MAJOR TEST
Bulk Materials Handling ITL 752

Max. Marks: 35

Time Allowed: Two Hours
Date: 18.11.2017

Answer All Questions

1. (a) Discuss the constructional and operational features of two basic types of bucket elevators in accordance with the discharge arrangement. (4)

(b) For a centrifugal discharge type of bucket elevator, determine the suitable location for the casing so that the material is discharged into the chute without any spillage. Mention the assumptions made. (4)

2. (a) Illustrate, with the aid of sketches, the following features of belt conveying systems:

(i) Standard 3-roll drive
(ii) Snubbed drive
(iii) Arrangement of components of a belt conveyor (3)

(b) For a particular belt conveyor application, two idler arrangements are being considered; a flat idler arrangement and a standard three idler set. The carrying capacity can be improved using a three idler set. However this is offset by the additional cost and complexity of the configuration. Assuming a surcharge angle for the material, $\delta = 25^0$ and an angle of wing idler to the horizontal, $\beta = 50^0$, determine how much of an increase in belt contact perimeter will be required if a flat belt configuration is to be used rather than a three idler arrangement assuming that the belt speed is same in each case. Material cross-sectional area for each belt can be expressed as follows: (3)

$A = 1/6\ b^2 \tan \delta$ for flat belts

$A = U\ b^2$ for troughed belts

Where the symbols have their usual meaning. Shape factor for a standard three idler system is given in the fig. **(On Back Page)**

(c) Assuming a three idler set is adopted for the application, determine the belt width required for a duty of 150 t/h at a belt speed of 3 m/s. (assume the bulk density for the material is 1000 kg/m^3) (3)

$B_{min} = 1.11b + 0.056$

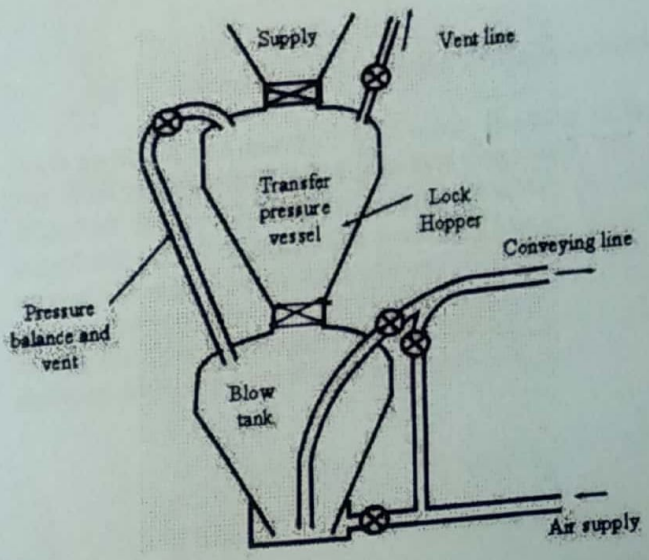
3. (a) Give examples of different types of screw conveyor flighting and discuss the particular applications for each one. (Sketches not required) (3)

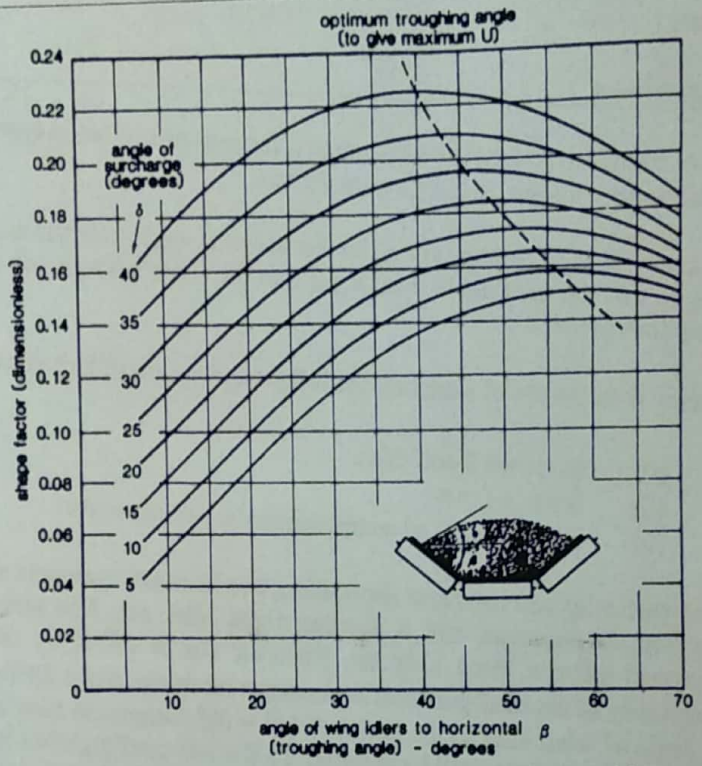
(b) Draw a sketch of the Auger Conveyor and compare the differences between the auger conveyor and U-Trough conveyors. (3)

4. (a) What do you understand by Scaling Parameters in pneumatic conveying system pipelines? With the help of a Conveying line pressure drop vs the exit air velocity graph, explain how the location of the step can be identified. (4)

(b) What do you understand by Fluidisation. Explain how the minimum fluidizing velocity can be determined using a Permeameter. (4)

(c) With the help of the sketch shown below, explain how a twin blow tank arrangement **in series** can be used for continuous conveying of material. (4)





Shape factors for standard three-roll idler set having all rollers of the same size.