

**MULIT VARIABLE CALCULAS & ODE FINAL REVISION**

Q1)  $\iint \frac{xy}{\sqrt{x^2 + y^2}} dx dy$  D:  $\begin{cases} x^2 + y^2 \leq 1 \\ xy \leq 0 \end{cases}$  Hints: Use change in polar coordinates

Q2)  $x^4 + y^4 - 2x^2 + 2y^2 - 1$  find extrema(min, max)

Q3) S:  $4z - x^2 - y^2 = 0$ , find eq of Tangent plane(TS) and Normal Tangent plane equation NS

Q4)  $f(x, y) = \sqrt{64 - x^2 - y^2}$  find Domf and sketch jmf and GF

Q5)  $f(x, y) = x^2 + y^2 - \frac{xy}{\sqrt{x^2 + y^2}}$   $x = r\cos\theta, y = r\sin\theta$ , find  $f_r\theta, f_{rr}, f_{\theta\theta}$

Q6)  $\iint x^3 y dx dy$  D:  $\begin{cases} \alpha_1 = y = x^2 \\ \alpha_2 = y = x^3 \end{cases}$

Q7)  $\iiint \left(\frac{1}{2}x + 1\right)^2 \sin \frac{y}{4} z^3 dx dy dz$  D:  $\begin{cases} 0 \leq x \leq 1 \\ 0 \leq y \leq 2\pi \\ 1 \leq z \leq 2 \end{cases}$

Q8) Given Tetra A(1,0,1), B(1,2, -1) C(2,1,2) D(-2,1,0)

- 1) Write down the eq of te face ABC
- 2) Find the angles of ABC
- 3) Write down the eq of altitude from D
- 4) Find the distance between AB and CD
- 5) Write down the eq of Circumsphere
- 6) find area, Volume of the tetra and curcumsphere