SELF ASSESSMENT TEST -4

CLASS 10+2

Diff. of infinite series, parametric functions,higher order.

1. If $y = x^{x^{x^{\cdots\cdots\infty}}}$ find $\frac{dy}{dx}$
2. If y = $\sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \ldots\ldots\ldots\ldots\infty}}}$ prove that $\frac{dy}{dx} = \frac{1}{x(2y-1)}$
3. If y = $\sqrt{\cos x + \sqrt{\cos x + \sqrt{\cos x + \ldots\ldots\ldots\ldots\infty}}}$ prove that $\frac{dy}{dx} = \frac{\sin x}{1-2y}$
4. If y = $\sin x^{\sin x^{\sin x^{\cdots\cdots\cdots\cdots\infty}}}$ prove $\frac{dy}{dx} = \frac{y^2 \cot x}{1 - y \log \sin x}$
5. If y = $e^{x+e^{x+e^{x+\cdots\cdots\cdots\infty}}}$ prove $\frac{dy}{dx} = \frac{y}{1-y}$
6. Find $\frac{dy}{dx}$, x = a(θ – sin θ) , y = a (1 + cos θ)
7. Find $\frac{dy}{dx}$, x = a(cos θ + t sin θ) , y = a (sin θ – θ cos θ)
8. Find $\frac{dy}{dx}$, x = a sin θ , y = a (cos θ + log tan θ/2)
9. Find $\frac{dy}{dx}$ x = $\frac{3at}{1+t^2}$, y = $\frac{3at^2}{1+t^2}$
10. Diff. $x^2 e^{3x}$ w.r.t. $(\log x)^2$
11. Diff. $\log(xe^x)$ w.r.t. x logx
12. Diff. $\tan^{-1}\left(\frac{3x - x^3}{1-3x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$
13. Diff. $\sin^{-1}\left(\frac{2x}{\sqrt{1+x^2}}\right)$ w.r.t. $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$

14.If y = $Ae^{mx} + Be^{nx}$ prove $\frac{d^2y}{d^2x} - (m+n)\frac{dy}{dx} + mny = 0$

15. If y = a sin (logx) + b cos (logx), then prove $x^2\frac{d^2y}{d^2x} + x\frac{dy}{dx} + y = 0$

16.If x = tan ($\frac{1}{a}$ logy) , prove $(1+x^2)\frac{d^2y}{d^2x} + (2x-a)\frac{dy}{dx} = 0$

17.If y = $\tan^{-1}x$, prove $(1+x^2)y_2 + 2x\,y_1 = 0$

18. If y = $\left(\sin^{-1}x\right)^2$, prove $(1-x^2)y_2 - x\,y_1 - 2 = 0$

19.If y = $e^{a\cos^{-1}x}$, prove $(1-x^2)y_2 - x\,y_1 - a^2 = 0$

20. If y = $\sin\left(2\cos^{-1}x\right)$, prove $(1-x^2)y_2 - x\,y_1 + 4y = 0$

21. If y = $e^{ax}\sin bx$, prove $y_2 - 2a\,y_1 + (a^2+b^2)y = 0$

22. If x = a (t + sint) , y = a (1 – cost) find y_2 at t = $\frac{\pi}{2}$

23. If x = a(cost +t sint), y = a(sint – tcost) find y_2 at t = $\frac{\pi}{4}$

24.If x = 3 sint – sin3t , y = 3cost – cos3t find y_2 at t = $\frac{\pi}{3}$

25. If y = $\log\left(x + \sqrt{1+x^2}\right)$ prove that $(1+x^2)y_2 + x\,y_1 = 0$