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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 steel which is used in the manufacturing of food equipment. 8
- (b) Explain about different stress which are the influencing factors is the fabrication process of food equipment. 8
- (c) What are all the sequential operations is CIP system ? 4
2. (a) Explain *any five* operational characteristics which should be considered in the selection of food equipment. 10

*Contd.*

(b) A belt conveyor with an inclination of  $20^\circ$  to the horizontal is to be used for the transportation of cocoa from the storage house. The bulk density of cocoa is  $6000 \text{ kg/m}^3$ . Production at the site is  $3000 \text{ tonne/h}$ . If the width is  $2 \text{ m}$ , then calculate the belt speed of the conveyor.

Data :  $K_a = 0.095$  ;  $C_i = 0.8$  4

(c)  $100 \text{ tonne/h}$  of spray dired when protein was transported to a packaging area by a horizontal screw conveyor. With the following operational data specify the screw arrangement for the safe transport. 6

Data :

Bulk density =  $1500 \text{ kg/m}^3$

Filling co-efficient =  $0.25$

Screw pitch/diameter of screw =  $0.7$

Speed of the screw shaft =  $70 \text{ rpm}$

$C_i = 1.0$ .

3. (a) Explain the functioning of uniform belt conveyors with proper diagrams. 10

(b) Write about the working principle of screw conveyor with suitable schematics. 10

4. (a) Write the TEMA classification of heat exchangers. 3
- (b) How the heat exchangers are categorized based in fluid flow arrangement ? 4
- (c) Explain the following types of heat exchangers.
- (i) Fixed tube sheet exchanger 3
- (ii) Outside packed floating head exchanger 4
- (iii) Inside floating head exchanger 4
- (iv) U-tube type exchanger. 2
5. (a) Write about the expansion provision in shell and tube heat exchangers. 10
- (b) Explain the designing aspects of channel and channel cover is shell and tube heat exchangers. 5
- (c) Mention the factors determining the effectiveness of hand grading. 5
6. (a) Explain *any four* sorting systems for grains. 10
- (b) Detail *any four* screening systems for the separation of particles. 10

7. (a) Write about the different types of alloys used in the construction of pressure vessels. 5
- (b) Explain the following components in the designing of pressure vessels.
- (i) Cylindrical and spherical shells 10
- (ii) Flanges. 5
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