Assignment

1. Redo assignment 1(it for those who did submit assignment 1 but have taken H values as input, either upload the steam table or assume a temp pressure value and do according to it)
   220989 221147 220574

2. You are given four different data points, differentiate between them as a single pump, series, and parallel. Plot efficiency of pump vs Flow rate and draw conclusions from it.
   To find it you can use a formula sheet which is attached below.
   excel

3. State and thoroughly explain three different approaches used in the real case working power cycle other than what we studied.

For 2nd and 3rd part you have to make a pdf file.

A	=	Area of measuring tank, m^2.
EMC	=	Energy meter constant, Pulses/kW-hr
E_i	=	Pump input, kW
E_S	=	Shaft output, kW
E_o	=	Pump output, kW
F_L	=	Flow rate, LPH.
g	=	Acceleration due to gravity, m/sec^2.
H	=	Total Head, m.
h_{pg}	=	Height of pressure gauge from suction of the pump, m.
N	=	Speed of Pump, RPM.
P	=	Pulses of energy meter.
P_d	=	Delivery pressure, kg/cm^2
P_{S1}	=	Suction pressure of pump 1, mmHg.
P_{S2}	=	Suction pressure of pump 2, mmHg / kg/cm^2.
Q	=	Discharge, m^3/sec.
t_p	=	Time taken for P pulses of energy meter, sec.
ρ	=	Density of fluid, kg/m^3.
η_p	=	Pump efficiency, %.
η_o	=	Overall efficiency, %.
η_m	=	Motor efficiency, %

EMC = 3200 pulses/kW Hr

ρ = 1000 Kg/m^3

h_{pg} = 1 m

g = 9.81 m/s^2

η_M = 0.8 (assumed)

PUMP INPUT

$$E_i = \frac{p}{t_p} \times \frac{3600}{\text{EMC}}$$

- **SHAFT INPUT:** $E_S = \eta . E_i$

- **FLOW RATE:** To calculate flow rate and convert it from LPH to m^3/sec

$$Q = \frac{F_l}{1000 \times 3600}$$

- **TOTAL HEAD:**

For individual and series: $$H = 10\left(P_d + \frac{P_{S_1}}{760}\right) + h_{P_g}$$

For parallel: $$H = 10\left[P_d + \frac{\left(\frac{P_{S_1} + P_{S_2}}{2}\right)}{760}\right] + h_{P_g}$$

- **PUMP OUTPUT:**

$$E_0 = \frac{PgQH}{1000},$$ 1000 is multiplied to obtain the values in kW.

- **PUMP EFFICIENCY:**

$$\eta_0 = \frac{E_0}{E_i} \times 100$$

$$\eta_s = \frac{E_0}{E_s} \times 100$$