

Ex.No-2**PANDAS****AIM:**

To analyse and study the best performance point of Reciprocating pumps using Pandas.

PROCEDURE :**1. Dataset Creation:**

Create a hypothetical dataset containing information about actual discharge(m³/s), input power(W), and output power(W).

2. Correlation Analysis :

Calculate the correlation matrix to examine the relationships between actual Discharge, input power, and output power using pandas' 'corr()' function.

3. Efficiency calculation :

Calculate the efficiency for each input value using the given formula: Efficiency(%)
$$= \text{Output_power} / \text{Input_power} * 100$$

4. Head calculation:

Calculate the total head for each performance using the given formula : Head (m) =
$$\text{output_power} / \text{actual discharge} * \rho g$$

5. Best Efficiency Point (BEP) :

Identify the Best Efficiency Point of the reciprocating pump from the efficiency by selecting the highest index values using the pandas' 'nlargest()' function

PROGRAM:

```

import pandas as pd
data={
    'Actual Discharge':[40,50,60,70,80,90],
    'Input Power':[1,2,3,4,5,10],
    'Output Power':[70,30,90,100,140,170]
}

density=1000 gravity=9.81

a=pd.DataFrame(data)

a['Efficiency']=(a['Output Power']/a['Input Power'])*100

a['Head']=(a['Output Power']/a['Actual Discharge'])/(density*gravity)
corr_matrix=a.corr()

print(corr_matrix)

max_efficiency=corr_matrix['Efficiency'].nlargest(2).iloc[1]

print("\nParameter with the highest correlation with efficiency=",max_efficiency)

```

OUTPUT:

```

      Actual Discharge  Input Power  Output Power  Efficiency  \
Actual Discharge      1.000000      0.922018      0.901611  -0.614487
Input Power           0.922018      1.000000      0.881684  -0.533271
Output Power          0.901611      0.881684      1.000000  -0.227847
Efficiency            -0.614487  -0.533271     -0.227847      1.000000
Head                  0.466245      0.489913      0.797480      0.391574

      Head
Actual Discharge  0.466245
Input Power      0.489913
Output Power     0.797480
Efficiency       0.391574
Head             1.000000

Parameter with the highest correlation with efficiency= 0.3915744643953921

```

Result:

The programs were run successfully