SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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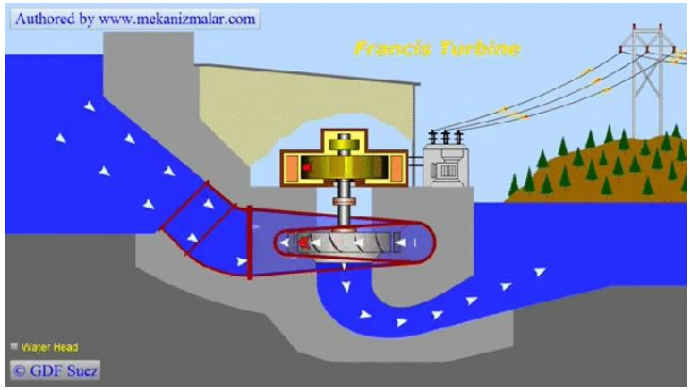
DEPARTMENT OF AGRICULTURAL ENGINEERING

19MEB201 – FLUID MECHANICS AND MACHINERY

II YEAR III SEM

UNIT 4 – TURBINES

CASE STUDY PERFORMANCE CURVES FOR TURBINES - GOVERNING OF TURBINES



CONTENT

- PERFORMANCE CHARACTERISTIC CURVES OF TURBINES
- TYPES OF PC CURVES
- MAIN CHARACTERISTIC CURVES/ CONSTANT HEAD CURVES
- UNIT SPEED FOR PELTON WHEEL
- UNIT SPEED OR REACTION TURBINES
- OPERATING CHARACTERISTIC CURVES / CONST. SPEED CURVES
- ASSESSMENT – KAHOOT
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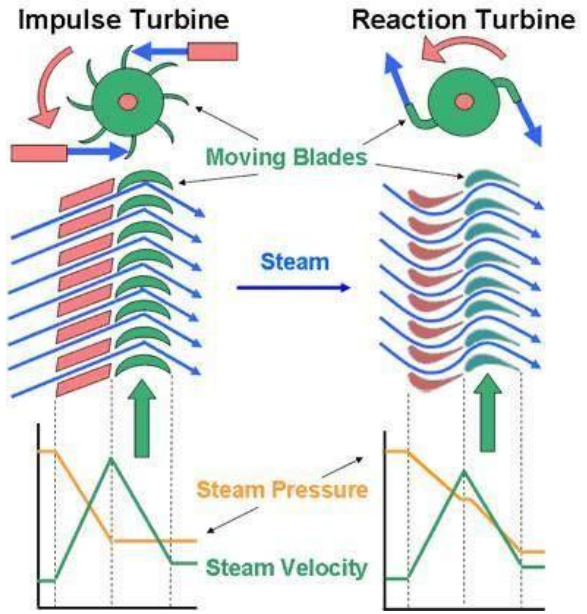
PERFORMANCE CHARACTERISTIC CURVES OF TURBINES

INTRODUCTION

- Designed conditions of turbine
- Hydraulic Turbines gives their best performance when they are operated at certain condition s of head, discharge, speed and out put 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, curvesare 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)



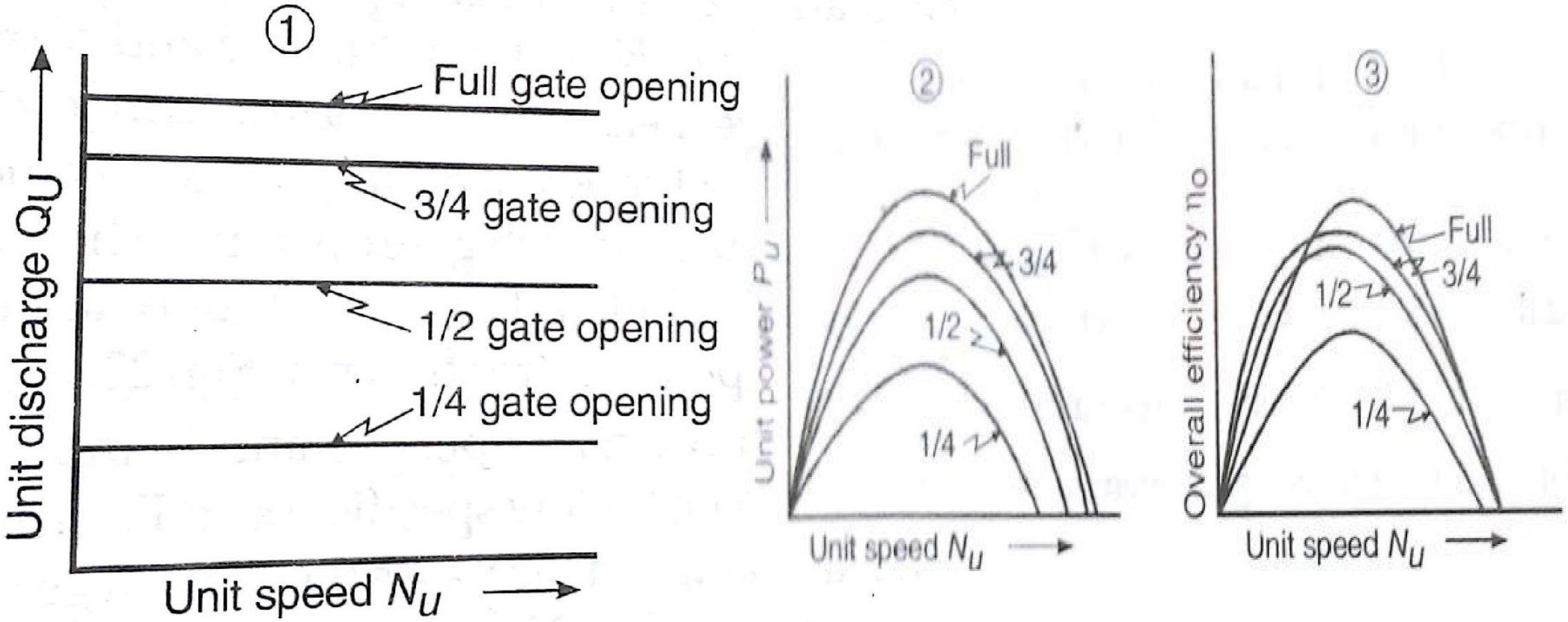
MAIN CHARACTERISTIC CURVES/ CONSTANT HEAD CURVES

- 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

Question: What Is mean by constant speed?

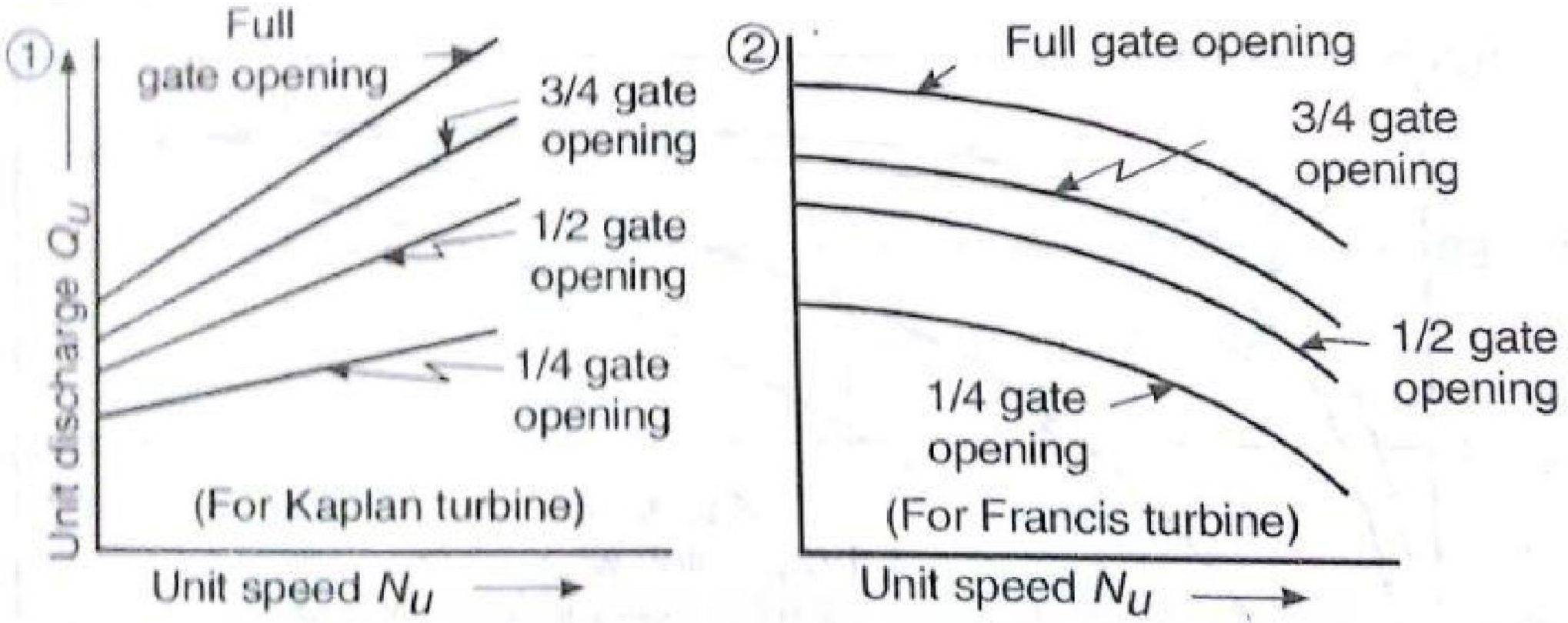
- For each value of speed, corresponding values of power and discharge are obtained

UNIT SPEEDFOR PELTON WHEEL

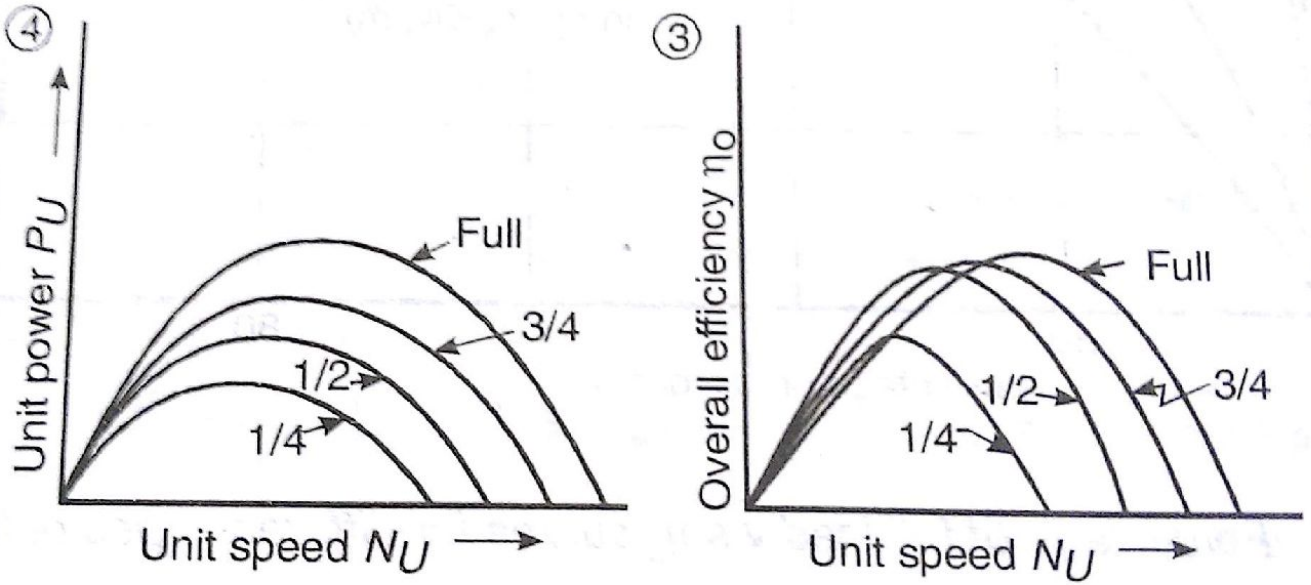


(a) For pelton wheel

UNIT SPEED OR REACTION TURBINES



UNIT SPEED FOR REACTION TURBINES



(b) For reaction turbine

OPERATING CHARACTERISTIC CURVES / CONST. SPEED CURVES

- Tests are performed at constant speed

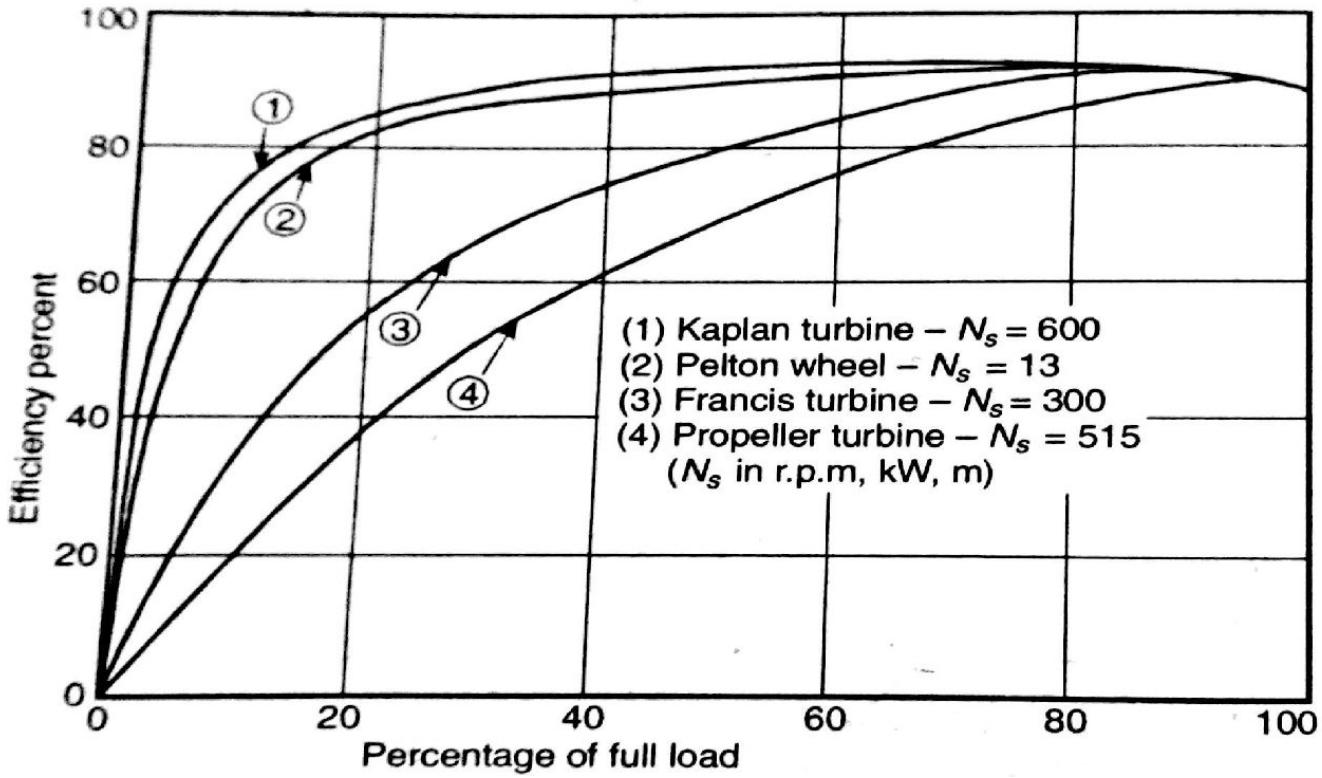
Question: What Is mean by turbine load?

- Constant speed is attained by regulating the gate opening thereby

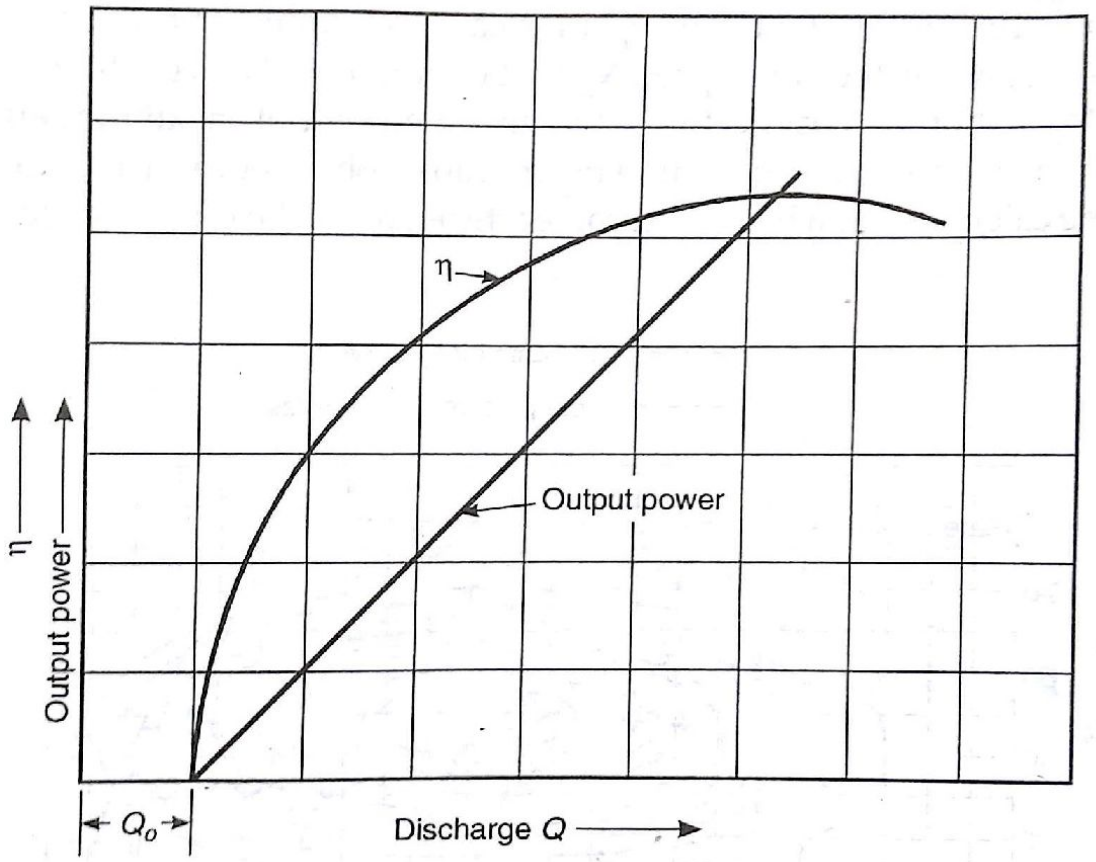
varying the discharge flowing through the turbine as the load varies

- Head may or may not kept constant

OPERATING CHARACTERISTIC CURVES / Const. Speed curves



OPERATING CHARACTERISTIC CURVES / Const. Speed curves



OPERATING CHARACTERISTIC CURVES / Const. Speed curves

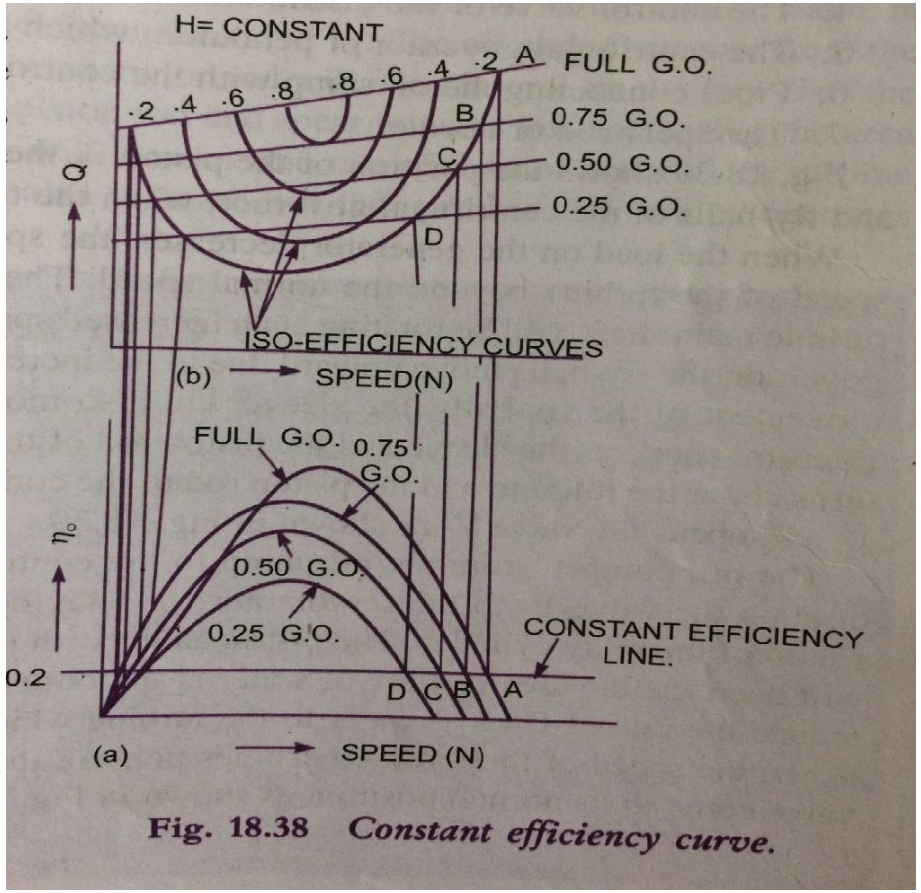
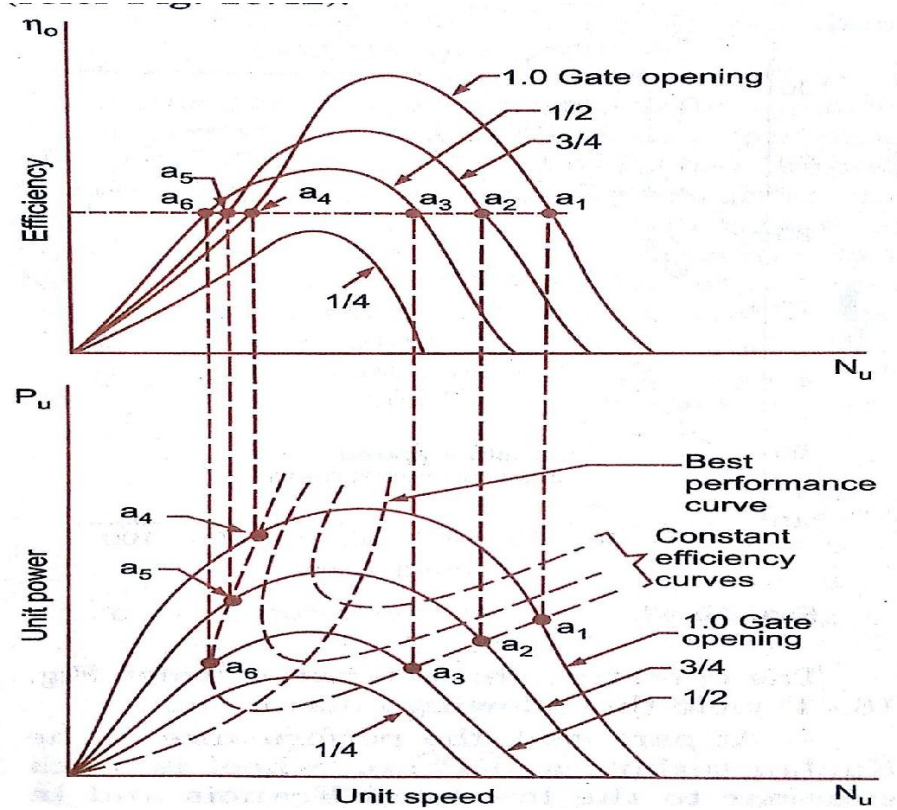


Fig. 18.38 *Constant efficiency curve.*



GOVERNING

- **Governing** system or **governor** is the main controller of the **hydraulic turbine**
- The **governor** varies the water flow through the **turbine** to control its speed or power output
- Generating units speed and system frequency may be adjusted by the **governor**

The governing of a turbine is defined as the operation by which the speed of the turbine is kept constant under all working conditions (irrespective of the load variations)

GOVERNING OF PELTON WHEEL – GOVERNING OF IMPULSE TURBINE

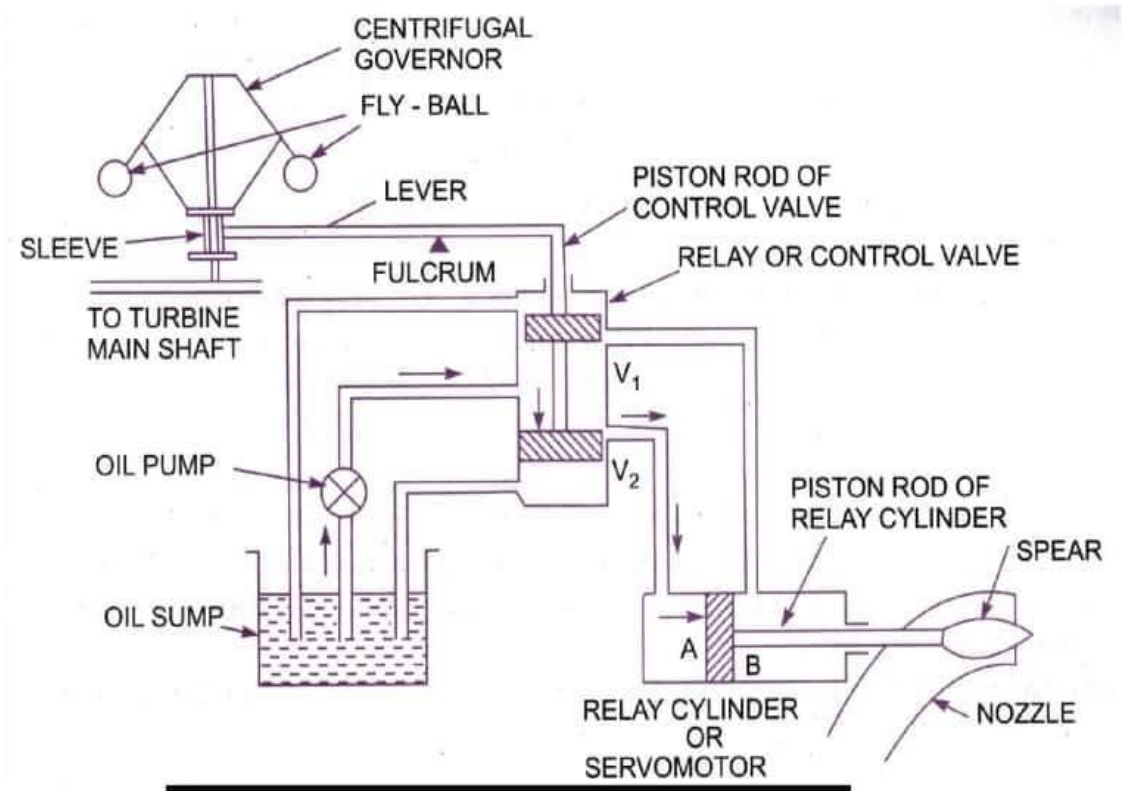
In Pelton wheel turbine, the quantity of water supplied by the nozzle can be regulated by anyone of the following methods:

a) Spear Regulation

b) Deflector Regulation

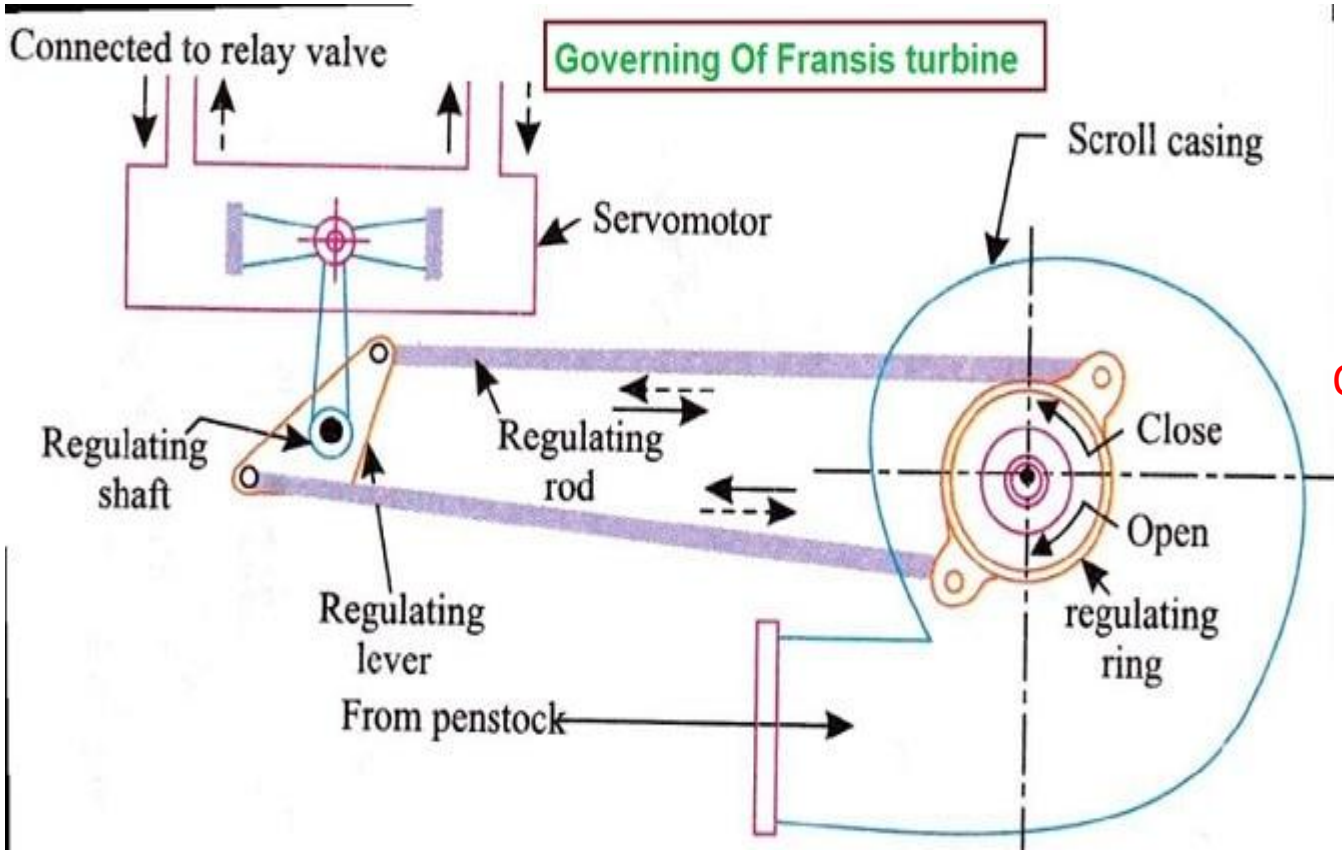
c) Double Regulation

GOVERNING OF PELTON WHEEL – GOVERNING OF IMPULSE TURBINE



Governing of Pelton wheel (Spear regulation)

GOVERNING OF FRANCIS TURBINE – GOVERNING OF REACTION TURBINE



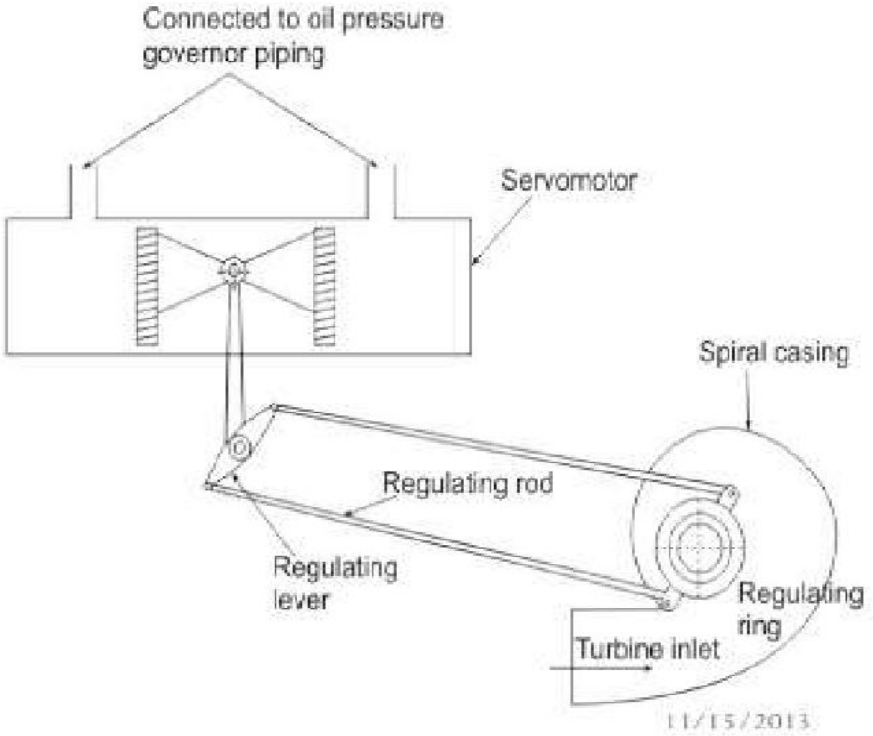
Question: Need of Governing ?

GOVERNING OF TURBINE

GOVERNING OF FRANCIS WATER TURBINE

- **The major components of the governor mechanism are as under:**

1. Oil pump and oil sump
2. Relay or control valve
3. Servomotor or relay cylinder
4. Governor and linkage
5. Regulating ring
6. Regulating rod



Question: How Governing varies from pelton to francis?

ASSESSMENT - KAHOOT

https://create.kahoot.it/share/performance-of-curve/cc3df762-dc1e-48a1-bd27-ad1ddca49521

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