MINOR TEST I - BULK MATERIALS HANDLING : ITL 752

Time Allowed : **One hour** **Max. Marks: 15**
Date: **02.09.2015**
Answer all questions

1. (a) Explain, with the aid of suitable diagrams, why aerodynamic machines are rarely used as air movers for pneumatic conveying systems. (2)

   (b) A combined positive / negative pressure conveying system is to be installed in a plant to handle pvc resin powder. A single blower / exhauster is to be used which has a rating of 0.40 m^3/s at free air conditions when operating between -0.3 bar guage and 0.4 bar gauge. The minimum conveying air velocity recommended for pvc resin powder in this type of system is 12 m/s. Rotary valves are used to feed the product into the conveying lines. Using the model described below:

   (i) Determine suitable standard pipe sizes for the two pipelines. (3)

   (ii) Determine the maximum and minimum values of conveying air velocity in each line. (3)

   The basic features of the model are:

   1. Product feeding into the 30 m long suction line and from the 40 m long positive pressure line are both at atmospheric pressure of 101.3 kN/m^2 absolute
   2. Free air conditions relate to a pressure of 101.3 kN/m^2 absolute and a temperature of 288 ^oK.
   3. The air leakage across the rotary valve in the positive pressure line is 0.07 m^3/s of free air.
   4. Standard pipelines are available in 25 mm increments in bore sizes.
   5. Losses associated with the transition section in the stepped pipeline can be neglected.
   6. The air temperature of the air and product can be taken as 20^0 C in the suction line and 40 ^0C in the pressure line.

2. Explain the function of a feeding device when used to supply material to a positive pressure pneumatic conveying system. With the help of a suitable sketch, explain the operational features of Rotary Valves when feeding a positive pressure conveying line. (4)

3. Discuss the difference between dilute phase, moving bed type dense phase and plug type dense phase flow in a pneumatic conveying pipeline (3)

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permeabil.