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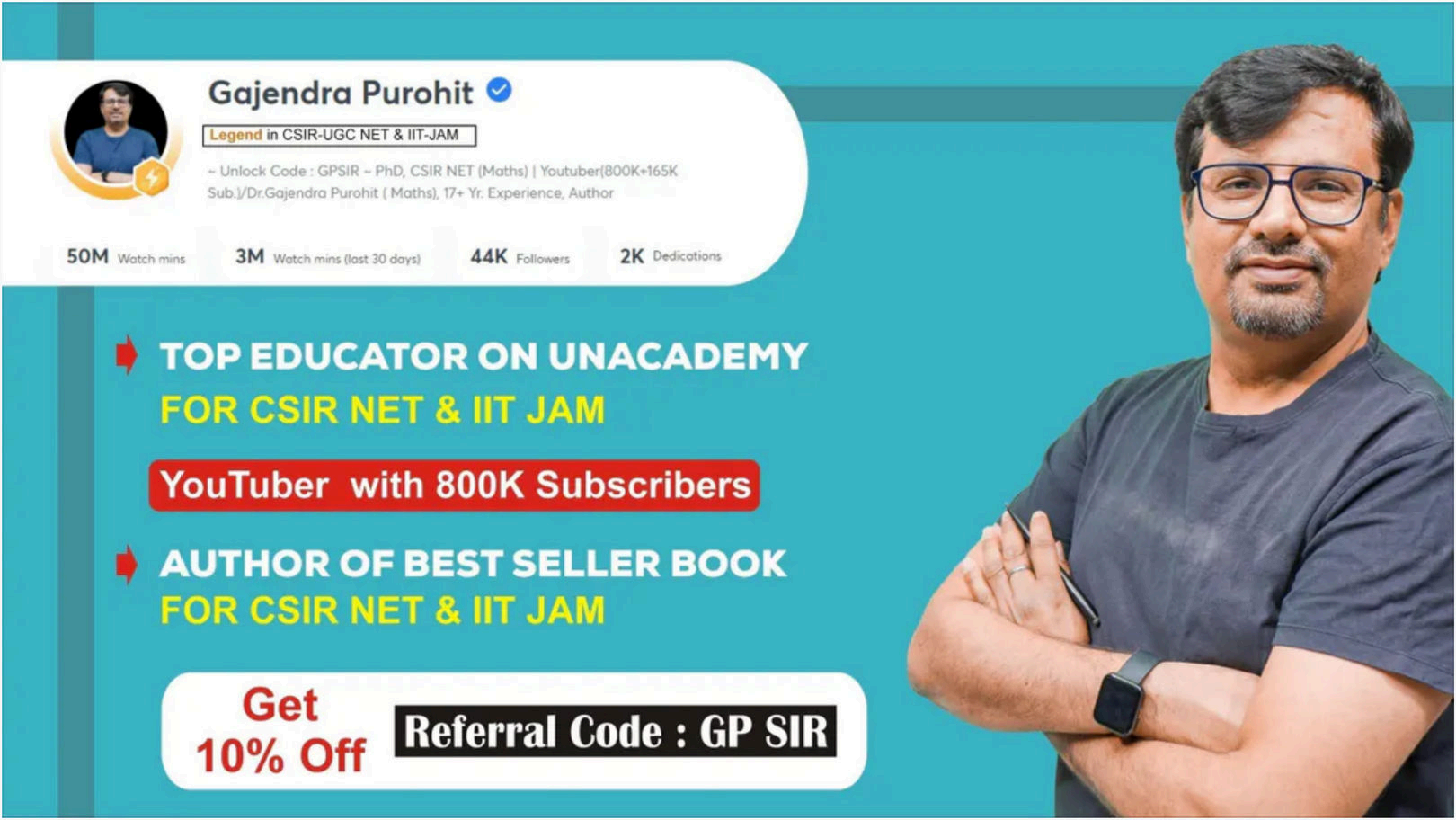
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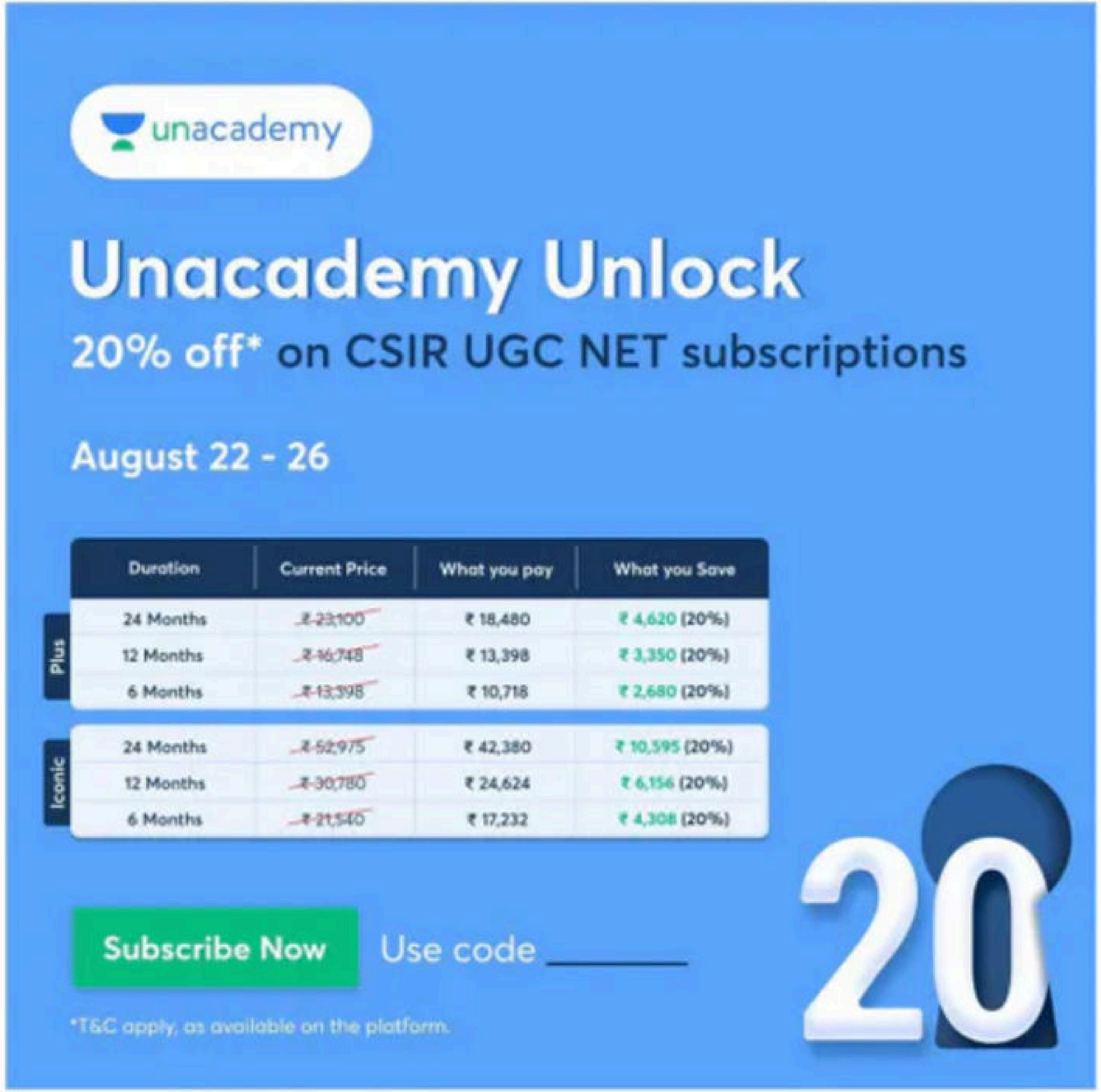
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Particular Integral (P.I.)

If n^{th} order linear differential equation with constant coefficient is $f(D)y = Q$ Then Particular Integral is given by $\dfrac{Q}{f(D)}$

$\dfrac{1}{f(D)}$ is an operator so $\dfrac{Q}{D} = \int Q dx$; $\dfrac{Q}{D^2} = \int\left(\int Q dx\right)dx$; $DQ = \dfrac{d}{dx}Q$

Method of Evaluation (P.I.)

Case 1: When $Q = e^{ax}$, where a is any constant

$$\frac{e^{ax}}{f(D)} = \frac{e^{ax}}{f(a)}; \text{provided } f(a) \neq 0$$

If $f(a) = 0$ then P.I. $\dfrac{e^{ax}}{(D-a)^r g(D)} = \dfrac{x^r}{r!.g(a)}e^{ax}$

Case 2: When $Q = \sin ax$ or $\cos ax$, where a is any constant

$$\frac{\sin ax}{f(D^2)} = \frac{\sin ax}{f(-a^2)}; \text{provided } f(-a^2) \neq 0$$

and $$\frac{\cos ax}{f(D^2)} = \frac{\cos ax}{f(-a^2)}; \text{provided } f(-a^2) \neq 0$$

(i) If $f(-a^2) = 0$ then

P.I.

$$\frac{\sin ax}{f(D^2)} = \frac{x}{f'(D^2)} \sin ax = \frac{x}{f'(-a^2)} \sin ax; \text{provided } f'(-a^2) \neq 0$$

(ii) If $f'(-a^2) = 0$ then

P.I. $\dfrac{\sin ax}{f(D)} = \dfrac{x^2}{f''(-a^2)} \sin ax$; provided $f''(a) \neq 0$ and so on

Case 3: When $Q = x^m$, where m being a positive integer

$$\frac{x^m}{f(D)} = [f(D)]^{-1} x^m$$

Use formula

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \ldots..$$

Q.1. The solution of Differential following differential equation $y''+4y'+4y=x^2, y(0)=1, y(1)=1$ is

(a) y(x) = 1

(b) y(x) = 0

(c) $y(x)=\left(\frac{5}{8}+\frac{7}{8}e^2x-\frac{5}{8}x\right)e^{-2x}+\frac{1}{4}\left(x^2-2x+\frac{3}{2}\right)$

(d) $y(x)=2\cos 4x+5\sin 4x$

Q2. The particular integral of the differential equation $y'' + y' + 3y = 5\cos(2x+3)$ is

(a) $2\cos(2x+3) - \sin(2x+3)$

(b) $2\sin(2x+3) + \cos(2x+3)$

(c) $\sin(2x+3) - 2\cos(2x+3)$

(d) $2\sin(2x+3) - \cos(2x+3)$

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Q.3. The solution of differential equation $y'' - y' - 2y = 3e^{2x}$

where $y(0) = 0$ and $y'(0) = -2$ is

(a) $y = e^{-x} - e^{2x} + xe^{2x}$

(b) $y = e^{x} - e^{-2x} - xe^{2x}$

(c) $y = e^{-x} + e^{2x} + xe^{2x}$

(d) $y = e^{x} - e^{-2x} + xe^{2x}$

Q4. The solution of the differential equation

$$\frac{d^2y}{dx^2}-\frac{dy}{dx}-2y=3e^{2x} \text{ where} y(0)=0 \text{ and}$$

$y'(0)$ = -2 is

(a) $y=e^{-x}-e^{2x}+xe^{2x}$

(b) $y=e^{-x}-e^{-2x}-xe^{2x}$

(c) $y=e^{-x}+e^{2x}+xe^{2x}$

(d) $y=e^{-x}-e^{-2x}+xe^{2x}$

Q5. Consider the following second order differential equation

$$y'' - 4y' + 3y = 2t - 3t^2$$

The particular solution of the differential equation is

(a) $-2 - 2t - t^2$ (b) $-2t - t^2$

(c) $2t - t^2$ (d) $-2 - 2t - 3t^2$

Q6. The solution of the differential equation for $y(t): \frac{d^2y}{dt^2} - y = 2cosh(t)$, subject to the initial conditions: $y(0)=0 \; and \; \left.\frac{dy}{dt}\right|_{t=0} = 0$ is:

(a) $\frac{1}{2}cosh(t) + t\,sinh(t)$

(b) $-sinh(t) + t\,cosh(t)$

(c) $t\,cosh(t)$

(d) $t\,sinh(t)$


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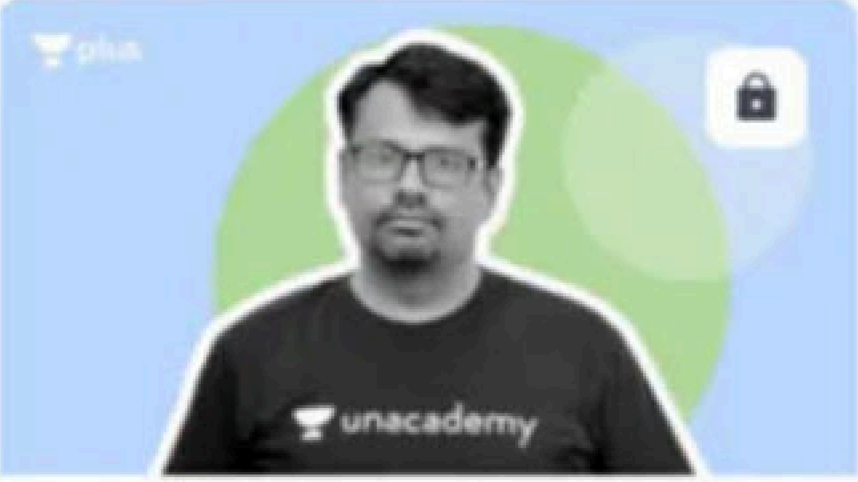

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Educator highlights

- Works at **Pacific Science College**
- Studied at **M.Sc., NET, PhD(Algebra), MBA(Finance), BEd**
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