Questions For CRT - 09

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Max. Marks : **40**
Time : **60 Minutes**
Topics : **Application Of Derivatives (Maxima-Minima, T & N, Inc. & Dec. Functions)**

▪ **Advanced MATH Classes**, 1st Floor (Above Master Of Burgers), Opp. HP Petrol Pump, Thana Road, Najafgarh.

Q01. **(a)** If $f(x)=\dfrac{1}{4x^2+2x+1}$ then find its maximum value.

(b) Find the equation of tangent to the curve $y=1-e^{x/2}$ at the point of intersection with y-axis.

(c) The equation of normal to the curve y = tan x at (0, 0) is ________.

(d) Find the points on the curve $y^3+3x^2=12y$, where the tangents are vertical.

(e) For what value of a, f (x) = a (x + sin x) is an increasing function? [$2\times5=10$

Q02. Show that the curves $2x=y^2$ and $2xy=k$ cut at the right angles, if $k^2=8$.

Q03. For the curve $y=4x^3-2x^5$, find all the points at which the tangent passes through origin.

Q04. If performance of the students 'y' depends on the no. of hours 'x' of hard work done per day is given by the relation $y=4x-\dfrac{x^2}{2}$.

Find the number of hours, the students work to have best performance. [$4\times3=12$

Q05. Find the angle of intersection of the curves $y^2 = 4ax$ and $x^2 = 4by$.

Q06. Tangents are drawn to the hyperbola $\dfrac{x^2}{9}-\dfrac{y^2}{4}=1$, parallel to the straight line $2x-y=1$. Find the points of contact of the tangents on the hyperbola.

Q07. An isosceles triangle of vertical angle 2θ is inscribed in a circle of radius a. Show that the area of triangle is maximum when θ = π/6.

OR Find the area of greatest rectangle that can be inscribed in $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$. [$6\times3=18$

Test held on : 04 June, 2017

Solutions Of CRT-09

Q01. **(a)** 4/3

(b) Point of contact : P(0, 0). Also equation of tangent : $x + 2y = 0$.

(c) $x + y = 0$

(d) $\left(\pm\frac{4}{\sqrt{3}}, 2\right)$

(e) See **Solutions Of Mathematicia by O.P. Gupta**.

Q02. See **Solutions Of Mathematicia by O.P. Gupta**.

Q03. $(0,0),(\pm 1,\pm 2)$

Q04. See **Solutions Of Mathematicia by O.P. Gupta**. Ans. 4 hours.

Q05. Point of intersections are : $P(0,0)$ & $Q(4a^{1/3}b^{2/3}, 4a^{2/3}b^{1/3})$. Angle of intersection at P and Q are respectively : $\frac{\pi}{2}$, $\tan^{-1}\left(\frac{3a^{1/3}b^{1/3}}{2(a^{2/3}+b^{2/3})}\right)$

Q06. $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right), \left(-\frac{9}{2\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$.

Q07. **OR** 2ab square units.

❖ Dear Student/Teacher,

I would urge you for a little favour. Please notify me about any error (s) which you notice in this (or other Maths) work. It would be beneficial for all the future learners of Maths like us. Any constructive criticism will be well acknowledged.

Please find below my contact info. when you decide to offer me your valuable suggestions.

I'm looking forward for a response.

Apart from this, I would wish **if you inform your friend/students** about my efforts for Maths so that they may also be benefitted.

Let's *learn* Maths with smile :-)

☞ For any clarification(s), please contact :

O.P. Gupta, *Math Mentor*

[Maths (Hons.), E & C Engg., Indira Award Winner]

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