PERFORMANCE CHARACTERISTIC CURVES OF TURBINES
INTRODUCTION

• Designed conditions of turbine -

• Hydraulic Turbines gives their best performance when they are operated at certain conditions of head, discharge, speed and output power.

• Model turbines are tested under different conditions of head, discharge, speed, power, efficiency. Results are plotted in the form of curves and are known as performance characteristic curves.

• For convenience, curves are plotted in terms of unit quantities.
Types of PC curves

• Main Characteristic curves / Constant head curves
• Operating characteristic curves / Constant Speed curves
• Constant efficiency curves (Muschel Curves)
Main Characteristic curves/ Constant head curves

• Curves are drawn by conducting experiment at constant head.

• Head and gate openings are kept constant and speed is varied by varying load on the turbine.

• For each value of speed, corresponding values of power and discharge are obtained.
For Pelton wheel

(a) For pelton wheel
For Reaction turbines
(b) For reaction turbine
OPERATING CHARACTERISTIC CURVES / Const. Speed curves

• Tests are performed at constant speed.

• Const. speed is attained by regulating the gate opening thereby varying the discharge flowing through the turbine as the load varies.

• Head may or may not kept constant.
(1) Kaplan turbine – \( N_s = 600 \)
(2) Pelton wheel – \( N_s = 13 \)
(3) Francis turbine – \( N_s = 300 \)
(4) Propeller turbine – \( N_s = 515 \)

\( N_s \) in r.p.m, kW, m
Constant Efficiency curves

Fig. 18.38 Constant efficiency curve.
Surge Tank

- a tank connected to a pipe carrying a liquid and intended to neutralize sudden changes of pressure in the flow by filling when the pressure increases and emptying when it drops.
Surge Tank