DPP - 017

M.M.:34 **www.mathstudy.in** **Time : 50 Mints**

1. $tan\theta = \dfrac{1}{2+\frac{1}{2+\frac{1}{2+\cdots\infty}}}$ where $\theta \in (0, 2\pi)$ find the possible value of θ [2]

2. Find the sum of the solutions of the equation $2e^{2x} - 5e^x + 4 = 0$ [2]

3. Suppose that x and y are positive numbers for which $log_9 x = log_{12} y = log_{16}(x + y)$ If the value of $\dfrac{y}{x} - 2cos\theta$, where $\theta \in (0, \dfrac{\pi}{2})$ find θ [2]

4. Using L'Hospitals or otherwise , evaluate the following limit $\lim\limits_{x\to 0^+}(\dfrac{[1^2(sinx)^x] + [2^2(sinx)^x] + \cdots + [n^2(sinx)^x]}{n^3})$ where [.] denotes the greatest integer function.

5. Consider $f(x) = \dfrac{1}{\sqrt{b-a}} \dfrac{\sqrt{\frac{b-a}{a} sin2x}}{\sqrt{1 + (\sqrt{\frac{b-a}{a}} sinx)^2}} \sqrt{a + btan^2 x}$, for $b > a > 0$ and the functions g(x) and h(x) are defined, such that g(x) $=[f(x)] - \{\dfrac{f(x)}{2}\} \& h(x) = sgn(f(x))$ for $x \in$ domain of f, otherwise g(x) =0 =h(x) for $x \notin$ domain of f, where [x] is the greatest integer function of x and $\{x\}$ is the fractional part of x. Then discuss the continuity of g and h at x $= \dfrac{\pi}{2}$ and x =0 respectively.

6. $\int \dfrac{x^2 tan^{-1} x}{(1 + x^2)^{5/2}} dx$

7. Using substitution only, evaluate $\int cosec^3 x dx$

DPP - 018

M.M.:42 **www.mathstudy.in** **Time : 55 Mints**

1. If $sinA = \frac{12}{13}$ Find the value of $tan\frac{A}{2}$
2. The straight line $\frac{x}{a}+\frac{y}{b} = 1$ cuts the x axis and the y axis in A and B respectively and a straight line perpendicular to AB cuts them in P and O respectively. Find the locus of the point of intersection of AQ and BP.
3. If $\frac{tan\theta}{tan\theta - tan3\theta} = \frac{1}{3}$ find the value of $\frac{cot\theta}{cot\theta - cot3\theta}$
4. If a Δ ABC is formed by the lines 2x+y-3=0, x -y+5=0 and 3x-y+1=0 then obtain a cubic equation whose roots are the tangent of the interior angles of the triangle.
5. Integrate $\int \frac{dx}{(a^2 - tan^2x)\sqrt{b^2 - tan^2x}}(a > b)$
6. Let $\frac{d}{dx}(x^2y) = x - 1$ where $x \neq 0$ and $y = 0$ when x =1. Find the set of values of x for which $\frac{dy}{dx}$ is positive.

DPP - 019

M.M.:48 **www.mathstudy.in** **Time : 70 Mints**

1. Two circles of radii R and r are externally tangent. Find the radius of the third circle which is between them and touches those circles and their external common tangent in terms of R and r.
2. Let a matrix A be denoted as A =diag($5^x, 5^{5^x}, 5^{5^{5^x}}$) then compute the value of the integral $\int (detA)dx$
3. Evaluate $\int \frac{-x}{1+x}\frac{dx}{\sqrt{x + x^2 + x^3}}$
4. If three distinct points, $(\frac{a^3}{a-1}, \frac{a^2-3}{a-1}), (\frac{b^3}{b-1}, \frac{b^2-3}{b-1}), (\frac{c^3}{c-1}, \frac{c^2-3}{c-1})$ are collinear then show that $abc + 3(a + b + c) = ab + bc + ca$
5. Integrate $\int \sqrt[3]{tanx}dx$