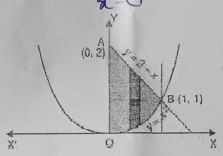
4 CLO 2 12 Marks

Beta Integral to evaluate $\int_0^1 x^4(1-\sqrt{x})^5\,dx$. (4)

ve Reduction Formula for $I_n = \int \sin^n x\,dx$ and hence use it to compute $\int_0^{\pi/2} \sin^4 x\,dx$. (4)

ply double integration to find the area of a lamina bounded by $x = 0$, $y = x^2$ and $x + y = 2$ shown as shaded gion in the given figure. (4)



tion 5 CLO 2 12 Marks

Compute the directional derivative of the scalar function $\phi = x^2 - y^2 + 2z^2$ at the point $P(1, 2, 3)$ in the direction of the line PQ where Q is the point $(5, 0, 4)$. (4

elect the values of constants a and b such that the vector field $\vec{A}$ is irrotational. (4

$$\vec{A} = (2xy + 3yz)\hat{i} + (x^2 + axz - 4z^2)\hat{j} + (3xy + byz)\hat{k}$$

ind the work done to move a particle in the xy-plane from O (0,0) to A(1,4) with a variable force (4

$\vec{F} = 2x^2y\ i + 3xy\ j$

(i) Along the curve $y = 4x^2$.

(ii) Along a straight line joining O and A.