

## Mechanical Engineering

### List of PBLs (Problem Based Learning)

#### 1. Working Model of Reciprocating Pump

A reciprocating pump is a type of positive displacement pump where a piston or plunger moves back and forth (reciprocates) within a cylinder to displace and transport fluids. This back-and-forth motion creates pressure differences, which draw fluid into the cylinder on the intake stroke and push it out on the discharge stroke.

#### 2. Working Model of Kaplan Turbine

A Kaplan turbine is a type of water turbine that is specifically designed for low-head, high-flow applications. It is a type of axial-flow reaction turbine, meaning the flow of water is parallel to the axis of the turbine and it operates on the principle of both reaction and impulse.

#### 3. Solution of Numerical Problem by using C language.

Make the solution of Problem based on Francis, Pelton and Kaplan turbine by using some software language like C.

#### 4. Working model of Draft tube

A draft tube is an essential component in reaction turbines, such as Kaplan and Francis turbines, used in hydroelectric power plants. It is a diverging tube or conduit that is attached to the exit of the turbine runner, serving several important functions in the operation of the turbine and the overall efficiency of the power plant.

#### 5. Case study on fluid

A fluid is a substance that can flow and does not have a fixed shape. Fluids can be either liquids or gases. The defining characteristic of a fluid is its ability to deform continuously under the action of a shear force, no matter how small that force may be.



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looking at the scientific literature and identifying compounds that have been studied and found to have medicinal properties. Alternatively, a botanist or pharmacologist may be consulted to help identify and evaluate the medicinal properties of a leaf. This work provides information on the medicinal benefits on health as well as the fast identification of medicinal plants. The aim of this PBL is to develop a system using convolutional neural networks (CNNs), to determine a variety of medicinal leaf properties. This can be used to identify characteristics of medicinal leaves, such as shape, color, size, and texture. By training a CNN on a set of medicinal leaf images, it is possible to accurately classify them and extract data on the properties of the leaves.

## **6. Early Diagnosis of Alzheimer’s Disease**

Alzheimer’s disease (AD) is a progressive neurodegenerative disorder that is characterized by a gradual deterioration of memory and other cognitive functions. Early diagnosis of AD is important in order to start treatment as soon as possible and slow the progression of the disease. Deep learning-based convolutional neural network (CNN) architectures can be used to detect AD in its early stages. The aim of this PBL is to develop a Deep learning-based convolutional neural network system that can be used for early detection of Alzheimer’s disease using MRI and PET scans.