DPP - 025

M.M.:40 **www.mathstudy.in** **Time : 45 Mints**

1. If $y=\frac{sin^2x}{1+cotx}+\frac{cos^2x}{1+tanx}$ then $\frac{dy}{dx}$ at x $=\frac{\pi}{4}$ is
   (a) 0
   (b) -1
   (c) 1
   (d) 2
2. The value of $cot(\frac{1}{2}(3\pi-tan^{-1}(\frac{1}{3})))$ equals
   (a) $(10+\sqrt{3})^{-1}$
   (b) $(3+\sqrt{10})^{-1}$
   (c) $(3+\sqrt{10})$
   (d) $(10+\sqrt{3})$
3. $\lim_{x\to-1^+}\frac{sin^{-1}(\sqrt{\pi}-\sqrt{cos^{-1}x})}{\sqrt{1-x^2}}$ equals
   (a) 0
   (b) 1
   (c) $\frac{1}{2\sqrt{\pi}}$
   (d) $\frac{1}{\sqrt{\pi}}$
4. If $f(x)=3+(1+7^{\frac{1}{1-x}})^{-1}$ then
   (a) $\lim_{x\to1^-}f(x)=4$
   (b) $\lim_{x\to1^+}f(x)=3$
   (c) $\lim_{x\to1^+}f(x)=5$
   (d) f has irremovable discontinuity at x = 1
5. If f(X) $=3x^{10}-7x^8+5x^6-21x^3+3x^2-7$ then the value of $\lim_{x\to1^+}\frac{f(1-h)-f(1)}{h^3+3h}$ is
   (a) $\frac{-53}{3}$
   (b) $\frac{-22}{3}$
   (c) $\frac{53}{3}$
   (d) $\frac{22}{3}$
6. If the triangle formed by the lines $x^2-y^2=0$ and the line $lx+2y=1$ is isosceles then $l=$
   (a) 1
   (b) 2
   (c) 3
   (d) 0
7. Using L'Hospital's rule or otherwise evaluate the limit, $\lim_{x\to0}\frac{(e^{2x^2}-1-2x^2)(cosx-1)}{(sin3x-ln(1+3x))x^4}$
8. Evaluate the limit $\lim_{x\to0}\frac{e^x-ln(x+e)}{e^x-1}$ Use of L'Hospital's rule or surd expansion not allowed.
9. Find all real numbers t satisfying the equation $(3^t-9)^3+(9^t-3)^3=(9^t+3^t-12)^3$
10. Find $g'(3)$ if $g(x)=x.2^{h(x)}$ where h(3) =-2 and $h'(3)=5$

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11. Find the value of expression $\frac{2}{log_4(2000)^6}+\frac{3}{log_5(2000)^6}$
12. Let f(x) $= acos(x+1)+bcos(x+2)+cos(x+3)$ where a,b,c are real . Given that f(x) has at least two zeros in the interval $(0,\pi)$ find all its real zeroes.
13. Calculate $sin(\frac{1}{4}arcsin\frac{\sqrt{63}}{8})$
14. If θ is eliminated from the equation $acos\theta+bsin\theta=c$ and $acos^2\theta+bsin^2\theta=c$ show that the eliminant is $(a-b)^2(a-c)(b-c)+4a^2b^2=0$
15. A triangle has side lengths 18,24 and 30 Find the area of the triangle whose vertices are the incentre circumcentre and centroid of the triangle.

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16. Find the real solutions to the system of equations
    $log_{10}(2000xy)-log_{10}x.log_{10}y=4$
    $log_{10}(2yz)-log_{10}y.log_{10}z=1$
    and $log_{10}(zx)-log_{10}z.log_{10}x=0$
17. Prove that , $cos^{-1}[1-\frac{1-cosx}{12cosx+13}]=\pi-2cot^{-1}(\frac{1}{5}tan\frac{x}{2})$ where $x\in(0,\pi)$
18. Compute the value of $cos(\frac{1}{4}tan^{-1}\frac{24}{7})$
19. If g(x) $= x^3+px^2+qx+r$ where p,q and r are integers. If g(0) and g (-1) are both odd, then prove that the equations g(x) =0 cannot have three integral roots.
20. Sum the series $cot^{-1}(2a^{-1}+a)+cot^{-1}(2a^{-1}+3a)+cot^{-1}(2a^{-1}+6a)+cot^{-1}(2a^{-1}+10a)+\cdots$ to n terms Also find the sum of infinite terms. $(a>0)$
21. Let $x=\frac{\sum_{n=1}^{44}cosn^\circ}{\sum_{n=1}^{44}sinn^\circ}$ find the greatest integer that does not exceed 100x