53 (FPT 702) FPED

2018

FOOD PROCESS EQUIPMENT DESIGN

Paper : FPT 702

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Write short notes on sizing and costing of food equiptment. 6

   (b) Mention the properties/characteristics of materials that has to be considered during the designing of food equipment. 3

   (c) Write about the properties of plastic materials which are used in the construction of food equipment. 6

(d) Discuss about the steps in the fabrication process of food equipment. 5

2. (a) Explain *any five* construction characteristics which should be considered in the selection of a Food Processing Equipment. 10

(b) List out the factors which should be considered during the selection of mechanical conveyors. 4

(c) Give the schematic diagrams (one for each category) for the following conveyors : 2+2+2=6

(i) Screw conveyors

(ii) Skatewheel conveyors

(iii) Segmented belt conveyors.

3. (a) Write in detail about the working principle of chain conveyors with suitable diagrams. 10

(b) A belt conveyor with an inclination of 15° to the horizontal is to be used for the transportation of cocoa from the storage house. The bulk density of cocoa is $4000 kg/m^3$. Production at the time is $2500 tonne/h$. If the width is $1{\cdot}7 m$, then calculate the belt speed of the conveyor.

Data : $K_a = 0{\cdot}095$; $C_i = 0{\cdot}8$. 4

(c) $500 tonne/h$ of spray dried whey protein is to be transported to the packing area by a horizontal screw conveyor. With the following data specify the screw arrangement.

Data :

bulk density = $1800 kg/m^3$

Filling coefficient = 0·21

Screw pitch/diameter of the screw = 0·5

Speed of the screw shaft = $60 rpm$

$C_i = 1{\cdot}0$

6

4. (a) Discuss about the working mechanism of pneumatic conveyors with proper diagrams. 10

(b) Classify the heat exchangers based on fluid flow arrangement. 4

(c) Give a representative diagram of shell and tube heat exchanger. 6

5. Explain the following parts of shell and tube heat exchangers :

(i) Tube sheet 10

(ii) Shell side and tube side passes 6

(iii) Baffle and tie rods. 4

6. (a) Write in detail about the following sorting systems for grains :

(i) Cylindrical separators 4

(ii) Disc separators 4

(iii) Color sorters. 2

(b) Detail *any four* screening systems for solid particles. 10

7. (a) Write about the different types of steel used in the construction of pressure vessels. 10

(b) Give short note on Head *or* Cover component of a simple pressure vessel. 10
