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CREATING AND SETTING EXAMPLES FOR FUTURE...

XII MATHS TEST ON DERIVATIVES AND ITS APPLICATION

M.M. : 50 **TIME : 90 MIN.**

Q1. Find dy/dx if $y = \tan^{-1}\left(\frac{1-\cos 2x}{\sin 2x}\right)$ **1**

Q2. find the value of a and b if the function $f(x) = \begin{cases} \frac{1-\cos 4x}{x^2}, x<0 \\ a, x=0 \\ \frac{b\sqrt{x}}{\sqrt{(16+\sqrt{x})}-4}, x>0 \end{cases}$ is continous at x = 0 **4**

Q3. Find dy/dx if a) y= $\sqrt{\tan\sqrt{x}}$ b) $y = \sqrt{\frac{(x-1)(x-2)}{(x-3)(x-4)(x-5)}}$ **(1+3)**

Q4. a) if cos y = $x\cos(a+y)$, then prove $\frac{dy}{dx} = \frac{\cos^2(a+y)}{\sin a}$

b) Prove $\frac{d}{dx}\left\{\frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} = \sqrt{a^2-x^2}\right.$ **(2+2)**

Q5. If y = a(sin t - t cos t) & x = a (cos t + t sin t) find $\frac{d^2y}{dx^2}$ **4**

Q6. If $y = \left\{x+\sqrt{x^2+1}\right\}^m$, then prove $(x^2+1)y_2 + xy_1 - m^2y = 0$

Q7. Differenti ate $\cot^{-1}\left\{\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right\}$ w.r.t. $\cos^{-1}x^2$ **4**

Q8. Show that the normal at any point θ to the curve x = a cos θ + a θ + sin θ; y=a sin θ -a θ cos θ is at a constant distance from origin. **4**

Q9. Show that the curves $2x = y^2$ and 2xy = k cut at right angles if $k^2 = 8$. **4**

Q10. For the curve $y = 4x^3 - 2x^5$ find all the points at which the tangent passes through origin. **4**

Q11. Find the intervals in which the function f given by f(x) $\frac{4\sin x - 2x - x\cos x}{2+\cos x}$ on (0.2π) is strictly increasing or strictly decreasing . **6**

Q12. If $(x-a)^2 + (y-b)^2 = c^2$, then prove $\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}}}{\frac{d^2y}{dx^2}} = -c$ **6**