MINOR -1 (February 2014)

CH 390 N - PROCESS UTILITIES

(Answer all questions) Time: 1 hrs

[List any assumptions made]

1. a) A blower of capacity 1.5 X 10 5 m^3/hr was installed in duct line of 700 mm diameter. Calculate the velocity and flow rate at positions 200m and 100m length where temperatures are 250 °C and 360 °C.

   b) Estimate decrease in power consumption in kwh/day, if the temperature of the air is reduced to 160 °C. from 250 °C and 360 °C

   c) Estimate the amount of water available at 25 °C required to cool the air from 360 °C to 35 °C. What will be exit temperature of water in °C.
   Density of air, ρ [Kg/m^3] is related to Temperature T [°K] as $\rho = 359.49T^{-1.00275}$

2. a) write difference between L-shape and S- type pitot tube
   b) The pressure drop measured with S-type pitot in a duct of 30 cm was 100 mm WG. Estimate flow rate in cu.m/hr through the duct. The coefficient of pitot tube is 0.97.

3. a) Estimate the diameter of duct to be used for air flow rate of 4000cu.m./hr
   b) List instruments, valves, accessories required for Air pipe line.

4. a) Write three differences between the Blower and compressor
   b) Why storage tank is used for compressor
   c) Why by-pas line is used for blower pipeline

5. a) What are industrial gases taken out from air

   b) Which method is used for separation rare gases from air?

   c) What type of valve is used to control air flows and pressure.

6. Write note in 500 words on long problem with the following topics

   a) Major title you can give

   c) Key words used

   d) Specific industrial application

   e) Research paper

   f) Brief description of process