TITLE : COMBINED THROTTLING AND SEPARATING CALORIMETER

1. OBJECTIVE :

To determine the dryness fraction of steam using

(i) Seperating Calorimeter

(ii) Throttling Calorimeter

(iii) Combined throttling and Separating calorimeter

2. THEORY

The dryness fraction is a measure of how dry steam is, it ranges from 0 to 1 with values closer to 1 exhibited in super heated or super dry steam. The combined Separating and throtling Calorimeter is an instrument used for measuring the dryness fraction. Wet steam is a mixture of saturated steam and water droplets in suspension. It is necessary to know the drgness fraction in order to know the enthalpy of wet steam when its pressure or temperature are known, the enthalpy is given by

$$h = h_f + x h_{fg} \quad \cdots \quad (1)$$

where the paramiters h_f and h_{fg} can be found in the standard steam tables and x represents the dryness of steam. In the Seperating calorimeter steam is forced to change its direction of flow, then by centrifugal action, the seperating calorimeter can give a close approximation of the dryness fraction (x) of steam. From the results obtained Let $\dot{m}_1$ represent the flow rate of the saturated steam condensed $\dot{m}_2$ represent the mass flow rate of suspended water then

$$x = \frac{\dot{m}_1}{\dot{m}_1 + \dot{m}_2}$$