

# SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

## DEPARTMENT OF MATHEMATICS

### 18MAB101T - CALCULUS AND LINEAR ALGEBRA

#### UNIT-II-TUTORIAL-5

DEGREE: B.Tech

SLOT: C2

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#### Part-B

1. Examine  $f(x, y) = x^3 + y^3 - 3axy$  for maxima and minima.
2. Find and classify the critical points of  $f(x, y) = x^3 + 3y - y^3 + 3x$ .
3. Find the maximum value of  $x^m y^n z^p$  given that  $x + y + z = a$ .
4. Find the minimum value of  $x^2 + y^2 + z^2$  given that  $xyz = a^3$ .
5. Show that the rectangular solid of maximum volume that can be inscribed in a sphere is a cube.

#### Part-C

6. Find the maximum and minimum distance of the point (3,4,12) from the sphere  $x^2 + y^2 + z^2 = 4$ .
7. Find the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ .
8. Find the dimensions of a rectangular box of maximum capacity whose surface area is 432 sq.cm when (a) box is open at the top (b) box is closed.
9. The temperature  $T$  at any point  $(x, y, z)$  in space  $T = 400xyz^2$ . Find the highest temperature on the surface of the unit sphere  $x^2 + y^2 + z^2 = 1$ .
10. Divide 24 into three parts such that the continued product of the first, square of the second part and the cube of the third may be maximum.

\*\*\*\*\*ALL THE BEST\*\*\*\*\*