

(viii) Calculate $\iint_R f(x, y) dA$ for $f(x, y) = 1 - 6x^2y$ and $R : 0 \leq x \leq 2, -1 \leq y \leq 1$.

(ix) Discuss the convergence or divergence of the series $\sum \frac{\sec^{-1} n}{n^{1.3}}$.

(x) If $\sin(A + iB) = x + iy$, prove that $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$.

SECTION - B

2. Graph the functions (a) $y = x^{\frac{5}{3}} - 5x^{\frac{2}{3}}$ (b) $y = |x^2 - 1|$.

3. The region bounded by the curve $y = x^2 + 1$ and the line $y = -x + 3$ is revolved about the x -axis to generate a solid. Find the volume of the solid.

4. (i) If $z = xf\left(\frac{y}{x}\right) + g\left(\frac{y}{x}\right)$, show that $x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} = 0$.

(ii) Verify Euler's theorem for the function, $u = \left(x^{\frac{1}{2}} + y^{\frac{1}{2}}\right)(x^n + y^n)$.

5. Find the minimum value of $x^2 + y^2 + z^2$, given that $ax + by + cz = p$.

SECTION-C

6. Find the equation of the sphere which passes through the points $(1, -4, 3)$, $(1, -5, 2)$, $(1, -3, 0)$ and whose center lies on the plane, $x + y + z = 0$.

7. Change the order of integration in the following integral and evaluate

$$\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy dx.$$

8. Find the radius and interval of convergence for the following power series

$$\sum_{n=1}^{\infty} \frac{(4x-5)^{2n+1}}{n^{\frac{3}{2}}}$$

For what values of x , does the series converges (a) absolutely, (b) conditionally

9. If $C = \cos^2 \theta - \frac{1}{3} \cos^3 \theta \cos 3\theta + \frac{1}{5} \cos^5 \theta \cos 5\theta - \dots$, then prove that

$$\tan 2C = 2 \cot^2 \theta.$$