Model Question Paper for CAT-I – Fall Sem 2021-22

BMAT101L - CALCULUS

1.

Verify Lagrange's mean-value theorem for $f(x) = x^4 - 16$ on $[1,2]$, and find its absolute maxima and absolute minima in $[1,2]$. Also, find the equation of the chord joining the points $(1,-15)$ and $(2,0)$.

2.

Let $f(x) = x\sqrt{4 - x^2}$. Find its points of intersection of the graph of f with the x-axis. Use this information to compute the area of the region $\mathscr{R}$ enclosed by the graph of $f(x)$ and the x-axis. Further, if the region $\mathscr{R}$ is revolved about the x-axis, what is the volume of the solid so generated?

3.

Consider $p = x - 2y + 3z$, $q = 2x + y - z$, $r = x - \frac{y}{3} + \frac{2z}{3}$. Compute the Jacobian $J\left(\frac{p,q,r}{x,y,z}\right)$ at any point (x, y, z). Also examine the possibility of functional dependence of p, q and r. If so, find the relation among them.