

TOPIC : Tangents & NormalsWord Problems on Maxima Minima (EXTRA QUESTIONS)

Date : 16/08/2017

- Q1) A square tank of capacity of 250 m^3 has to be dug out. The cost of land is ₹ 50 per sq. m. The cost of digging increases with the depth and for the whole tank is $400(\text{depth})^2$ rupees. Find the dimensions of the tank for the least total cost.
(Ans: 10m, 10m, 2.5m)
- Q2) The total area of a page is 150 sq. inches. The combined width of the margin at the top & bottom is 3" and the sides is 2". What must be the dimensions of the page in order that the area of the printed matter may be maximum?
(Ans: 10 inches, 15 inches)
- Q3) A closed rectangular box with a square base is to be made so as to contain 1000 cubic feet. The cost of the material per sq. foot for the bottom is 15 paise, for the top 25 paise and for the sides 20 paise. The labour charges for making the box are ₹ 3. Find the dimensions of the box for minimum cost.
(Ans: 10 ft, 10 ft, 10 ft)
- Q4) The fuel charges for running a train are proportional to the square of the speed generated in miles per hour and costs ₹ 48 per hour at 16 miles per hour. What is the most economical speed if the fixed charges i.e. salaries etc. amount to ₹ 300 per hour (Ans: 40 miles/hr)
- Q5) Find the co-ordinates of the points on the curve $y = \frac{x^2-1}{x^2+1}$, $x > 0$ s.t. the tangent at these pt(s) has the greatest slope. Also find equation of tangent at the pt(s)
- Q6) Assuming petrol burnt in driving a motor boat varies as the cube of its velocity, find the most economical speed when going against a current of 'c' miles per hour.
(Ans: $3c$ miles per hour)

Q7) When travelling x km/hr, a truck burns diesel at the rate of $\frac{1}{300} \left(\frac{900}{x} + x \right)$ l/km. If the diesel costs 40 paise/l and the driver is paid ₹1.5 per hour, find the steady speed that will minimize the total cost of the trip of 500 km.

(Ans: 45 km per hour)

Q8) A box of constant volume 'c' is to be twice as long as it is wide. The material on the top and four sides costs three times as much per sq m as that in the bottom. What are the most-economic dimensions?

Q9) Tangent to the circle $x^2 + y^2 = 4$ at any point on it in the first quadrant makes intercepts OA and OB on x & y axes respectively, O being the centre of the circle. Find the minimum value of (OA + OB).

(Ans: $4\sqrt{2}$ units)