

## SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution) Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai Accredited by NAAC-UGC with 'A++' Grade (Cycle III) & amp; Accredited by NBA (B.E - CSE, EEE, ECE, Mech & amp; B.Tech.IT) COIMBATORE-641 035, TAMIL NADU

#### **DEPARTMENT OF MATHEMATICS**

### UNIT V

Volume of triple integrals : Jain Jain y 1) Find the volume; of the sphere - $\chi^2 + y^2 + z^2 = a^2$  without transformation. Soln: Volume = 8 × Volume in the ist octant. Soln: Z limits:  $Z = \pm \int a^2 - x^2 - y^2$ Z Vagies from 0 to  $\int a^2 - x^2 - y^2$ Put z = o in limits :  $x^{2} + y^{2} = a^{2}$  : Alwin (2) +  $y^{2} = a^{2} + x^{2}$  = Ab  $x^{2} + b^{2}$  $y = \pm \sqrt{a^2 - x^2}$ Varies from o to  $\sqrt{a^2 - x^2}$ Put y = 0, z = 0 in  $x^2 + y^2 + z$ x bx (=) ± a ( <sup>2</sup> x - 10) o to a Varies from x

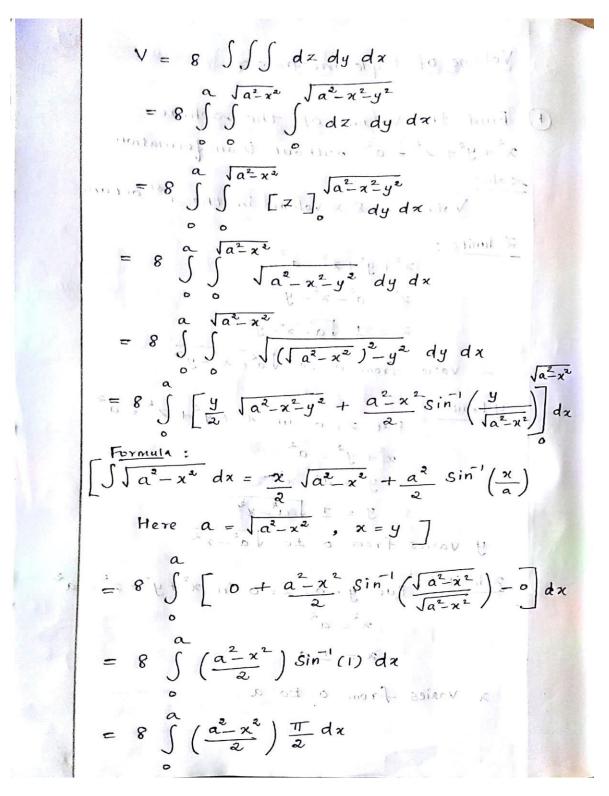


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### **DEPARTMENT OF MATHEMATICS**





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#### **DEPARTMENT OF MATHEMATICS**

$$V = \underbrace{\$\pi}_{\frac{1}{2} \times \frac{1}{2}} \int_{0}^{\alpha} (a^{2} - x^{2}) dx$$

$$= 2\pi \left[ a^{2} \times -\frac{x^{3}}{3} \right]_{0}^{\alpha}$$

$$= 2\pi \left[ a^{2} \cdot a - \frac{a^{3}}{3} \right]$$

$$= 2\pi \left[ a^{3} - \frac{a^{3}}{3} \right]$$

$$= 2\pi \left[ \frac{3a^{3} - a^{3}}{3} \right]$$

$$V = 2\pi \left( \frac{2a^{3}}{3} \right)$$

$$V = \underbrace{\#\pi a^{3}}_{3} \text{ cubic units}$$