SNS COLLEGE OF TENHNOLOGY

(AN AUTONOMOUS INSTITUTION)

UNIT I: MULTIPLE INTEGRALS

AREA PROBLEMS

1. Find double integral, the area between the parabola $y^2=4ax$ and the line $y=x$
2. Find the area of the region bounded by the parabola $y^2=4ax$ and the line $x+y=3a$ in the positive quadrant
3. Find the area between the parabola $x^2=4y$ and the straight line $x-2y+4=0$
4. Find the area common to $y^2=4x$ and $x^2=4y$ using double integration.

CHANGE OF ORDER OF INTEGRATION

1. Change the order of Integration and hence Evaluate $\int_0^1 \int_y^{\sqrt{y}} \frac{x}{x^2+y^2}\,dxdy$
2. Change the order of Integration and hence Evaluate $\int_0^a \int_0^{\frac{b}{a}\sqrt{a^2-x^2}} x^2\,dydx$
3. Change the order of Integration and hence Evaluate $\int_0^4 \int_{x^2/4}^{2\sqrt{x}} dydx$
4. Change the order of Integration and hence Evaluate $\int_0^a \int_{a-\sqrt{a^2-y^2}}^{a+\sqrt{a^2-y^2}} dydx$
5. Change the order of Integration in $\int_0^a \int_{x^2/a}^{2a-x} xydydx$ and then Evaluate it
6. Change the order of Integration and evaluate the integral $\int_0^a \int_y^a \frac{x}{\sqrt{x^2+y^2}}\,dydx$
7. Change the order of Integration in $\int_0^{2a} \int_{\frac{x^2}{4a}}^{3a-x} xy\,dy\,dx$ and then Evaluate it
8. By changing the order of integration evaluate $\int_0^a \int_0^{2\sqrt{ax}} x^2\,dy\,dx$

9. Evaluate $\int_0^{\infty}\int_x^{\infty}\frac{e^{-y}}{y}\,dx\,dy$ by changing the order of integration

TRIBLE INTEGRAL

1. Evaluate $\int_1^3\int_{1/x}^{1}\int_0^{\sqrt{xy}} xyzdzdydx$
2. Evaluate $\int_0^2\int_1^3\int_1^2 xy^2zdzdydx$
3. Evaluate $\int_0^a\int_0^b\int_0^c (x+y+z)dzdydx$
4. Evaluate $\int_0^1\int_0^{1-x}\int_0^{x+y} e^z\,dzdydx$
5. Evaluate $\int_0^1\int_0^x\int_0^{\sqrt{x+y}} zdzdydx$
6. Evaluate $\int_0^{\log a}\int_0^x\int_0^{x+y} e^{x+y+z}\,dzdydx$
7. Evaluate $\int_0^1\int_0^{\sqrt{1-x^2}}\int_0^{\sqrt{1-x^2-y^2}} \frac{dxdydz}{\sqrt{1-x^2-y^2-z^2}}$
8. Evaluate $\int_0^{\log 2}\int_0^x\int_0^{x+y} e^{x+y+z}\,dzdydx$
9. Evaluate $\iiint_v dxdydz$ where V is the volume of the tetrahedron whose vertices are (0,0,0),(0,1,0),(1,0,0) and (0,0,1).
10. Evaluate $\iiint_V xyz\,dxdydz$ through the positive spherical octant for which $x^2+y^2+z^2\le a^2$
11. Evaluate $\iiint_V dxdydz$, where V is the finite region of the space (tetrahedron) Formed by the planes x=0, y=0, z=0 and 2x+3y+4z=12
12. Find the volume of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$
13. Find the volume of the tetrahedron bounded by the coordinates and $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$
14. Express the volume of the sphere $x^2+y^2+z^2=a^2$ as a volume integral and evaluate it