

Q.1. The steady state 1-D heat conduction equation in the nonuniform bar(**Fig.1**) with the temperature boundary condition is given as,

$$\frac{d}{dx} \left(A \frac{dT}{dx} \right) = 0, \text{ with } 0 < x < 2m \text{ and } T(0) = 50^\circ C \text{ and } T(2) = 10^\circ C$$

The cross-section area of the bar A is given at x. Solve the equation for temperature distribution in the bar by (i) Least square method and (ii) Galerkin method. Solve it also by Ritz method (Integral). Consider one parameter solution. Report the temperature at x=1m. [20]

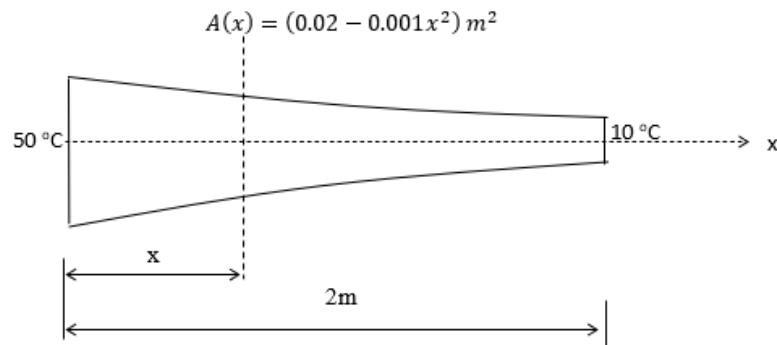


Fig.1

Q.2. Find the member forces and reactions in the 2-D truss shown in **Fig.2** using finite element method. Taking the governing differential equation of bar deformation find the elemental equilibrium equation for a 1-D linear element in its local axis(x' -axis) using weak form Galerkin method. Transform the elemental equations in 2-D co-ordinate(x - y -axis) system. Use these in solving the truss. EA of both the members are same. [20]

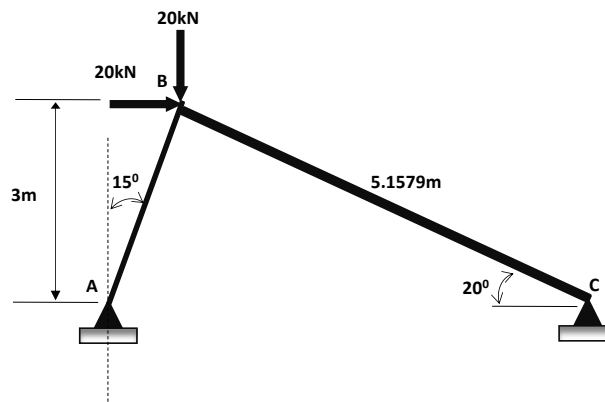


Fig.2