

MGM's

Jawaharlal Nehru Engineering College

## **Laboratory Manual**

ELECTRICAL POWER GENERATION & Its ECONOMICS.

For

Second Year (EEP) Students

Manual made by

**Prof. T.S.JADHAV**

Ó Author JNEC, Aurangabad.

## **FORWARD**

It is my great pleasure to present this laboratory manual for second year engineering students for the subject of Electrical Power Generation & Its Economics. Keeping in view the vast coverage required for visualization of concepts of Electrical Power Generation & Its Economics With simple language.

As a student, many of you may be wondering with some of the questions in your mind regarding the subject and exactly what has been tried is to answer through this manual.

Faculty members are also advised that covering these aspects in initial stage itself, will greatly relived them in future as much of the load will be taken care by the enthusiasm energies of the students once they are conceptually clear.

Prof. Dr. S.D.Deshmukh  
Principal

# **LABORATORY MANNUAL CONTENTS**

This manual is intended for the second year students of Electrical, Electronics & Power Engineering branch in the subject of Electrical Power Generation & Its Economics.

This manual typically contains practical/Lab Sessions related Electrical Power Generation & Its Economics covering various aspects related the subject to enhanced understanding.

Although, as per the syllabus, only descriptive treatment is prescribed, we have made the efforts to cover various aspects of Electrical Power Generation & Its Economics subject covering types of different power plants, their working, their advantages and disadvantages, their different parts & its economics will be complete in itself to make it meaningful, elaborative understandable concepts and conceptual visualization.

Students are advised to thoroughly go through this manual rather than only topics mentioned in the syllabus as practical aspects are the key to understanding and conceptual visualization of theoretical aspects covered in the books.  
Good Luck for your Enjoyable Laboratory Sessions

Prof.T.S.Jadhav.

## **SUBJECT INDEX**

### **1. Lab Exercise Part-1:**

- 1) Draw the layout of modern thermal power plant.
- 2) Draw the layout of modern hydro electric power plant.
- 3) Draw the layout of different hydro electric power plant.
- 4) Draw the layout of different water turbines.
- 5) Draw the layout of diesel power plant.

### **2. Lab Exercise Part-2:**

- 1) To study of modern thermal power plant.
- 2) To study of modern hydro electric power plant.
- 3) To study of different water turbines.
- 4) To study of diesel power plant.
- 5) To study of boiler mounting and accessories.
- 6) To study of centrifugal pump.

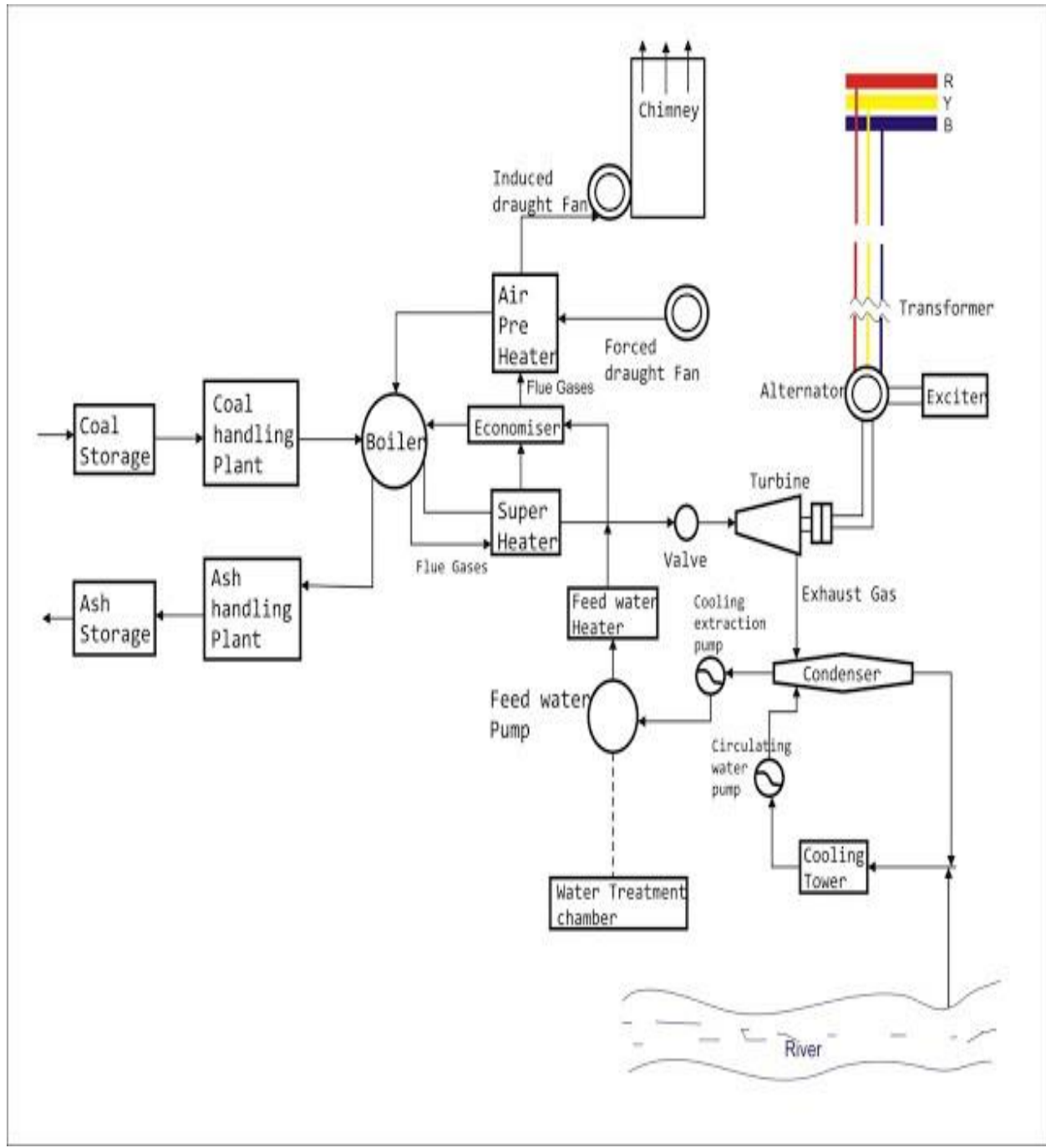
### **3. Conduction of Viva-Voce Examination**

### **4. Evaluation and Marking Systems**

# 1. Lab Exercise Part-1:

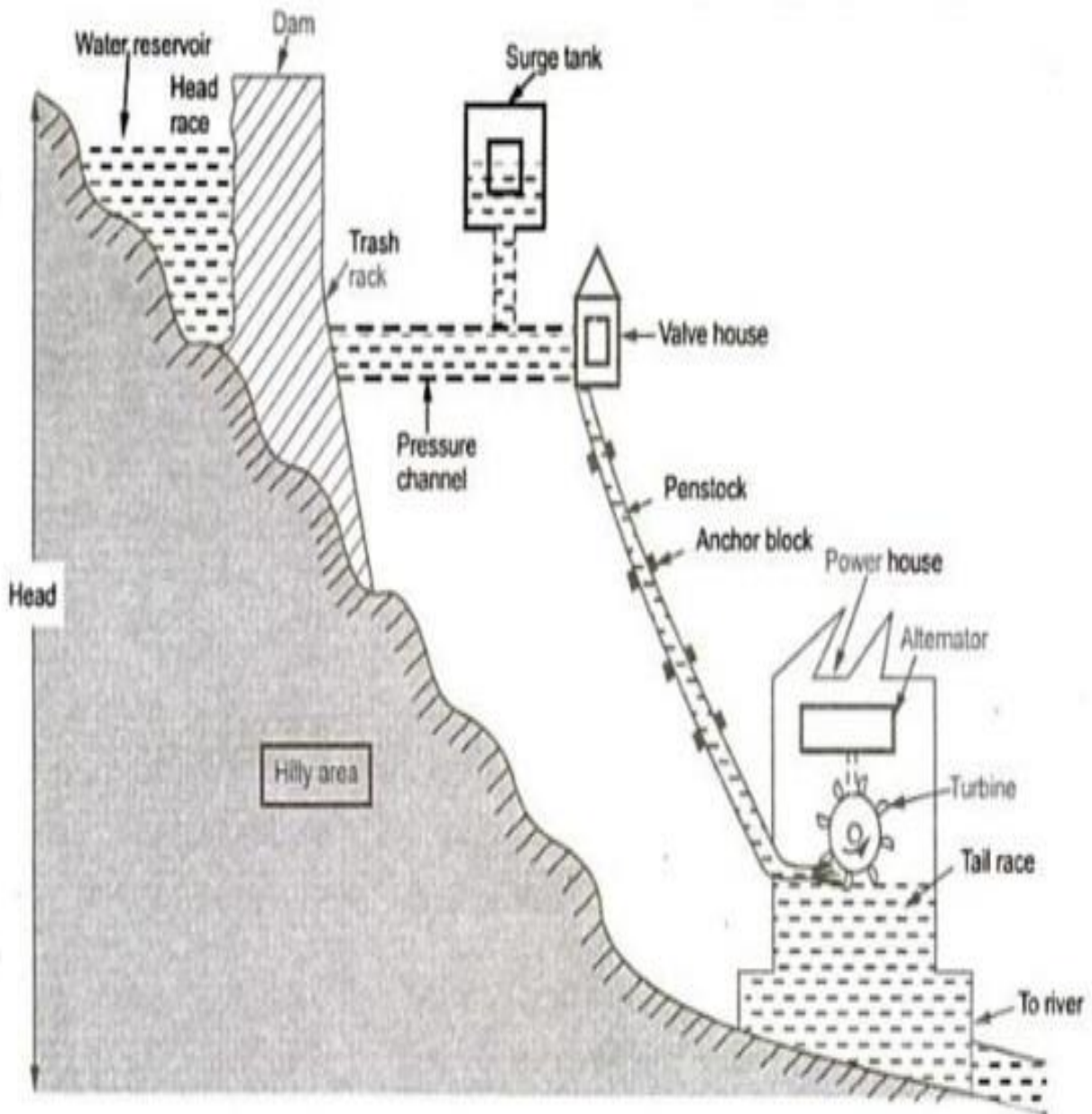
Exercise No 1.1 : ( 2 Hours) – 1 Practical

**DRAW THE LAYOUT OF MODERN THERMAL POWER PLANT.**



Exercise No 1. 2 : ( 2 Hours) – 2 Practical

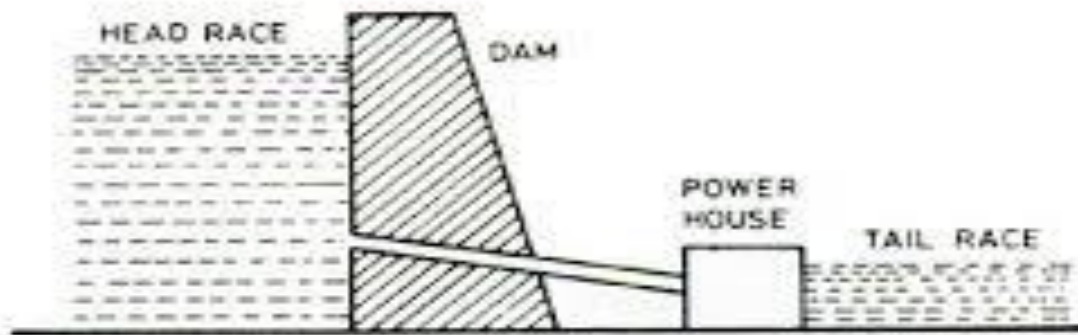
**DRAW THE LAYOUT OF MODERN HYDRO ELECTRIC POWER PLANT.**



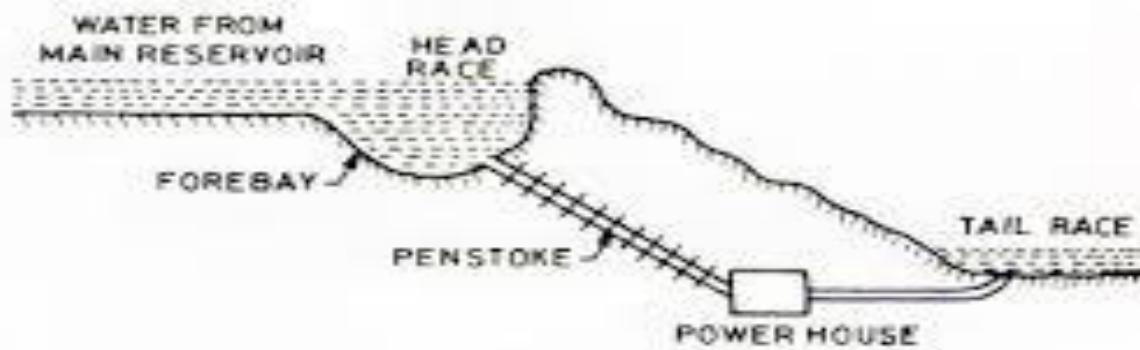
Exercise No 1.3 : ( 2 Hours) – 3 Practical

**DRAW THE LAYOUT OF DIFFERENT HYDRO ELECTRIC POWER PLANT.**

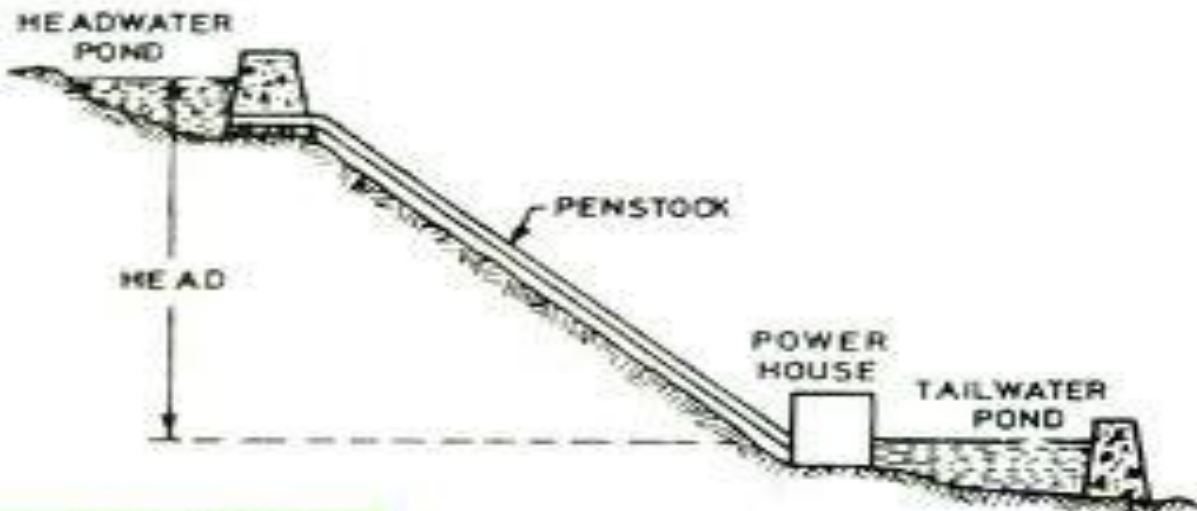
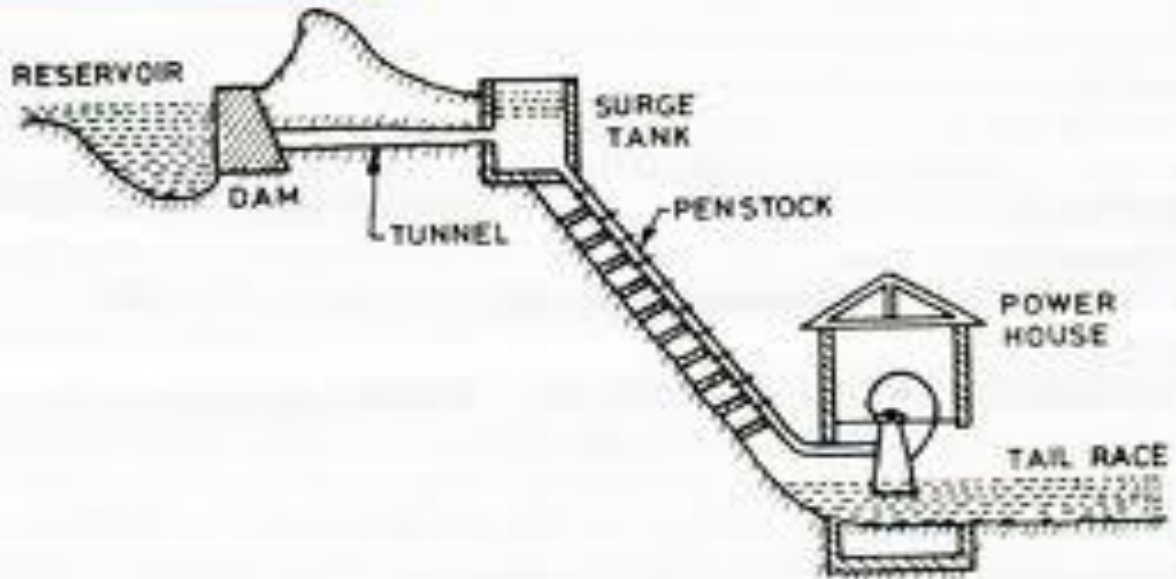
Low Head Plant



Medium Head Plant



### High Head Plant



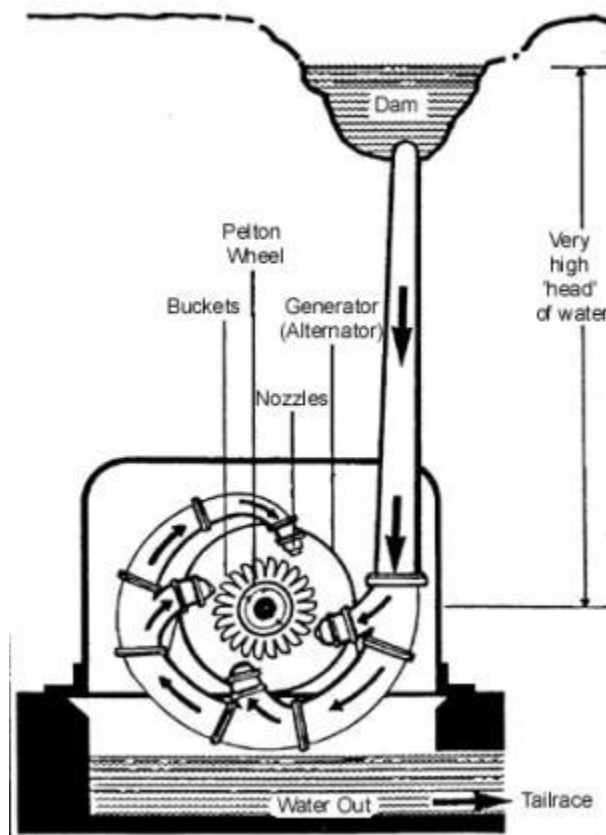
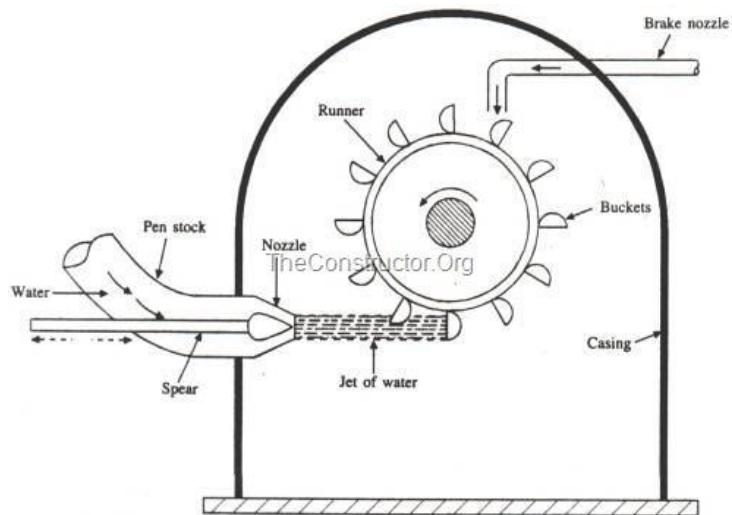
### Pumped Storage Plant



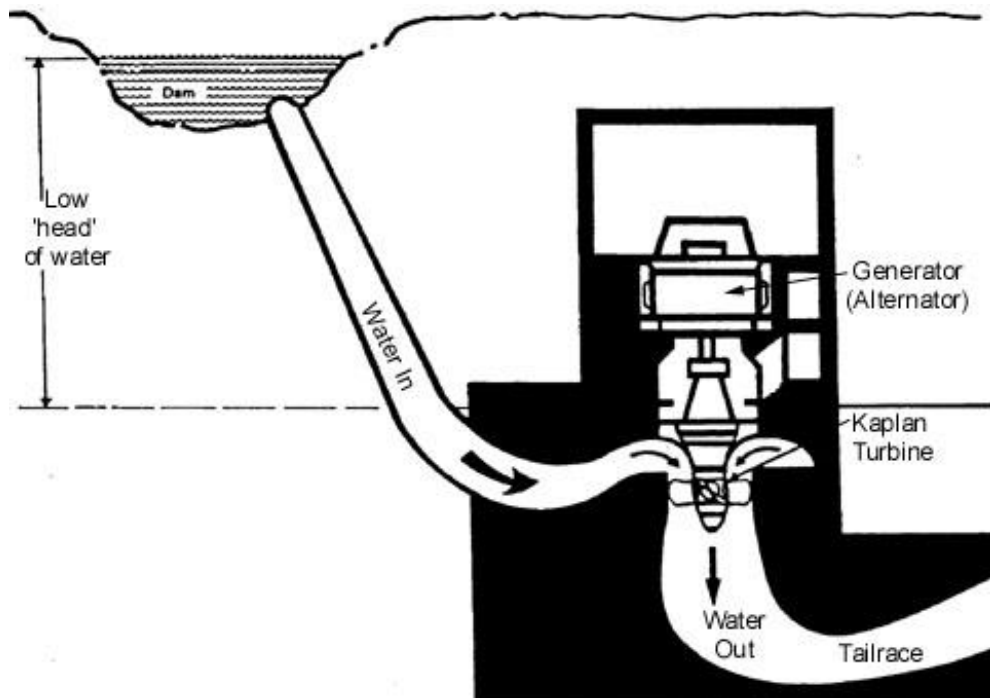
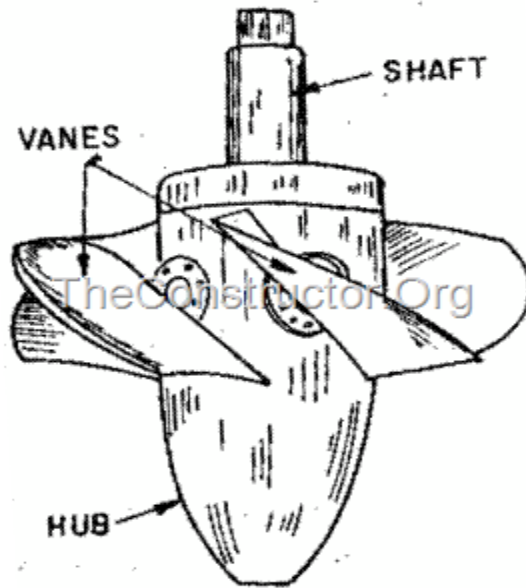
**Exercise No 1.4 : ( 2 Hours) – 4 Practical**

**DRAW THE LAYOUT OF DIFFERENT WATER TURBINES.**

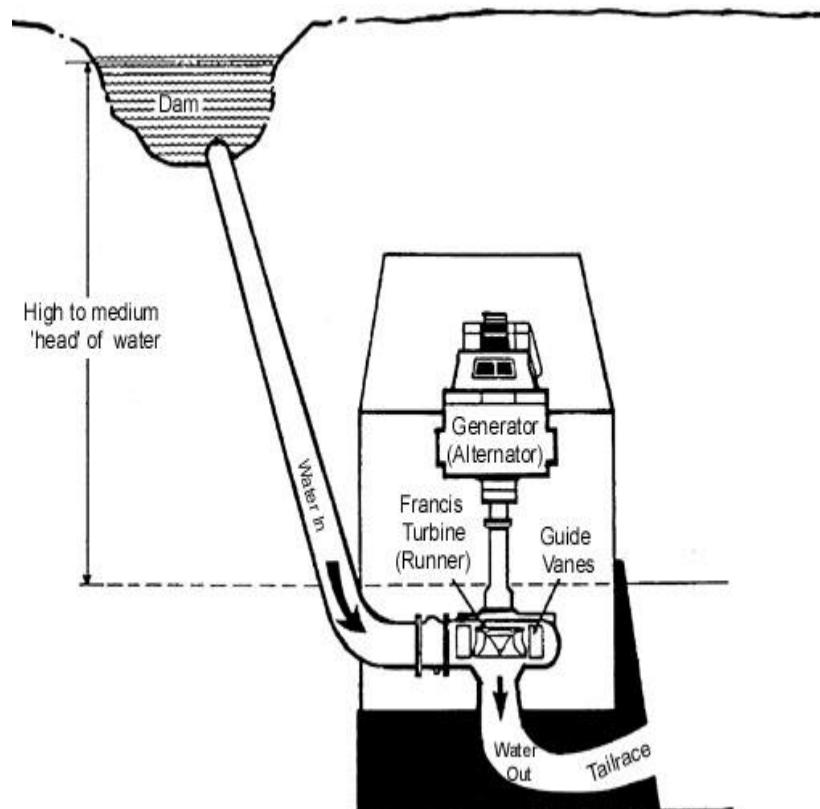
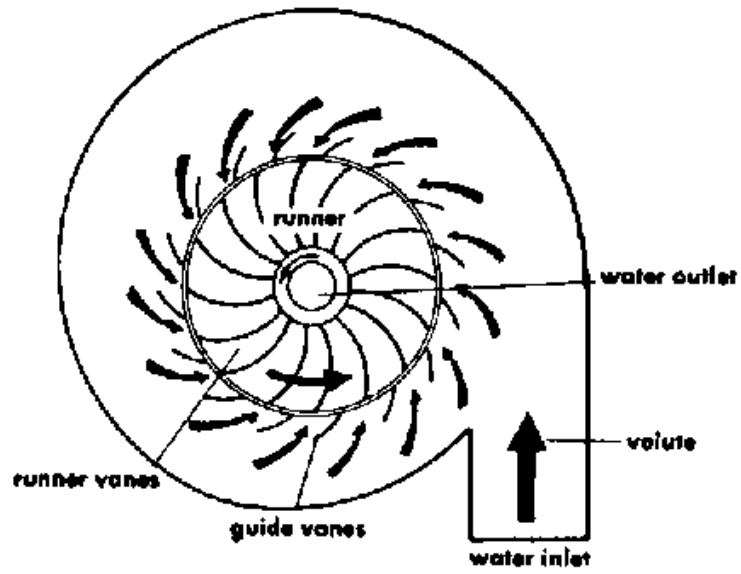
1) Pelton Wheel Turbine



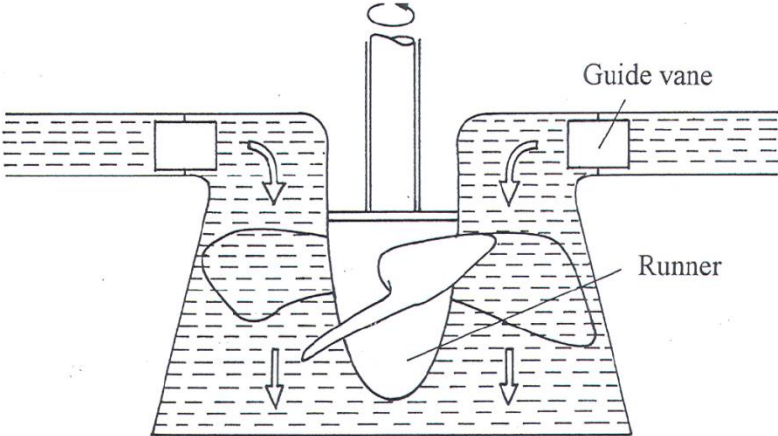
## 2) Kaplan Turbine



### 3) Francis Turbine

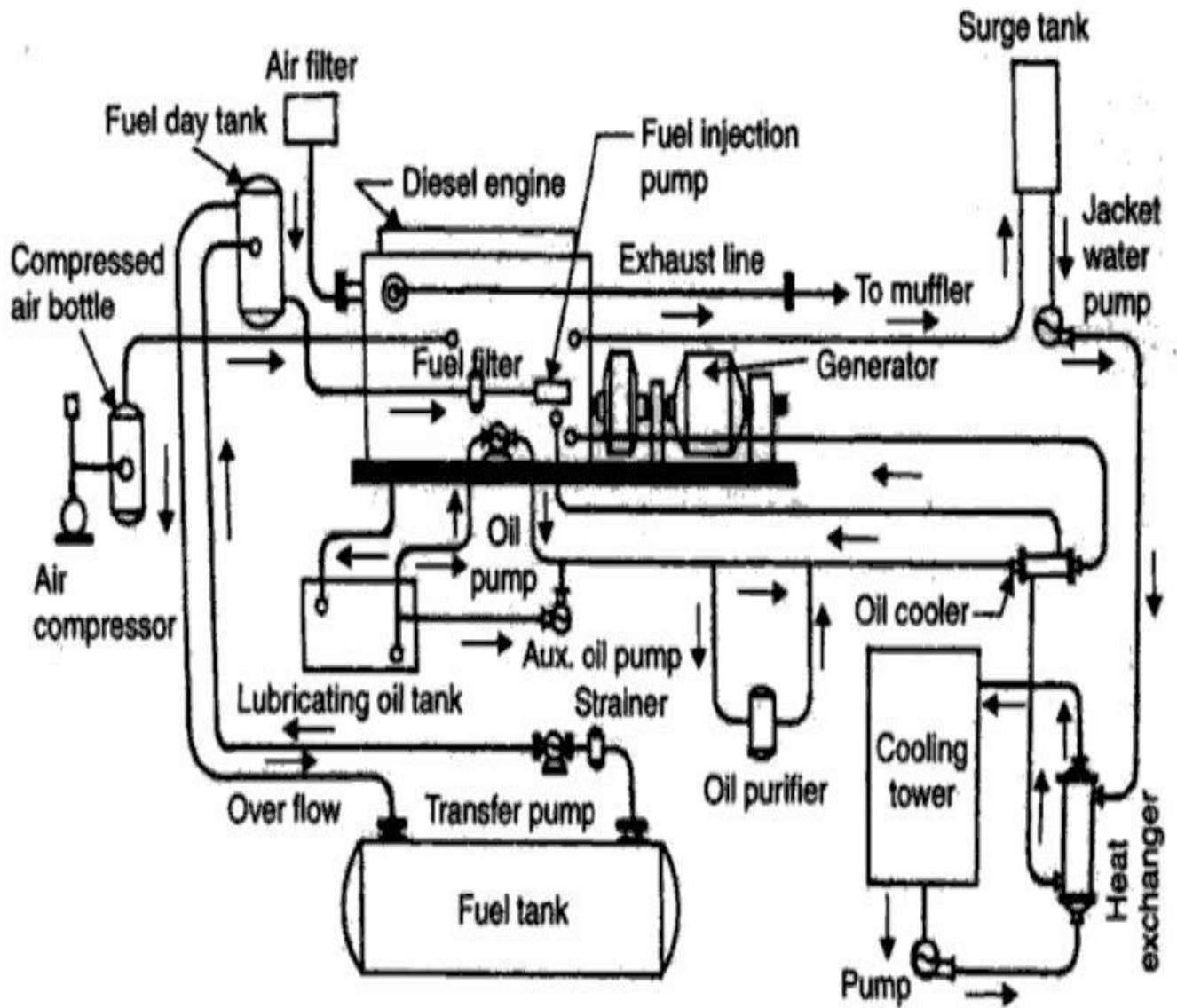


4) Propeller Turbine



Exercise No 1.5 : ( 2 Hours) – 5 Practical

**DRAW THE LAYOUT OF DIESEL POWER PLANT.**



## **2. Lab Exercise Part-2:**

**Exercise No 2.1: ( 2 Hours) – 1 Practical**

**TO STUDY OF MODERN THERMAL POWER PLANT.**

**THEORY :-**

**Q.1.** Write the working principle of Thermal Power Plant.

**Q.2.** Explain the following parts of the thermal power plant in detail.

- 1) Boiler.
- 2) Economiser.
- 3) Air Preheater.
- 4) Superheater.
- 5) Condenser.
- 6) Turbine (Prime mover)
- 7) Water Treatment Plant.
- 8) Electrical Equipment.

**CONCLUSION**

Exercise No 2.1: ( 2 Hours) – 2 Practical

**TO STUDY OF MODERN HYDRO ELECTRIC POWER PLANT.**

**THEORY :-**

**Q.1.** Write the working principle of Hydro Power Plant.

**Q.2.** Explain the following parts of the hydro power plant in detail.

- 1) Area.
- 2) Dam.
- 3) Reserver.
- 4) Penstoc.
- 5) Storage tank.
- 6) Turbine and Generator.
- 7) Switchgear and Protection.

**Q.3.** What are the different types of the hydro power plant?

**CONCLUSION**

**Exercise No 2.1: ( 2 Hours) – 3 Practical**

**TO STUDY OF DIFFERENT WATER TURBINES.**

**THEORY:-**

**Q.1.** What is turbine in hydro power plant?

**Q.2.** Write down the classification of water turbine.

**Q.3.** Explain the following water turbine .

- 1) Pelton Wheel Turbine.
- 2) Francis Turbine.
- 3) Kaplan Turbine.
- 4) Propeller Turbine.

**CONCLUSION**



**Exercise No 2.1: ( 2 Hours) – 4 Practical**

**TO STUDY OF DIESEL POWER PLANT.**

**THEORY:-**

**Q.1.** Write the working principle of Diesel Power Plant.

**Q.2.** Explain the following parts of the diesel power plant in detail.

- 1) Fuel Supply System.
- 2) Air Intake System.
- 3) Exhaust System.
- 4) Cooling System.
- 5) Lubricating System.
- 6) Engine Starting System.

**CONCLUSION**

**Exercise No 2.1: ( 2 Hours) – 5 Practical**

**TO STUDY OF BOILER MOUNTING AND ACCESSORIES.**

**THEORY:-**

**Q.1.** Write down the classification of boiler.

**Q.2.** What is mean by boiler mounting?

**Q.3.** Explain the following boiler mounting devices

- 1) Safety Valve.
- 2) Water level Indicator.
- 3) Pressure Gauge.
- 4) Fusible Plug.
- 5) Feed Check Valve.
- 6) Steam Stop Valve.

**Q.4.** Explain the following boiler accessories.

- 1) Economizer.
- 2) Super heater.
- 3) Air pre heater.
- 4) Feed water pump.

**CONCLUSION**

## Exercise No 2.1: ( 2 Hours) – 6 Practical

### **TO STUDY OF CENTRIFUGAL PUMP.**

#### **THEORY:-**

**Q.1.** Write down the classification of centrifugal pump.

**Q.2.** Explain the following parts of the centrifugal pump in detail.

- 1) Impeller.
- 2) Closed Impeller.
- 3) Semi-open Impeller.
- 4) Open Impeller.
- 5) Delivery Pipe.

**Q.3.** Write down the working of centrifugal pump.

**Q.4.** What are the load losses in centrifugal pump.

#### **CONCLUSION**

