**F.Sc.(Part-2)**
*Differentiation*
**CH # 02**

# IMPORTANT—FORMULAS

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| **1.** $\frac{d}{dx}(c)=0$ , 'c' is any constant | **2.** $\frac{d}{dx}(x)=1$ |
| **3.** $\frac{d}{dx}(x^n)=nx^{n-1}$ (The Power Rule) | **4.** $\frac{d}{dx}\ell nx=\frac{1}{x}$ |
| **5.** $\frac{d}{dx}e^x=e^x$ | **6.** $\frac{d}{dx}e^{f\,x}=e^{f\,x}.f'\,x$ |
| **7.** $\frac{d}{dx}\log_a x=\frac{1}{x\ell na}$ | **8.** $\frac{d}{dx}a^x=a^x\ell na$ |
| **9.** $\frac{d}{dx}\sin x=\cos x$ | **10.** $\frac{d}{dx}\cos x=-\sin x$ |
| **11.** $\frac{d}{dx}\tan x=\sec^2 x$ | **12.** $\frac{d}{dx}\cot x=-\operatorname{cosec}^2 x$ |
| **13.** $\frac{d}{dx}\sec x=\sec x\tan x$ | **14.** $\frac{d}{dx}\operatorname{cosec} x=-\operatorname{cosec} x\cot x$ |
| **15.** $\frac{d}{dx}\sin^{-1}x=\frac{1}{\sqrt{1-x^2}}$ | **16.** $\frac{d}{dx}\cos^{-1}x=\frac{-1}{\sqrt{1-x^2}}$ |
| **17.** $\frac{d}{dx}\tan^{-1}x=\frac{1}{1+x^2}$ | **18.** $\frac{d}{dx}\cot^{-1}x=\frac{-1}{1+x^2}$ |
| **19.** $\frac{d}{dx}\sec^{-1}x=\frac{1}{x\sqrt{x^2-1}}$ | **20.** $\frac{d}{dx}\operatorname{cosec}^{-1}x=\frac{-1}{x\sqrt{x^2-1}}$ |
| **21.** $\frac{d}{dx}\sinh x=\cosh x$ | **22.** $\frac{d}{dx}\cosh x=\sinh x$ |
| **23.** $\frac{d}{dx}\tanh x=\operatorname{sech}^2 x$ | **24.** $\frac{d}{dx}\coth x=-\operatorname{cosech}^2 x$ |
| **25.** $\frac{d}{dx}\operatorname{sech} x=-\operatorname{sech} x\tanh x$ | **26.** $\frac{d}{dx}\operatorname{cosech} x=-\operatorname{cosech} x\coth x$ |
| **27.** $\frac{d}{dx}\sinh^{-1}x=\frac{1}{\sqrt{1+x^2}}$ | **28.** $\frac{d}{dx}\cosh^{-1}x=\frac{1}{\sqrt{x^2-1}}$ |
| **29.** $\frac{d}{dx}\tanh^{-1}x=\frac{1}{1-x^2}$ | **30.** $\frac{d}{dx}\coth^{-1}x=\frac{1}{1-x^2}$ |
| **31.** $\frac{d}{dx}\operatorname{sech}^{-1}x=\frac{-1}{x\sqrt{1-x^2}}$ | **32.** $\frac{d}{dx}\operatorname{cosech}^{-1}x=\frac{-1}{x\sqrt{1+x^2}}$ |

**33.** $\frac{d}{dx}\left[f(x)g(x)\right]=\left(\frac{d}{dx}f(x)\right)g(x)+f(x)\left(\frac{d}{dx}g(x)\right)$ {The Product Rule}

**34.** $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right]=\frac{g(x)\left(\frac{d}{dx}f(x)\right)-f(x)\left(\frac{d}{dx}g(x)\right)}{\left[g(x)\right]^2}$ {The Qoutient Rule}

**35.** $fog'\,x=f'\left[g\;x\;\right].g'\,x$ OR $\frac{dy}{dx}=\frac{dy}{dt}\times\frac{dt}{dx}$ The Chain Rule