

ISC COACHING CENTRE



**EXPERT TUITION FROM
EXPERIENCED TEACHERS**

Class IV-X *English, Maths,
Science & Social Science*
Class XI-XII

**English, Maths, Accountancy, Economics,
I.p, C.S, Business Studies, History,
Pol. Science, History, Geography**

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|-----------------------|-------------------|-----------------|
| - Class Notes | - Pre-Board Paper | - Board Papers |
| - Important Questions | - Assignmenta | - Mcq Questions |
| - Test papers | - Sample papers | - Short Notes |

**Branch 1:-
C-20, Bunglow Road,
Adarsh Nagar**

**Branch 2:-
ISC, Near Labour
Chowk, Adarsh Nagar**

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Class XII Maths Differentiation assignment 3

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Proving Questions

Q1. If $x^m y^n = (x+y)^{m+n}$, prove $\frac{d^2y}{dx^2} = 0$

Q2. If $e^y(x+1)=1$, show $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$

Q3. If $y = x^x$, prove $\frac{d^2y}{dx^2} - \frac{1}{y} \left(\frac{dy}{dx}\right)^2 - \frac{y}{x} = 0$

Q4. If $y = 2(\cos(\log x) + 3 \sin(\log x))$, prove $x^2 y'' + x y' + y = 0$

Q5. If $x = \sin t$, $y = \sin pt$. Prove $(1-x^2)y'' - x y' + p^2 y = 0$

Q6. If $x = a \cos \theta + b \sin \theta$, $y = a \sin \theta - b \cos \theta$

Q7. $y = e^{m \sin^{-1} x}$, show that $(1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - m^2 y = 0$

Q8. $y = (x + \sqrt{1+x^2})^n$, show

$$(1+x^2)y'' + xy' = n^2 y$$

Q9. $y = A e^{mx} + B e^{nx}$

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

Q10. $y = \log[x + \sqrt{x^2 + a^2}]$, show that

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

Q11. $y = x \log\left(\frac{x}{a+bx}\right)$, prove that

$$x^3 \frac{d^2 y}{dx^2} = \left[x \frac{dy}{dx} - y \right]^2$$

Q12. $x = \tan\left(\frac{1}{a} \log y\right)$, show that

$$(1+x^2) y'' + (2x-a) y' = 0$$

Q13. If $x = \cos \theta$ and $y = \sin^3 \theta$, prove.

$$y \frac{d^2 y}{dx^2} + \left(\frac{dy}{dx} \right)^2 = 3 \sin^2 \theta (5 \cos^2 \theta - 1)$$

Q14. If $y = \sin^{-1} x$, show that

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

Q15. $y = (\tan^{-1} x)^2$, show that

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

Q16 $y = 3 \cos(\log x) + 4 \sin(\log x)$, show $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = 0$

Q17 $y = \operatorname{cosec}^{-1} x$, show $x(x^2 - 1)y'' + (2x^2 - 1)y' = 0$

Q18 $y = (\cot^{-1} x)^2$, show $(x^2 + 1)^2 y'' + 2x(x^2 + 1)y' = 2$

Q19 $y = 3e^{2x} + 2e^{3x}$, prove $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} + 6y = 0$

Q20 $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$, show that $(1-x^2)y'' - 3xy' - y = 0$

Q21 $y = e^x (\sin x + \cos x)$, prove $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 2y = 0$

Q22 $y = e^x \sin x$, prove $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 2y = 0$

Q23 If $x = a(\cos \theta + \theta \sin \theta)$ & $y = a(\sin \theta - \theta \cos \theta)$
show $\frac{d^2 y}{dx^2} = \frac{1}{a} \left(\frac{\sec^3 \theta}{\theta} \right)$

Q24 $y = x^x$, prove $\frac{d^2 y}{dx^2} - \frac{1}{y} \left(\frac{dy}{dx} \right)^2 - \frac{y}{x} = 0$

Q25 $y = \frac{\log x}{x}$, show $\frac{d^2 y}{dx^2} = \frac{2 \log x - 3}{x^3}$