



Indira Gandhi Delhi Technical University For Women

(Formerly Indira Gandhi Institute of Technology)

Kashmere Gate, Delhi-110006

APPLIED MATHEMATICS-1 (BAS-101)

(Differential Calculus)

TUTORIAL SHEET -8

1. Using Taylor's series , verify that $\tan^{-1}(x+y) = x + y - \frac{(x+y)^3}{3} + \frac{(x+y)^5}{5} - \dots$

2. Expand $\frac{1}{1+x-y}$ by Taylor's series up to second degree terms.

(Ans. $1 - x + y + x^2 - 2xy + y^2$)

3. Compute the approximate value of $(1.04)^{3.01}$

(Ans. 1.12)

4. The temperature T at any point (x,y,z) of space is given by $T = 400xyz^2$, find the highest temperature at the surface of the sphere $x^2+y^2+z^2 = 1$.

(Ans. Highest temperature 50 attained at $(\frac{1}{2}, \frac{1}{2}, \frac{\pm 1}{\sqrt{2}})$ and $(\frac{-1}{2}, \frac{-1}{2}, \frac{\pm 1}{\sqrt{2}})$)

5. Find the point upon the plane $ax + by + cz = p$ at which the function

$f = x^2 + y^2 + z^2$ has minimum value and find this minimum f.

(Ans. f attains minimum at $(\frac{pa}{a^2+b^2+c^2}, \frac{pb}{a^2+b^2+c^2}, \frac{pc}{a^2+b^2+c^2})$ and $\min f = \frac{p^2}{a^2+b^2+c^2}$)

6. Find the minimum value of $x^2 + y^2 + z^2$, given that $xyz = a^3$

(Ans. $3a^2$)

7. A thin closed rectangular box is to have one edge equal to twice the other and a constant volume $72m^3$. Find the least surface area of the box.

(Ans. $108 m^2$)

8. Expand $e^x \log_e(1+y)$ in powers of x and y up to terms of third degree.

(Ans. $e^x \log_e(1+y) = y + xy - \frac{1}{2}y^2 + \frac{1}{2}x^2y - \frac{1}{2}xy^2 + \frac{1}{3}y^3 + \dots$)