $\left(\frac{d^3y}{dx^3}\right)^4$ → 3 ; $\left(\frac{dy}{dx}\right)^5$ → 1

Order: 3
Degree: 4

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Polynomial

$y = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \cdots + a_1 x + a_0$ is said to be polynomial

If

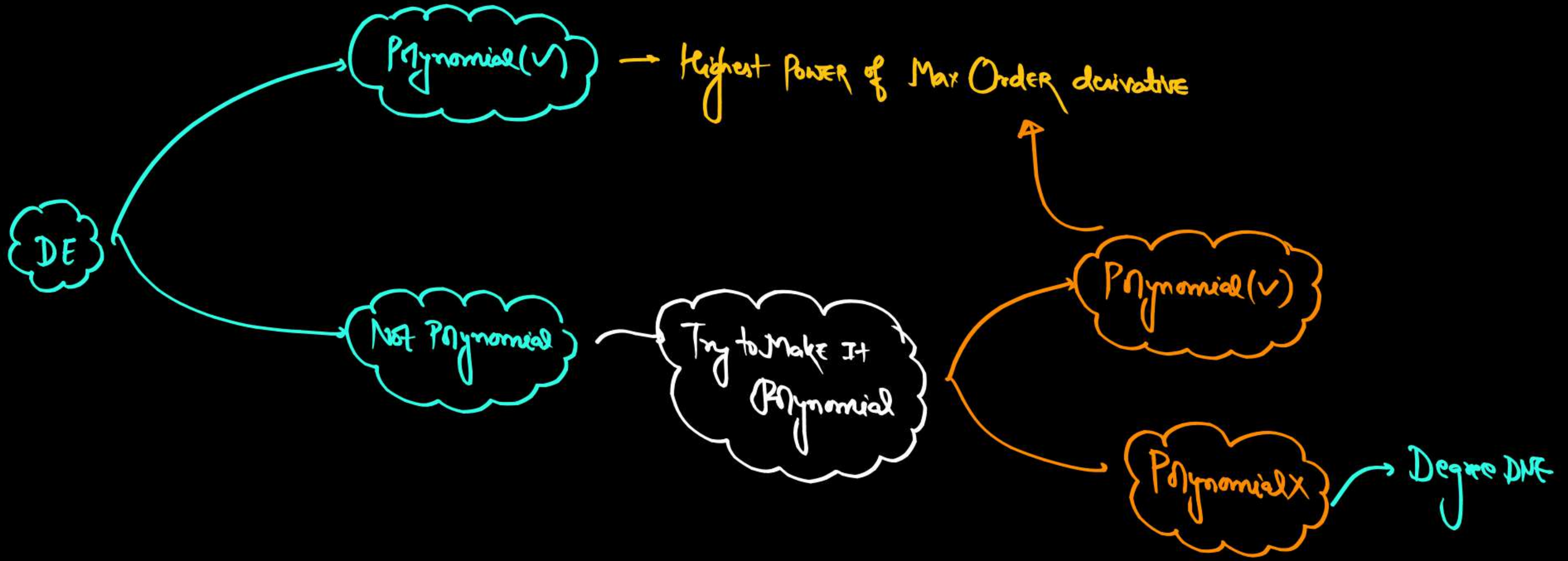
$\cap$ [(I) Power $\rightarrow$ Positive Integral value

(II) $a_n, a_{n-1} \cdots a_0 \in R$]

$y = \sqrt{x}\, x$

$y = (x)^{1/2}\, x$

Concept of Degree



Q)

$$\left(\frac{d^4y}{dx^4}\right)^1 + \left(\frac{d^3y}{dx^3}\right) + \sin xy = 0$$

4 — 3

Order: 4

Degree: 1

Q)

$$\sqrt{\left(\frac{d^2y}{dx^2}\right)} = \sin x + \frac{dy}{dx}$$

2 — 1

Squaring both side

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

1

Order: 2

Degree: 1

9) $\frac{d^2y}{dx^2}$

$e = \sin xy$

$\left(\frac{d^2y}{dx^2}\right)^1 = \log[\sin xy]$

Order: 2
Degree: 1

9) $\frac{d^3y}{dx^2}$

$e = \sin xy + \frac{dy}{dx}$

$\frac{d^3y}{dx^2} = \log\left[\sin xy + \frac{dy}{dx}\right]$

(2) (1)

Order: 2
Degree: DND

8)

$$\ln\left(\frac{d^2y}{dx^2}\right) = a$$

$$\left[\frac{d^2y}{dx^2}\right]^1 = \ln^1(a)$$

↳ Order: 2
Degree: 1

8)

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

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

(2) (1)

[Order: 2
Degree: DNE

Question: CUET 2026 PYQs

The order and the degree of the differential equation $\left(\frac{d^4y}{dx^4}\right)^2 = \left[x + \left(\frac{dy}{dx}\right)^2\right]^3$ are

(A) order 1; degree 6

(B) order 4, degree 2

(C) order 1, degree 2

(D) order 4, degree not defined

Order: 4
Degree: 2

Question: CUET 2026 PYQs

If m and n are respectively order and degree of the differential equation

$$\left(\frac{d^2y}{dx^2}\right)^5 + 6.\frac{\left(\frac{d^2y}{dx^2}\right)^3}{\frac{d^3y}{dx^3}} + \frac{d^3y}{dx^3} = x^2 + 5 \text{ then :}$$

A) m = 3, n = 3

B) m = 2, n = 3

C) m = 3, n = 2

D) m = 3, n = 5

$$\left(\frac{d^3y}{dx^2}\right)^5 \cdot \left(\frac{d^3y}{dx^3}\right)^1 + 6\left(\frac{d^3y}{dx^2}\right)^3 + \left(\frac{d^3y}{dx^3}\right)^2 = (x^2+5)\left(\frac{d^3y}{dx^3}\right)^1$$

Order : 3 → m

Degree : 2 → n

SSR SIR

Question: CUET 2026 PYQs

If $y = x\frac{dy}{dx} + \sqrt{a^2\left(\frac{dy}{dx}\right)^2 + b^2}$, then the order and degree of the differential equation are

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

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

(1) (1)

(A) order = 2, degree = 2

(B) order = 2, degree = 1

(C) order = 1, degree = 2

(D) order = 2, degree = not defined

Order: 1
Degree: 2]

Q) Find the Sum of Order & Degree of DE.

$$\frac{d}{dx}\left[\frac{dy}{dx}\right]^5 = 0$$

$$5\left(\frac{dy}{dx}\right)^4 \left(\frac{d^2y}{dx^2}\right)^1 = 0$$

① ②

Order : 2
Degree : 1

③

$$\frac{d}{dx}\left[f(x)\right]^5 = 0$$

$$5\left[f(x)\right]^4 * f'(x) = 0$$

Q) $$\frac{d}{dx}\left[\frac{dy}{dx}\right]^{100} = 5$$

$$100\left(\frac{dy}{dx}\right)^{99} \left(\frac{d^2y}{dx^2}\right)^1 = 5$$

① ②

Sum = 3

Question: CUET 2026 PYQs

Match List-I with List-II.

Choose the correct answer from the options given below:

List-I (Differential equation)	List-II (Sum of the order and the degree of the differential equation)
A. $\frac{d}{dx}\left(\frac{dy}{dx}\right) = 1$	I. 2
B. $4 + \left(\frac{dy}{dx}\right)^4 = 7\left(\frac{d^2y}{dx^2}\right)^3$	II. 3
C. $x^3\left(\frac{d^2y}{dx^2}\right)^2 + x\left(\frac{dy}{dx}\right)^4 + 1 = 0$	III. 5
D. $\frac{dy}{dx} = x^4e^{-3y}$	IV. 4

(A) A-II, B-III, C-IV, D-I

(B) A-III, B-II, C-I, D-IV

(C) A-IV, B-I, C-II, D-III

(D) A-II, B-III, C-I, D-IV

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Question: CUET 2026 PYQs

The order of the differential equation

$\left(\frac{d^3y}{dx^3}\right)^4 + \frac{d^4y}{dx^4} + \log\left(\frac{dy}{dx}\right) = 0$ is

(3) (4) (1)

A 4

B 3

C 1

D Not defined

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Question: CUET 2026 PYQs

List-I (Differential Equation)	List-II (Degree)
(A) $\left(\frac{dy}{dx}\right)^3 + \left(\frac{d^2y}{dx^2}\right)^2 = 0$	(I) Not defined
(B) $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + 1 = 0$	(II) 2
(C) $\sqrt{1 + \left(\frac{d^2y}{dx^2}\right)^2} = \left(\frac{dy}{dx} + x\right)^2$	(III) 1
(D) $\frac{d^2y}{dx^2} + e^{\frac{dy}{dx}} = 0$	(IV) 3

Match List-I with List-II

Choose the correct answer from the options given below:

A (A) - (II), (B) - (IV), (C) - (III), (D) - (I)

B (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

C (A) - (IV), (B) - (I), (C) - (II), (D) - (III)

D (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

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Question: CUET 2026 PYQs

If the order and degree of the differential equation $y + \frac{dy}{dx} = \int y\,dx$ are m and n respectively, then (m - n) is equal to

A 0

B 1

C -1

D Not defined

$y + \frac{dy}{dx} = yx + C$

(Order = 1, Dg = 1)

Question: CUET 2026 PYQs

The order and degree of the differential equation $\frac{d^3y}{dx^3} + \left(\frac{d^2y}{dx^2}\right)^2 + e^{\frac{dy}{dx}} = 2$ is

(A) Order = 2 ; degree = 2

(B) Order = 3 ; degree = 1

(C) Order = 3 ; degree is not defined

(D) Order = 1 ; degree = 3

Order: 3

Degree: ND

Question: CUET 2026 PYQs

The product of order and degree of the differential equation

$$x\left(\frac{d^3y}{dx^3}\right)^1 = \left(1+\left(\frac{dy}{dx}\right)^2\right)^4$$ is

(3)

A 12

B 3

3*1

C 8

D 6

$(a+b)^2 = a^2+b^2+\cdots$

$(a+b)^4 = a^4+b^4+\cdots$

$(a+b)^{100} = a^{100}+b^{100}+\cdots$

$(a+b)^{501} = a^{501}+b^{501}+\cdots$

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If m and n are the order and the degree of the differential equation :

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

then which one of the following is TRUE?

A. $m = n$ ×

B. $m + 2n = 7$ ×

$2+6=8$

C. $2m + n = 8$ ×

$4+3=7$

D. $3m + n = 9$ ✓

$6+3=9$

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

Order: 2 → m

Degree: 3 → n

Question: CUET 2026 PYQs

List-I Differential equation	List-II Order and degree of differential equation
(A) $\left(\frac{d^2y}{dx^2}\right)^2 + 4y = 0$	(I) Order = 2 degree = 3
(B) $\left(\frac{d^3y}{dx^3}\right) + \left(\frac{dy}{dx}\right)^2 + xy = 0$	(II) Order = 2 degree = 2
(C) $\left[\left(\frac{d^2y}{dx^2}\right)^{1/2}\right]^3 = \left[\left(\frac{dy}{dx}\right)^{1/3}\right]^2$	(III) Order = 2 degree = 1
(D) $\sqrt{1 + \left(\frac{dy}{dx}\right)^2} = \left(k\frac{d^2y}{dx^2}\right)^{1/3}$	(IV) Order = 3 degree = 1

Match List-I with List-II

Choose the correct answer from the options given below:

A (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

B (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

C (A) - (I), (B) - (IV), (C) - (III), (D) - (II)

D (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

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Question: CUET 2026 PYQs

The product of the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 - 3\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^4 = y^4$ is

A 12

B 6

C 4

D 8

Order: 2
Degree: 2
$2 \times 2 = 4$

SSR SIR

Question: CUET 2026 PYQs

Match the LIST-I with LIST-I

Choose the correct answer from the options given below:

LIST-I Differential Equation	LIST-II Degree of Differential Equation
A. $\left(\frac{d^3y}{dx^3}\right) + \left(\frac{d^2y}{dx^2}\right)^2 - \frac{dy}{dx} + y = 0$	I. 2
B. $\frac{dy}{dx} + \left(\frac{d^2y}{dx^2}\right)^4 + 2\left(\frac{d^3y}{dx^3}\right)^3 = 0$	II. 4
C. $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^2y}{dx^2}\right)^4 - y = 0$	III. 1
D. $\left(\frac{d^2y}{dx^2}\right)^4 + \left(\frac{dy}{dx}\right)^3 + y = 0$	IV. 3

(A) A-I, B-IV, C-II, D-III

(B) A-III, B-II, C-I, D-IV

(C) A-I, B-II, C-III, D-IV

(D) A-III, B-IV, C-I, D-II

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Question: CUET 2026 PYQs

For the differential equation $\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}}}{\frac{d^2y}{dx^2}} = k, k \neq 0$ which one of the following is TRUE ?

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

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

(A) Non-linear differential equation of order 2 and degree 2

(B) linear differential equation of order 2 and degree 2

(C) Non-linear differential equation of order 2 and degree 3

(D) linear differential equation of order 2 and degree 3

Question: CUET 2026 PYQs

The order of the differential equation $\left(\frac{d^5y}{dx^5}\right)^2 + e^{\frac{dy}{dx}} + y^2 = 0$ is :

A 1

B Not defined

C 5

D 2

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Question: CUET 2026 PYQs

If m and n are the order and degree of the differential equation

$$\left(9\frac{d^3y}{dx^3}\right)^2 = \left[\left\{1+\left(\frac{dy}{dx}\right)^2\right\}^{5/2}\right]^2$$

then the value of 2m + 3n is equal to

$6+6 = 12$

A. 10

B. 12

C. 15

D. 7

$$81\left(\frac{d^3y}{dx^3}\right)^3 = \left[1+\left(\frac{dy}{dx}\right)^2\right]^5$$

(3) (1)

$m = 3$

$n = 2$

Question: CUET 2026 PYQs

The sum of the order and degree of the differential equation :

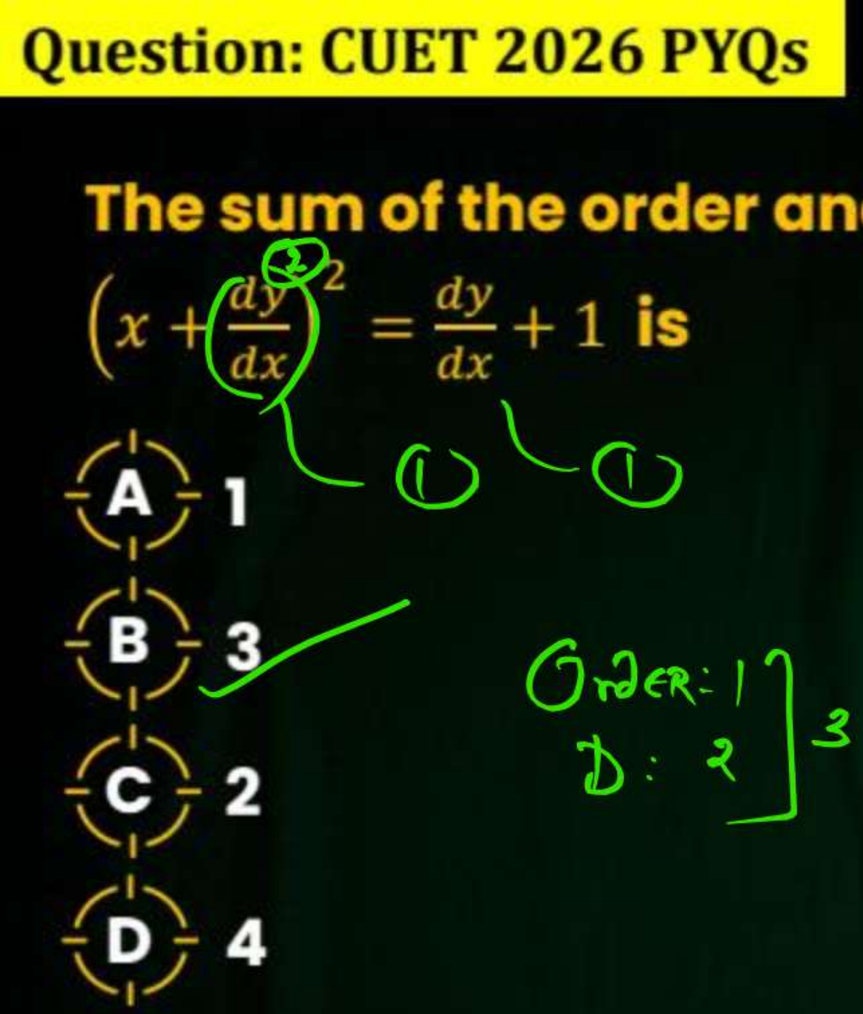
$\left(x+\left(\frac{dy}{dx}\right)^2\right)^2=\frac{dy}{dx}+1$ **is**

(A) 1

(B) 3

(C) 2

(D) 4



#Q. Let the degree and order of the differential equation

$$2x^3\frac{dy}{dx} - 5\left(\frac{d^2y}{dx^2}\right)^2 = 6\left(\frac{dy}{dx}\right)^3$$

be m and n respectively. Then

(A). m = 2 (B). n = 3

(c). m = 3 (D). mn = 4

Choose the correct answer from the options given below:

A (A) and (B) only

B (A) and (D) only

C (B) and (C) only

D (B) and (D) only

#Q. In the following differential equation $\frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^2 = 2x^2 log\left(\frac{d^2y}{dx^2}\right)$ order and degree is:

(2) (1) (2)

A Order 2, Degree 2

B Order 2, Degree not defined

(2)

M

C Order not defined, Degree 2

D Order 1, Degree 2

#Q. Match List-I with List-II

List-I (Differential Equations)		List-II (Degree/Order)	
A.	Degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^3 + 2\log x \cdot y = 0$	(i).	3
B.	Order of the differential equation $\frac{d^4y}{dx^4} + \left(\frac{dy}{dx}\right)^4 + xy = 0$	(ii).	2
C.	Degree of differential equation $\left(\frac{d^4y}{dx^4}\right)^2 + \left(\frac{dy}{dx}\right)^3 + x^2y = 0$	(iii).	1
D.	Order of the differential equation $\frac{d^3y}{dx^3} + y\left(\frac{dy}{dx}\right)^3 = 0$	(iv).	4

Choose the correct answer from the options given below:

A (A) - (III), (B) - (II), (C) - (IV), (D) - (I)

B (A) - (I), (B) - (II), (C) - (IV), (D) - (III)

C (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

D (A) - (I), (B) - (III), (C) - (IV), (D) - (II)

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#Q. The number of arbitrary constants in the general solution of a differential equation of order 4 and degree 1 is

A 0

B 4

C 2

D 1

C_1

Question – CUET 2025 PYQs

#Q. The order of $\sqrt{1+\left(\frac{dy}{dx}\right)^2} = \left[a\frac{d^2y}{dx^2}\right]^{1/3}$ is

A 1

B 2

C 3

D 4

SSR SIR

#Q. Match List-I with List-II

List-I		List-II	
A.	The degree of differential equation $\frac{d^3y}{dx^3} = e^{\frac{dy}{dx}}$	(i).	2
B.	The order of differential equation $\left(\frac{dy}{dx}\right)^2 + \frac{d^3y}{dx^3} = 0$	(ii).	4
C.	The sum of order and degree of differential equation $\frac{d}{dx}\left(\frac{d^2y}{dx^2}\right) + \left(\frac{dy}{dx}\right)^5 = x$	(iii).	Not defined
D.	The number of arbitrary constants in the general solution of a differential equation of order 2	(iv).	3

Choose the correct answer from the options given below:

A (A) - (I), (B) - (IV), (C) - (II), (D) - (III)

B (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

C (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

D (A) - (IV), (B) - (I), (C) - (II), (D) - (III)

SSR SIR

#Q. The sum of the order and degree of the differential equation representing the family of curves $y = mx + m^2$, where m is arbitrary constant, is

A. 3

B. 4

C. 5

D. 2

$y = mx + m^2$ — (1)

$\frac{dy}{dx} = m$ — (2)

$y = \left(\frac{dy}{dx}\right) \cdot x + \left(\frac{dy}{dx}\right)^2$

Req DE.

#Q. The number of arbitrary constants in the particular solution of a differential equation of order 4 and degree 3 is

A 0

B 1

C 3

D 4

Question – CUET 2022 PYQs

If m is the degree and n is the order of the given differential equation:

$$\frac{x^3\left(\frac{d^3y}{dx^3}\right)^2 + 2x^2\left(\frac{d^2y}{dx^2}\right)^3}{(x+1)^5} = \left(3x - \frac{d^2y}{dx^2}\right)^4 (x+1)^5$$

(A) $m - n = 2$

(B) $m + n = 5$

(C) $m = 4, n = 3$

(D) $order\ (n) is\ 3\ but\ degree\ (m) is\ not\ defined.$

$m = 2$

$n = 3$

Formation of DE

$y = f(x, y, c_1, c_2 \cdots c_n)$ — ① To find out DE

n ACs.

(1) Diff Eqn ① 'n' times

(2) We get $(n+1)$ Eqn

(3) Eliminate All ACs from $(n+1)$ Eqn.

(4) We get Req' DE.

Q) $y^2 = 4ax$ — ① $(a - ACs)$

$2y\frac{dy}{dx} = 4a$ — ②

$y^2 = 2y\left(\frac{dy}{dx}\right) \cdot x$

$y = 2x\left(\frac{dy}{dx}\right)$

Note: (I) If we have a general Eqn having n-Ass Then Order of DE will be 'n'

(II) But we Can't Predict Degree of DE.

$C_1 \pm C_2 = C$

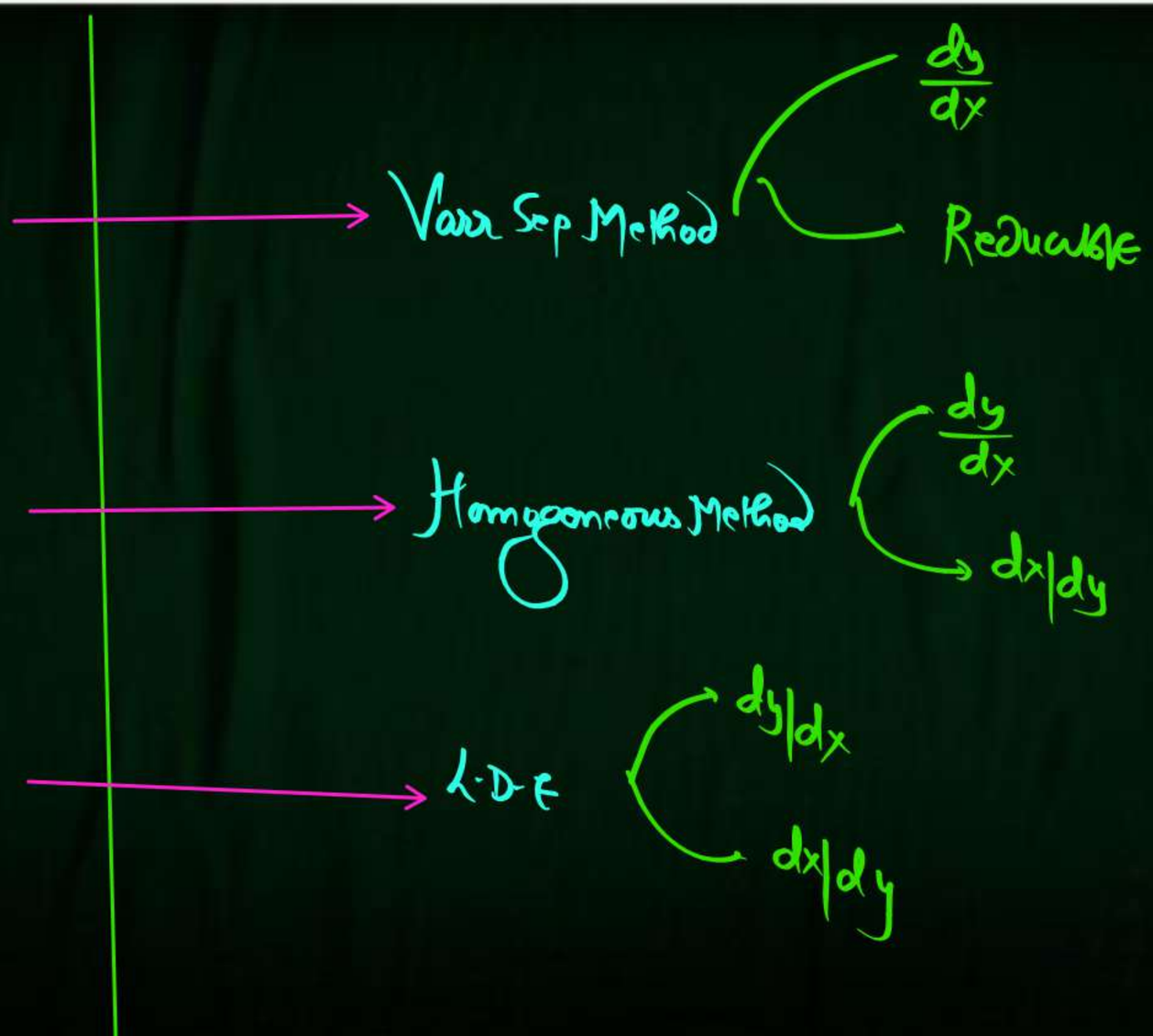
Q) $y = c_1 e^x + c_2 \sin x + c_3 \cos x \rightarrow$ Order of DE = 3

Q) $y = (c_1 + c_2) e^x + (c_3 + c_4) \sin x$

$\Rightarrow k e^x + C \sin x$

Order : 2

METHODS OF DE



SSR SIR



Variable & Separable Method

$$\frac{dy}{dx} = F(x,y)$$

↳ Explicit form

$$\frac{dy}{dx} = f(x)\cdot f(y)$$

$$\int \frac{dy}{f(y)} = \int f(x)\,dx + C$$

↳ Req Soln

SSR SIR

Question: CUET 2026 PYQs

The number of solutions of the differential equation $\frac{dy}{dx} - y = 1$, given that $y(0) = 1$ is

A. 0
B. 1
C. 2
D. Infinitely many

Boundary Condⁿ

Particular Solⁿ ?

C = ?

$\frac{dy}{dx} = (1+y)$

$\int \frac{dy}{(1+y)} = \int dx$

$\log|1+y| = x + C$ — General Eqn

at $x=0, y=1$

$\log_e 2 = 0 + C$

$C = \log_e 2$

$\log|1+y| = x + \log_e 2$

1 Solⁿ

$y(0)=1$

At $x=0$ Par y ki Value 1 Hai

$y=1$ at $x=0$

$(0,1)$ Passes

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Question: CUET 2026 PYQs

The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = ax + by$ is

$$\frac{e^{-by}}{-b} = \frac{e^{ax}}{a} + C$$

(A) $\frac{e^{-by}}{a} = \frac{e^{ax}}{b} + c$, where c is an arbitrary constant

$$\frac{dy}{dx} = e^{ax+by}$$

(B) $e^{-by} = e^{ax} + c$, where c is an arbitrary constant

$$\frac{dy}{dx} = e^{ax} \cdot e^{by}$$

(C) $-b\,e^{-by} = a\,e^{ax} + c$, where c is an arbitrary constant

(D) $\frac{e^{-by}}{-b} = \frac{e^{ax}}{a} + c$, where c is an arbitrary constant

$$\int \frac{dy}{e^{by}} = \int e^{ax}\,dx$$

$$\int e^{-by}\,dy = \int e^{ax}\,dx$$

Question: CUET 2026 PYQs

General solution of the differential equation $\frac{dy}{dx} = e^{ax+by}$ is: (where C is an arbitrary constant)

(A) $e^{ax} + e^{-by} = C$

(B) $e^{ax+by} = C$

(C) $be^{ax} + ae^{-by} = C$

(D) $ae^{ax} - be^{-by} = C$

HW

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Question: CUET 2026 PYQs

The solution of the differential equation $\frac{dy}{dx} + y = 1, y(1) = 0$ is

(A) $1 + x = \log_e |1 - y|$

(B) $1 - x = \log_e |1 + y|$

(C) $1 + x = \log_e |1 + y|$

(D) $1 - x = \log_e |1 - y|$

HW

Question: CUET 2026 PYQs

Particular solution of the differential equation $dy = e^{2x+y}dx$, $y(0) = 0$ is:

(A) $y = \log \left|\frac{2}{3 - e^{2x}}\right|$

(B) $y = \log (3 - e^{2x})$

(C) $y = \frac{2}{3 - e^{2x}}$

(D) $y = 3 - e^{2x}$

$\because y(0) = 0$

$\downarrow$

at $x = 0; y = 0$

$\frac{dy}{dx} = e^{2x+y}$

$\frac{dy}{dx} = e^{2x} \cdot e^{y}$

$\int e^{-y} dy = \int e^{2x} dx$

$-e^{-y} = \frac{e^{2x}}{2} + C$

$-e^{0} = \frac{e^{0}}{2} + C$

$-1 = \frac{1}{2} + C$

$C = -3/2$

$-e^{-y} = \frac{e^{2x}}{2} - \frac{3}{2}$

$e^{-y} = \frac{(3 - e^{2x})}{2}$

$-y = \log\left[\frac{3 - e^{2x}}{2}\right]$

$y = \log\left[\frac{2}{3 - e^{2x}}\right]$

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Question: CUET 2026 PYQs

Let $y(x)$ be the solution curve of the differential equation $x(1+y^2)dx - y(1+x^2)dy = 0$ and it passes through the point $(0, 1)$, then

A $y^2 = 2x^2 + 1$

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

C $y = 2x^2 + 3x + 1$

D $y^2 = \log|1+x| + x^2 + 1$

$x(1+y^2)dx = y(1+x^2)dy$

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

$\int \frac{y}{1+y^2}dy = \int \frac{x}{(1+x^2)}dx$

$1+y^2 = t$

$2ydy = dt$

$ydy = \frac{1}{2}dt$

$1+x^2 = u$

$2xdx = du$

$xdx = \frac{1}{2}du$

$\int \frac{\frac{1}{2}dt}{t} = \int \frac{\frac{1}{2}du}{u} + C$

$\frac{1}{2}\log|t| = \frac{1}{2}\log|u| + \log|c|$

$\log|t| = \log|u| + \log|c|$

$t = u \cdot c$

$(1+y^2) = (1+x^2) \cdot c$

Genson

$(1+1) = c \Rightarrow c = 2$

$(1+y^2) = (1+x^2) \cdot 2$

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

SSR SIR

Question: CUET 2026 PYQs

The general solution of the differential equation $\frac{dy}{dx} = e^{2x-y} + xe^{-y}$ is:

$\frac{dy}{dx} = e^{2x} \cdot e^{-y} + x \cdot e^{-y}$

(A) $2e^{-y} = e^{2x} + x + C$: where C is an arbitrary constant

(B) $2e^{y} = e^{2x} + x^2 + C$: where C is an arbitrary constant $\frac{dy}{dx} = e^{-y}\left(e^{2x} + x\right)$

(C) $2e^{-y} = e^{2x} + x^2 + C$: where C is an arbitrary constant $\int e^{y} dy = \int \left(e^{2x} + x\right) dx$

(D) $2e^{y} = e^{2x} + x + C$: where C is an arbitrary constant

$e^{y} = \frac{e^{2x}}{2} + \frac{x^2}{2} + C$

$2e^{y} = e^{2x} + x^2 + C$

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Question: CUET 2026 PYQs

The particular solution of the differential equation $dy = e^{2x+y}dx$, $y(0) = 0$ is

(A) $x = \log_e \left|\frac{3+e^{2y}}{2}\right|$

(B) $x = \log_e \left|\frac{3-e^{2y}}{2}\right|$

(C) $y = \log_e \left|\frac{2}{3-e^{2x}}\right|$

(D) $y = \log_e \left|\frac{2}{3+e^{2x}}\right|$



Question: CUET 2026 PYQs

The particular solution of the differential equation $\log\left(\frac{dy}{dx}\right) = 3x + 4y$, given that $y = 0$, when $x = 0$ is:

(A) $3e^{-3x} + 4e^{4y} = 12$

(B) $4e^{-3x} + 3e^{4y} = 7$

(C) $4e^{3x} + 3e^{-4y} = 7$

(D) $3e^{3x} + 4e^{-4y} = 12$

Question: CUET 2026 PYQs

Let $y = f(x)$ be the solution curve of the differential equation $\frac{dy}{dx} + 2y^2 = 0$ if $f(1) = 1$, then $f(2)$ is equal to

(A) $-\frac{1}{4}$

(B) $-\frac{1}{2}$

(C) $\frac{1}{3}$

(D) $\frac{1}{4}$

$$\frac{dy}{dx} + 2y^2 = 0$$

$$\frac{dy}{dx} = -2y^2$$

$$\int -\frac{dy}{y^2} = \int 2\,dx$$

$$\boxed{\frac{1}{y} = 2x + C}$$ Gen Eqn

$\because f(1) = 1$

↳ at $x = 1$; $y = 1$

$1 = 2 + C \Rightarrow \boxed{C = -1}$

$$\frac{1}{y} = (2x - 1)$$

$$\boxed{y = \frac{1}{(2x-1)}}$$

$$f(x) = \frac{1}{(2x-1)}$$

$$f(2) = \frac{1}{4-1} \Rightarrow 1/3$$

SSR SIR

Question: CUET 2026 PYQs

Solution of differential equation $\frac{dy}{dx} = \frac{1+x^2}{1+y^2}$ is

A $x^3 - y^3 + 3(x+y) + C = 0$: where C is an arbitrary constant

B $x^3 + y^3 + 3(x-y) + C = 0$: where C is an arbitrary constant

C $x^3 - y^3 + 3(x-y) + C = 0$: where C is an arbitrary constant

D $x^3 + y^3 + 3(x+y) + C = 0$: where C is an arbitrary constant

$3y + y^3 = 3x + x^3 + C$

$x^3 - y^3 + 3(x-y) + C = 0$

$\int (1+y^3)\,dy = \int (1+x^3)\,dx$

$y + \frac{y^3}{3} = x + \frac{x^3}{3} + C$

SSR SIR

Question: CUET 2026 PYQs

The solution of the differential equation $e^{\frac{dy}{dx}} = x + 1;\ y(0) = 5$ is

$y = (x+1)\log_e(x+1) - x + 5$

(A) $y = x\log_e x - x + 5$

(B) $y = x\log_e(1+x) - x$

(C) $y = 2\log_e(1+x) + x$

(D) $y = (1+x)\log_e(1+x) - x + 5$

$\int \log x\,dx = (x\log x - x) + C$

$\frac{dy}{dx} = \log(x+1)$

$\int dy = \int \log(x+1)\,dx$

$y = (x+1)\log(x+1) - (x+1) + C$

$y = (x+1)\log(x+1) - x + C$

$\because y(0) = 5 \Rightarrow$ at $x = 0,\ y = 5$

$5 = \log 1 - 0 + C$

$C = 5$

SSR SIR

Question: CUET 2026 PYQs

The particular solution of the differential equation $xdy + ydx = 0$, given $y = 2$, when $x = 1$, is

(A) $xy = 2$

(B) $x + y = 3$

(C) $\log x . \log y = 2$

(D) $x^2 + y^2 = 5$

$y=2, x=1$

$2=c$

$y=2/x$

$xy=2$

$xdy = -ydx$

$\int \frac{dy}{y} = \int -\frac{dx}{x}$

$\log|y| = -\log|x| + \log c$

$\log y = \log(1/x) + \log c$

$y = c/x$

SSR SIR

Question: CUET 2026 PYQs

The equation of the curve that passes through $(-1, 1)$ and the slope of line touching to the curve at any point (x, y) is $\frac{3x^2}{y}$, is:

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

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

(C) $y^2 = x^3 + \frac{3}{2}$

(D) $y^2 = 2x^3 + 6$

$\therefore \frac{dy}{dx} = \frac{3x^2}{y}$

$\int y\,dy = \int 3x^2\,dx$

$\frac{y^2}{2} = \frac{3x^3}{3} + C$

$y^2 = 2x^3 + C$

Pass $(-1, 1)$

$1 = -2 + C$

$C = 3$

$y^2 = 2x^3 + 3$

PS



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Question: CUET 2026 PYQs

The general solution of the differential equation $\frac{dy}{dx} = 1 + x + y + xy$ is: (where C is an arbitrary constant)

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

(B) $\log_e |1 + y|^2 = x^2 + 2x + C$

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

(D) $\log_e |1 + y| = x + \frac{x^2}{2} + C$

Choose the correct answer from the options given below:

A (A) only

B (B) only

C (B) and (D) only

D (B) and (C) only

$\frac{dy}{dx} = (1+x) + y(1+x)$

$\frac{dy}{dx} = (1+x)(1+y)$

$\int \frac{dy}{(1+y)} = \int (1+x)\,dx$

$\log|1+y| = x + \frac{x^2}{2} + C$

$2\log|1+y| = 2x + x^2 + C$

$\log|1+y|^2 = x^2 + 2x + C$

SSR SIR

Question – CUET 2025 PYQs

#Q. Let $y(x) = a(x+1)\log(x+1) + bx + 1$ be the solution of the differential equation $e^{\frac{dy}{dx}} = x + 1; y(0) = 5$, then the value of $(a+b)$ is:

A. 0

B. 1

C. 2

D. -1

$\frac{dy}{dx} = \log(x+1)$

$\int dy = \int \log(x+1)\,dx$

$y = (x+1)\log(x+1) - (x+1) + C$

$y = (x+1)\log(x+1) - x + C$

$a = 1$, $b = -1$

$a+b+c = ?$

$a+b = 1-1 = 0$

SSR SIR

#Q. The solution of the differential equation $\frac{dr}{dt} = -rt, r(0) = r_0$ is

A $r = r_0 e^{t^2/2}$

B $r = -r_0 e^{t^2/2}$

C $r = r_0 e^{-t^2/2}$

D $r = -r_0 e^{-t^2/2}$

$$\int \frac{dr}{r} = \int -t\,dt$$

$$\ln|r| = -\frac{t^2}{2} + C$$

$\because r(0) = r_0$

↳ at $t=0; r=r_0$

$$\ln r_0 = -0 + C$$

$$C = \ln r_0$$

$$\ln|r| = -\frac{t^2}{2} + \ln r_0$$

$$\ln r - \ln r_0 = -t^2/2$$

$$\ln\left(\frac{r}{r_0}\right) = -t^2/2$$

$$\frac{r}{r_0} = e^{-t^2/2}$$

$$r = r_0 \cdot e^{-t^2/2}$$

Ans

Question – CUET 2025 PYQs

#Q. Solution of the differential equation $\frac{dy}{dx} = \sqrt{1 + x^2 + y^2 + x^2y^2}$ is:
(Here is an arbitrary constant)

A $\log\left|\frac{y + \sqrt{1 + y^2}}{x + \sqrt{1 + x^2}}\right| = C$

B $\log\left|\frac{y + \sqrt{1 + y^2}}{\sqrt{x + \sqrt{1 + x^2}}}\right| = C$

C $\log\left|\frac{y + \sqrt{1 + y^2}}{\sqrt{x + \sqrt{1 + x^2}}}\right| = \frac{x}{2}\sqrt{1 + x^2} + C$

D $\log\left|\frac{y + \sqrt{1 + y^2}}{x + \sqrt{1 + x^2}}\right| = \frac{x}{2}\sqrt{1 + x^2} + C$

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

$\frac{dy}{dx} = \sqrt{(1+x^2)(1+y^2)}$ $\qquad \sqrt{ab} = (\sqrt{a})(\sqrt{b})$

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

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$$\int \frac{dy}{\sqrt{1+y^2}} = \int \sqrt{1+x^2}\, dx$$

$$\log\left|1+\sqrt{1+y^2}\right| = \frac{x}{2}\sqrt{1+x^2} + \frac{1}{2}\log\left|x+\sqrt{1+x^2}\right| + C$$

$$\log\left|1+\sqrt{1+y^2}\right| - \log\left|x+\sqrt{1+x^2}\right|^{1/2} = \frac{x}{2}\sqrt{1+x^2} + C$$

$$\boxed{\log\left[\frac{1+\sqrt{1+y^2}}{\sqrt{x+\sqrt{1+x^2}}}\right] = \frac{x}{2}\sqrt{1+x^2} + C}$$

Ans

Reducible to Var Sep.

$$\frac{dy}{dx} = f(x+y)$$

linear fun

(I) Let $x+y=t$

(II) $$1+\frac{dy}{dx} = \frac{dt}{dx}$$

(III) $$\frac{dt}{dx} - 1 = f(t)$$

(IV) $$\frac{dt}{dx} = 1+f(t)$$

Solve by V & S.

(V) In the last Must put $t = (x+y)$

Solution of differential equation $\frac{dy}{dx} = \cos(x+y+3)$ is :

(1) $y = -\sin(x+y+3)+c$

(2) $y = \sin(x+y+3)+c$

(3) $y = 2\tan^{-1}(x+c)-x-3$

(4) $y = \frac{1}{2}\tan^{-1}(x+c)+x+3$

$x+y+3=t$

$1+\frac{dy}{dx}=\frac{dt}{dx}$

$\frac{dy}{dx}=\left(\frac{dt}{dx}-1\right)$

$\left(\frac{dt}{dx}-1\right)=\cos t$

$\frac{dt}{dx}=(1+\cos t)$

$\int \frac{1}{x} = \ln|x|$

$\int \frac{1}{\cos x} = \ln|\cos x|$

$$\int \frac{dt}{1+\cos t} = \int dx$$

$$\int \frac{dt}{1+2\cos^2 t/2 - 1} = x + c$$

$$\frac{1}{2}\int \sec^2 t/2 \, dt = (x+c)$$

$$\frac{1}{2}\frac{(\tan t/2)}{(\frac{1}{2})} = (x+c)$$

$$\boxed{\tan(t/2) = (x+c)}$$

$$\frac{t}{2} = \tan^{-1}(x+c)$$

$$t = 2\tan^{-1}(x+c)$$

$$(x+y+3) = 2\tan^{-1}(x+c)$$

$$\boxed{y = 2\tan^{-1}(x+c) - x - 3}$$

Ans



HOMOGENEOUS METHOD

Homogeneous Equations

(I) If Degree of Each Term is Same

(II) If $f(\lambda x, \lambda y) = \lambda^n \cdot f(x, y)$

Then we say $f(x,y)$ is Homo Eqn of Order (n).

Identify Homo

Eg: $f(x,y) = x^2 + y^2 + x^1y^1$

$x \to \lambda x$
$y \to \lambda y$

(2) (2) (2) → Homo

$f(\lambda x, \lambda y) = (\lambda x)^2 + (\lambda y)^2 + (\lambda x)(\lambda y)$

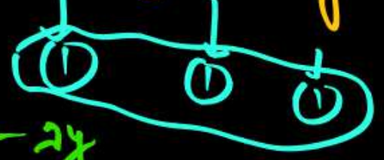
$f(\lambda x, \lambda y) \Rightarrow \lambda^2 [x^2 + y^2 + xy]$

$f(\lambda x, \lambda y) = \lambda^2 \cdot f(x, y)$

$F(x,y)$ – Homo of 2nd order

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8) $F(x,y) = x + \sqrt{x^2+y^2}$



→ Homo

$x \to \lambda x,\ y \to \lambda y$

$F(\lambda x, \lambda y) = (\lambda x) + \sqrt{(\lambda x)^2 + (\lambda y)^2}$

$\Rightarrow \lambda x + \sqrt{\lambda^2(x^2+y^2)}$

$\Rightarrow \lambda x + \lambda\sqrt{x^2+y^2}$

$F(\lambda x, \lambda y) = \lambda\left[x + \sqrt{x^2+y^2}\right]$

$f(\lambda x, \lambda y) = \lambda \cdot F(x,y)$

$f(x,y)$ — Homo

9) $F(x,y) = \dfrac{y + \sqrt{x^2+y^2}}{x}$ (1, 1, 1)

$\dfrac{(1)}{(1)} - \dfrac{(1)}{(1)}$ → zero'th order

9) $F(x,y) = \left(\dfrac{\lambda x}{\lambda y}\right) + \left(\dfrac{\lambda y}{\lambda x}\right)^2 + 3\left(\dfrac{\lambda x}{\lambda y}\right)^8\left(\dfrac{\lambda y}{\lambda x}\right)^5 + 5$

Homo

Solving Rule – Homogeneous DE – dy/dx type

$$\frac{dy}{dx} = F(x,y) = F\left(\frac{y}{x}\right) \quad \text{---} (1)$$

(I) Let $\frac{y}{x} = v \Rightarrow y = vx$

(II) diff both side.

$$\frac{dy}{dx} = v + x\frac{dv}{dx}$$

(III) Substitute $\frac{dy}{dx}$ In Eqn (1)

(IV) We get VES Eqn

(V) $v = \left(\frac{y}{x}\right)$ In the last

$$\frac{dx}{dy} = F(x,y) = F\left(\frac{x}{y}\right) \quad (1)$$

(I) Let $\frac{x}{y} = v \Rightarrow x = vy$

(II) $\frac{dx}{dy} = v + y\cdot\frac{dv}{dy}$

(III) Substitute In (1)

(IV) We get VES Eqn

(V) In the last $v = \left(\frac{x}{y}\right)$

SSR SIR

Question – CUET 2025 PYQs

#Q. The particular solution of the differential equation $\left\{x \sin^2\left(\frac{y}{x}\right) - y\right\} dx + x dy = 0$, $y = \frac{\pi}{4}$ when $x = 1$ is

A $x = e^{\tan\frac{y}{x}+1}$

B $x = e^{\tan\frac{y}{x}-1}$

C $x = e^{\cot\frac{y}{x}-1}$

D $x = e^{\cot\frac{y}{x}+1}$

$x dy = \left[y - x \cdot \sin^2\left(\frac{y}{x}\right)\right] dx$

$\frac{dy}{dx} = \left(\frac{y}{x}\right) - \sin^2\left(\frac{y}{x}\right)$

$y = vx$

$\frac{dy}{dx} = v + x\frac{dv}{dx}$

$v + x\frac{dv}{dx} = v - \sin^2 v$

$\int \frac{dv}{-\sin^2 v} = \int \frac{dx}{x}$

$\int -\operatorname{Cosec}^2 v \, dv = \log|x| + C$

$\cot v = \log|x| + C$

$\cot\left(\frac{y}{x}\right) = \log|x| + C$

at $y = \frac{\pi}{4}$, $x = 1$

$\cot\left(\frac{\pi}{4}\right) = \log|1| + C$

0

$C = 1$

$\cot\left(\frac{y}{x}\right) = \log|x| + 1$

$\log|x| = \cot\left(\frac{y}{x}\right) - 1$

$x = e^{\cot\left(\frac{y}{x}\right) - 1}$

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Question – CUET 2025 PYQs

#Q. Which one of the following equations is a homogeneous differential equation?

A $(4x + 5)dy + (3y - 4)dx = 0$

B $x^2 y dx - (x^3 + y^3)dy = 0$

C $(x^3 + 2y^2 x)dy + 2xydx = 0$

D $x^2 dy - y^2 dx = \sqrt{x^2 + y^2}dx$

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Question – CUET 2025 PYQs

#Q. The general solution of the differential equation $x\left(\frac{dy}{dx}\right) = y + x\,tan\left(\frac{y}{x}\right)$ is:

A $tan\left(\frac{y}{x}\right) = cx$, where c is an arbitrary constant

B $sin\left(\frac{y}{x}\right) = cx$, where c is an arbitrary constant

C $sin\left(\frac{x}{y}\right) = cx$, where c is an arbitrary constant

D $sin\left(\frac{y}{x}\right) = cx^2$, where c is an arbitrary constant

$x\left(\frac{dy}{dx}\right) = y + x\cdot\tan\left(\frac{y}{x}\right)$

$\frac{dy}{dx} = \left(\frac{y}{x}\right) + \tan\left(\frac{y}{x}\right)$ — (1)

(I) $\frac{y}{x} = v \Rightarrow y = vx$

(II) $\frac{dy}{dx} = v + x\frac{dv}{dx}$ put in Eq (1)

$$v + x\frac{dv}{dx} = v + \tan v$$

$$\int \frac{dv}{\tan v} = \int \frac{dx}{x}$$

$$\int \cot v = \log|x| + c$$

$$\log|\sin v| = \log|x| + \log|c|$$

$$\log|\sin v| = \log|cx|$$

$$\sin v = cx$$

$$\sin\left(\frac{y}{x}\right) = cx$$ — (ans)

Question – CUET 2025 PYQs

#Q. The solution of the differential equation $\frac{dy}{dx} = \frac{x+y}{x-y}$ is:

$\frac{dy}{dx} = \frac{1+(y/x)}{1-(y/x)}$

$y = vx$

$\frac{dy}{dx} = v + x\frac{dv}{dx}$

A $y = \frac{x}{2}log_e(x^2+y^2) + C$: C is an arbitrary constant

B $y = \sqrt{x^2+y^2} + C$: C is an arbitrary constant

$v + x\frac{dv}{dx} = \frac{1+v}{1-v}$

C $y = \frac{1}{2}log_e(x^2+y^2) + C$: C is an arbitrary constant

$x\frac{dv}{dx} = \frac{1+v}{1-v} - v$

$x\frac{dv}{dx} = \frac{1+v-v+v^2}{1-v}$

D $tan^{-1}\frac{y}{x} = \frac{1}{2}log_e(x^2+y^2) + C$: C is an arbitrary constant

$$\int \frac{(1-v)\,dv}{(1+v^2)} = \int \frac{dx}{x}$$

$$\int \frac{1}{1+v^2}dv - \int \frac{v\,dv}{1+v^2} = \log|x| + C$$

$$1+v^2 = t$$

$$2v\,dv = dt$$

$$v\,dv = \frac{1}{2}dt$$

$$\tan^{-1}v - \int \frac{\frac{1}{2}dt}{t} = \log|x| + C$$

$$\tan^{-1}v - \frac{1}{2}\log|t| = \log|x| + C$$

$$\boxed{\tan^{-1}(v) - \frac{1}{2}\log|1+v^2| = \log|x| + C}$$

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

$$\tan^{-1}\left(\frac{y}{x}\right) - \frac{1}{2}\left[\log\left(\frac{x^2+y^2}{x^2}\right)\right] = \log|x| + C$$

$$\tan^{-1}\left(\frac{y}{x}\right) - \frac{1}{2}\left[\log(x^2+y^2) - \log x^2\right] = \log|x| + C$$

$$\tan^{-1}\left(\frac{y}{x}\right) - \frac{1}{2}\log(x^2+y^2) + \cancel{\frac{1}{2}\log x} = \log|x| + C$$

$$\tan^{-1}\left(\frac{y}{x}\right) - \frac{1}{2}\log(x^2+y^2) + \cancel{\log|x|} = \cancel{\log|x|} + C$$

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

Question – CUET 2025 PYQs

The differential equation $\frac{dy}{dx} = F(x, y)$ will not be a homogeneous differential equation, if F(x, y) is :

A $\cos x - \sin\left(\frac{y}{x}\right)$

B $\left(\frac{y}{x}\right)$

C $\frac{x^2+y^2}{xy}$

D $\cos^2\left(\frac{x}{y}\right)$

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Question: CUET 2026 PYQs

Solution of the differential equation $y\,e^{\frac{x}{y}}\,dx + \left(y - x\,e^{\frac{x}{y}}\right)dy = 0$ **is:**
(Consider $\log\ x = \log_e x$ **)**

$$y \cdot e^{\frac{x}{y}}\,dx = \left(x\,e^{\frac{x}{y}} - y\right)dy$$

(A) $e^{\frac{x}{y}} = y + C$: **where C is an arbitrary constant**

(B) $y + e^{\frac{x}{y}} = C$: **where C is an arbitrary constant**

$$\frac{dx}{dy} = \frac{x\,e^{\frac{x}{y}}}{y\,e^{\frac{x}{y}}} - \frac{y}{e^{\frac{x}{y}}}$$

(C) $e^{\frac{x}{y}} + \log\ y = C$: **where C is an arbitrary constant**

(D) $\frac{x}{y} + \log\ y = C$: **where C is an arbitrary constant**

$$\frac{dx}{dy} = \left(\frac{x}{y}\right) - \frac{1}{e^{\left(\frac{x}{y}\right)}}$$

$$\frac{x}{y} = v$$

$$x = vy$$

$$\frac{dx}{dy} = v + y\cdot\frac{dv}{dy} = v - \frac{1}{e^v}$$

$$\int e^v\,dv = \int -\frac{dy}{y}$$

$$e^v = -\log|y| + c$$

$$e^{(x/y)} = -\log|y| + c$$

Question: CUET 2026 PYQs

Which of the following is a homogeneous differential equation ?

(A) $ydx + (x - y^2)dy = 0$

(B) $\frac{dy}{dx} + 2y \tan x = 2x$

(C) $x^2 \frac{dy}{dx} = xy - 2x^2 + y^2$

(D) $(x^3 - y^3)dx + 3xy\,dy = 0$

Question: CUET 2026 PYQs

The general solution of the differential equation $ye^{x/y}dx = (xe^{x/y} + y^2)dy$, $(y \neq 0)$ is (Where c is an arbitrary constant)

A $e^{y/x} = x + c$

B $e^{x/y} = y + c$

C $e^{x/y} = x + c$

D $e^{y/x} = y + c$

$$\frac{dx}{dy} = \frac{x e^{x/y}}{y e^{x/y}} + \frac{y^2}{y \cdot e^{x/y}}$$

$$\frac{dx}{dy} = \left(\frac{x}{y}\right) + \frac{y}{e^{x/y}}$$

$\frac{x}{y} = v$

$x = vy$

$\frac{dx}{dy} = v + y\frac{dv}{dy}$

$$v + y\frac{dv}{dy} = v + \frac{y}{e^v}$$

$$\int e^v dv = \int dy$$

$e^v = y + c$

$e^{(x/y)} = (y + c)$

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Linear Differential Equations

dy/dx
dx/dy

DE of type dy/dx

$$\left(\frac{dy}{dx}\right) + P(x)\cdot y = Q(x)$$

↳ Ist Order L.D.E

Cond^n (I) Order & Degree $\Rightarrow 1$

(II) $P(x)$ & $Q(x)$ — Is a fm of x & Const

(III) $y\left(\frac{dy}{dx}\right)$ Shouldn't Present x

Solving Rule.

(I) Integrating factor $(I.F) = e^{\int P(x)\,dx}$

(II) Sol^n Eq^n

$$y(I.F) = \int (I.F)\cdot Q(x)\,dx + C$$

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Solving Rule – DE– dx/dy type

$$\frac{dx}{dy} + P(y)\cdot x = Q(y)$$

Cond^{n} (1) $P(y)$ & $Q(y)$ — A fun of y @ Const

(2) Order & degree : 1

(3) $x\left(\frac{dx}{dy}\right)$ Should't Present

Steps (I) $I.F = e^{\int P(y)dy}$

(II) S.E

$$(x)(IF) = \int (IF)\cdot Q(y)dy + C$$

$$\frac{dy}{dx} + P(x)\cdot y = Q(x)$$

Cond^{n} (1) Order & degree : 1

(2) $P(x)$ & $Q(x)$ — fun of x @ Const

(3) $y\left(\frac{dy}{dx}\right)$ x

(I) $I.F = e^{\int P(x)dx}$

(II) S.E.

$$y*(IF) = \int (IF)\cdot Q(x)dx + C$$

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Some Calculations → Practice Se Mind Me Fit Kar lo

(I) If $P(x) = \tan x$

$$I.F = e^{\int \tan x \, dx}$$

$$I.F = e^{\log|\sec x|}$$

$$I.F = (\sec x)$$

(II) If $P(x) = \cot x$

$$I.F = e^{\int \cot x \, dx}$$

$$IF = e^{\log|\sin x|}$$

$$IF = \sin x$$

(III) If $P(x) = \frac{1}{x}$

$$IF = e^{\int \frac{1}{x} dx} = e^{\log|x|} \Rightarrow x$$

$$P(x) = \frac{a}{x}$$

$$IF = e^{\int \frac{a}{x} dx} \Rightarrow e^{a\log|x|}$$

$$\Rightarrow e^{\log x^a}$$

$$IF \Rightarrow x^a$$

Eg. $P(x) = 2/x$

$$IF = x^2$$

Eg. $P(x) = 10/x$

$$IF = x^{10}$$

(iv) $P(x) = \frac{-a}{x}$

$$IF = e^{\int -\frac{a}{x} dx}$$

$$IF = e^{-a \log|x|}$$

$$\Rightarrow e^{a \log(1/x)}$$

$$\Rightarrow e^{\log\left(\frac{1}{x^a}\right)}$$

$$\boxed{IF = \left(\frac{1}{x^a}\right)}$$

Q. $P(x) = -2/x$

$$IF = \frac{1}{x^2}$$

$P(x) = -10/x$

$$IF = \frac{1}{x^{10}}$$

Question: CUET 2026 PYQs

Match the LIST-I with LIST-II

List-I (Differential equation)	List-II (Integrating factor)
A. $\frac{dy}{dx} + 3y = e^{-2x}$	I. $\frac{1}{x}$
B. $\frac{xdy}{dx} + y = 3x^2$	II. e^{-x}
C. $\frac{xdy}{dx} - y = 3x^2$	III. x
D. $\frac{dy}{dx} - y = x$	IV. e^{3x}

Choose the correct answer from the options given below:

(A) A-IV, B-III, C-I, D-II

(B) A-III, B-IV, C-I, D-II

(C) A-II, B-III, C-IV, D-I

(D) A-I, B-II, C-III, D-IV

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Question: CUET 2026 PYQs

Match List-I with List-II

List-I (Differential equation)	List-II (Integrating factor)
A. $\frac{dx}{dy} + \frac{2x}{y} = y^2$	I. e^x
B. $\frac{dy}{dx} + y = e^{-x}$	II. $\frac{1}{\sqrt{y}}$
C. $\frac{dy}{dx} - \frac{y}{2} = x$	III. y^2
D. $\frac{dx}{dy} - \frac{1}{2}\frac{x}{y} = \sin y$	IV. $e^{-x/2}$

IF = y^2 — (III)

e^x — (I)

$e^{-x/2}$ (IV)

(II)

Choose the correct answer from the options given below:

A (A) - (III), (B) - (I), (C) - (IV), (D) - (II)

B (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

C (A) - (III), (B) - (II), (C) - (I), (D) - (IV)

D (A) - (I), (B) - (IV), (C) - (III), (D) - (II)

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Question: CUET 2026 PYQs

Integrating factor of the differential equation $x \log\ x \frac{dy}{dx} + y = 2 \log\ x$ **is equal to : (Consider** $\log\ x = \log_e x$ **)**

(A) $x \log\ x$

(B) ~~$\log\ |x|$~~

(C) e^x

(D) $\frac{1}{x}$

$IF = e^{\int \frac{dt}{t}}$

$\log|t|$

$\Rightarrow e$

$\Rightarrow t$

$\Rightarrow \log(\log x)$

$\frac{dy}{dx} + \left(\frac{1}{x \log x}\right) y = \frac{2}{x}$

$P(x) = \frac{1}{x \log x}$

$IF = e^{\int \frac{1}{x \log x} dx}$

$\log x = t$

$\frac{1}{x} dx = dt$

SSR SIR

Question: CUET 2026 PYQs

Match the LIST-I with LIST-II

List-I (Differential equations)	List-II (Integrating factor)
A. $(x+y)\frac{dy}{dx} = 1$	I. e^{-x}
B. $x\frac{dy}{dx} - y = x^2$ $P(x) = -\frac{1}{x}$ $IF = 1/x$ —(III)	II. x
C. $\frac{dy}{dx} - y = \sin x$ e^{-x} —(I)	III. $\frac{1}{x}$
D. $x\frac{dy}{dx} + \frac{y}{x} = \tan x$ $IF = x$ —(II)	IV. e^{-y}

Choose the correct answer from the options given below:

A. A - I, B - III, C - IV, D - II

B. A - I, B - II, C - IV, D - III

C. A - IV, B - I, C - III, D - II

D. A - IV, B - III, C - I, D - II

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Question: CUET 2026 PYQs

Consider the differential equation $\frac{dx}{dy} + Px = Q$, where p and Q are function of y. Then

A. Its integrating factor (I.F.) is $e^{\int P\,dy}$

B. Its integrating factor (I. F.) is $e^{\int P\,dx}$

C. Its solution is given by $x(I.F.) = \int Q(I.F.)dy + C$

D. Its solution is given by $y(I.F.) = \int Q(I.F.)dx + C$

Choose the correct answer from the options given below:

(A) B and D only

(B) B and C only

(C) A and C only

(D) A and D only

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Question: CUET 2026 PYQs

General solution of the Differential equation $\frac{dy}{dx} + ay = e^{mx}$ is

$IF = e^{ax}$

(A) $(a+m)y = e^{mx} + Ce^{-ax}$: where C is an arbitrary constant

(B) $y = e^{mx} + Ce^{-ax}$: where C is an arbitrary constant

(C) $(a+m)y = e^{mx} + C$: where C is an arbitrary constant

(D) $y \cdot e^{ax} = me^{mx} + C$: where C is an arbitrary constant

$y \cdot e^{ax} = \frac{e^{(a+m)x}}{(a+m)} + C$

$y(e^{ax}) = \int e^{ax} \cdot e^{mx}\, dx$

$\Rightarrow \int e^{(a+m)x}\, dx$

$y(a+m)e^{ax} = e^{ax} \cdot e^{mx} + C$

$y(a+m) = e^{mx} + C \cdot e^{-ax}$

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Question: CUET 2026 PYQs

General solution of the differential equation $(x + 2y^3)dy = ydx$ is (Where C is an arbitrary constant)

A $y = x(x^2 + C)$

B $yx = x^2 + C$

C $\frac{x}{y} = y + C$

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

$\frac{dy}{dx} = \frac{y}{(x+2y^3)}$

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

$\frac{dx}{dy} = \frac{x}{y} + 2y^2$

$\frac{dx}{dy} - \frac{1}{y} \cdot x = 2y^2$

$P(y) = -1/y$

$I.F = \frac{1}{y}$

Sol:

$x(1/y) = \int \frac{1}{y} \cdot 2y^2 dy + C$

$\frac{x}{y} = \frac{2y^3}{2} + C$

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

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Question: CUET 2026 PYQs

The general solution of the differential equation $\frac{dy}{dx} + y\cot x = 2\cos x$ is (Where C is an arbitrary constant)

(A) $(y + \sin x)\sin x = C$

(B) $(y + \cos x)\sin x = C$

(C) $(y - \sin x)\sin x = C$

(D) $(y - \cos x)\sin x = C$

$IF = \sin x$

$y(\sin x) = \int \sin x\,(2\cos x)\,dx$

$y(\sin x) = -\cos 2x + C$

$y(\sin x) + \frac{1}{2}\cos 2x = C$

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

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

$(y\sin x - \sin^2 x) = C$

$(y - \sin x)\sin x = C$

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Question: CUET 2026 PYQs

The integrating factor of the differential equation $y \log_e(10y).\frac{dx}{dy} + x = \frac{1}{[\log_e(10y)]^2}$, **is**

(A) $\log_e y$

(B) $\log_e(10y)$

(C) $\log_e 10$

(D) $1 + \log_e y$

$$y \cdot \log_e(10y) \cdot \frac{dx}{dy} + x = \frac{1}{[\log_e(10y)]^2}$$

$$\frac{dx}{dy} + \frac{1}{y \cdot \log_e(10y)} \cdot x = \frac{1}{y[\log_e(10y)]^3}$$

$$P(y) = \frac{1}{y \log_e(10y)}$$

$$I.F = e^{\int \frac{1}{y \log(10y)} dy}$$

$\log(10y) = t$

$\frac{1}{10y} dy = dt$

$\frac{1}{y} dy = 10\, dt$

$$I.F = e^{\int \frac{10\, dt}{t}} \quad \log|t|$$

$\Rightarrow e$

$\Rightarrow t^{10}$

$$I.F = (\log 10y)^{10}$$

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$\#$ $\because P(y) = \dfrac{1}{y \log(10y)}$

$P(y) \to \dfrac{1}{y[\log 10 + \log y]}$

$P(y) = \dfrac{1}{y[1 + \log y]}$

$IF = e^{\int \frac{1}{y(1+\log y)} dy}$

$1 + \log y = t$

$\frac{1}{y} dy = dt$

$\int \frac{dt}{t}$

$\Rightarrow e$

$\Rightarrow e^{\log t}$

$\Rightarrow t$

$\Rightarrow (1 + \log y)$

Question: CUET 2026 PYQs

The general solution of the differential equation $ydx + (x - y^3)dy = 0$ is:

$ydx = (y^3 - x)dy$

$\frac{dx}{dy} = y^2 - \frac{x}{y}$

$\frac{dx}{dy} + \frac{1}{y} \cdot x = y^2$

$P(y) = 1/y$

$IF = y$

$x(y) = \int y \cdot y^2 \, dy$

$xy = \frac{y^4}{4} + C$

(A) $xy = \frac{y^4}{4} + cx$: c is an arbitrary constant.

(B) $x = \frac{y^4}{4} + c$: c is an arbitrary constant.

(C) $xy = \frac{y^4}{4} + c$: c is an arbitrary constant.

(D) $xy = \frac{y^3}{3} + c$: c is an arbitrary constant.

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#Q. Consider the differential equation $\frac{dy}{dx} + y \tan x = \sec x$ then which of the following statements are correct?

$P(x) = \tan x$

$IF = \sec x$

(A) It is homogeneous ✗

(B) It has $\sec x$ as its integrating factor

$y(\sec x) = \int \sec x \cdot \sec x \, dx$

(C) Its general solution is $y \sec x = \tan x + c$, where C is arbitrary constant.

(D) Its degree is not defined ✗

$y(\sec x) = \tan x + c$

Choose the correct answer from the options given below:

A (A) and (D) only

C (C) and (D) only

B (B) and (C) only ✓

D (B), (C) and (D) only

Question – NCERT QUESTIONS

The general solution of a differential equation of the type

$\frac{dx}{dy} + P_1 x = Q_1$ is

(A) $y\, e^{\int P_1\, dy} = \int \left(Q_1 e^{\int P_1 dy}\right) dy + C$

(B) $y\, .\, e^{\int P_1\, dx} = \int \left(Q_1 e^{\int P_1 dx}\right) dx + C$

(C) $x\, e^{\int P_1\, dy} = \int \left(Q_1 e^{\int P_1 dy}\right) dy + C$

(D) $x\, e^{\int P_1\, dx} = \int \left(Q_1 e^{\int P_1 dx}\right) dx + C$

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Question – NCERT QUESTIONS

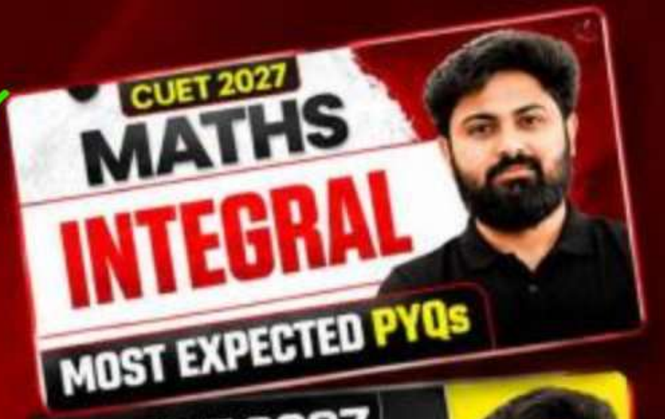
A homogeneous differential equation of the form $\frac{dy}{dx} = h\left(\frac{x}{y}\right)$ can be solved by making the substitution.

(A) $y = vx$ (B) $v = yx$ (C) $x = vy$ (D) $x = v$

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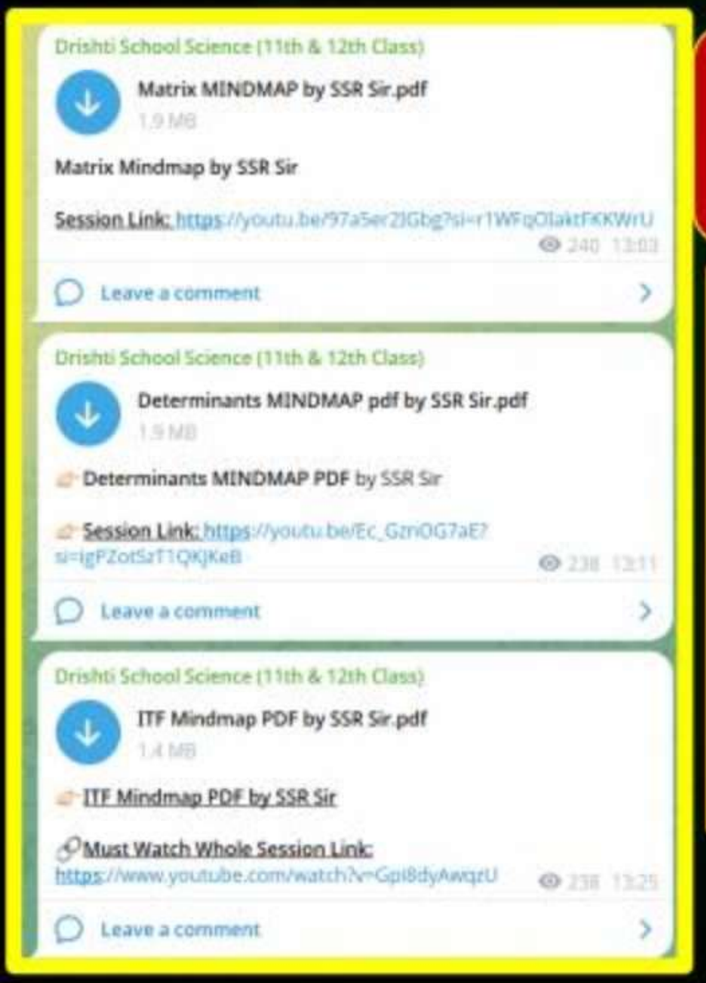
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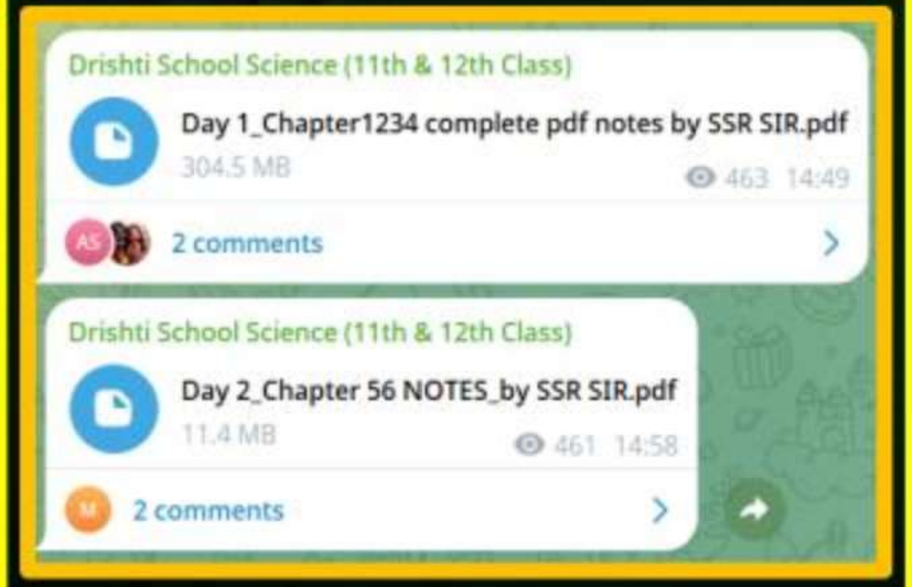
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Thank You
May God Watch Over You !!
~ SHASHANK SINGH RAJPUT (SSR)