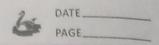


Weak Formulation for Boundary Value Broblem $-\frac{d}{dn}\left[a(n)\frac{du}{dn}\right] = f(n) \quad \text{for } 0 < n < L$ Subject to $u(0) = u_0 \quad \left(a\frac{du}{dn}\right) = g_L$ $dn = g_L$ Three Steps in the development of weak Move all the gan to the left side, muttiply the whole egn with a test on weight sn w and integrate over (0, L) 0= Sw[-d (adu)-fln)]dn Weighted integral on weighted residual equivalent to conignal

2) Trade differentiation from 4 to we using integration by parts 0= f zw [-d (adu)] - wf(n)} dn J (dw a du - wf(n)) dn - [wady] L = \int \left(\du \ \text{du \ dn \ \dn \right) \dn - [wa du] - (wa du) n=L = f (dw adu - wf(n)) dn o - (wg)o - (wg)



Use the Neumann Boundary Coendition u= no -> Essential Boundary Condition (d du) | = gr -> Natural
Boundary
Condition :. w(0)=0 ": u (0)=40 As w(0)=0 Q(L) = (adu nx) n=1 0 = Sladw du - wa)dn -w(L) GL Weak form Equivalent of original Differential Eqn.