SRM Institute of Science and Technology
Kattankulathur
DEPARTMENT OF MATHEMATICS
18MAB101T CALCULUS & LINEAR ALGEBRA
UNIT-2 Functions of Several Variables

Sl.No.	Tutorial Sheet-2	Answers
	PART – B	
1	Find the extreme values of a function $z = f(x, y)$.	
2	Find the extreme values of a function $x^2 + y^2 + 6x + 12$.	(-3, 0) is the stationary point, minimum value = 3.
3	Find the maxima and minima of the function $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.	Max value is 112 when $x = 1,\ y = 2$.
4	Find the dimensions of the rectangular box, open at the top of maximum capacity whose surface is 432 sq.cm.	$x = 12,\ y = 12$ and $z = 6$.
5	Explain the Lagrange's method of undetermined multipliers.	
	PART – C	
6	A rectangular box, open at the top, is to have a given capacity. Find the dimensions of the box requiring least material for its construction.	S is minimum when $x = y = (2V)^{1/3} = 2z$.
7	Find the minimum value of xy^2z^3 subject to $x + y + z = 24$.	The extreme points are (4, 8, 12) and the minimum value is $4 \times 8^2 \times 12^3$.
8	Find the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.	$V = \frac{8abc}{3\sqrt{3}}$.
9	Find the minimum value of $x^2 + y^2 + z^2$ given that $ax + by + cz = p$.	$f = \frac{p^2}{a^2 + b^2 + c^2}$.
10	Identify the saddle point and extreme points of $f(x, y) = x^4 - y^4 - 2x^2 + 2y^2$. Ans.: (i) The points (0, 1), (0, -1) are maximum point. (ii) The points $(\pm 1, 0)$ are minimum points. (iii) The points $(\pm 1, \pm 1)$ are saddle points.	