END SEMESTER EXAMINATION, NOVEMBER-2018

Semester : 5th

Subject Code : FPT-502

FOOD ENGINERRING OPERATIONS-I

Full Marks – 70

Time – Three hours

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

Instructions :

1. *All* questions of PART–A are compulsory.

2. Answer any *five* questions from PART–B.

PART– A

Marks – 25

1. Fill in the blanks :   1×5=5

(a) In a HTST pasteurizer, milk is heated to _____ .

(b) Operation of hammer mill is an example of dynamic force application by _____ .

(c) Jaw crusher is of two types : One is Black type and other is _____ .

(d) The angle of repose in flat belt idler is _____.

(e) The spacing of idlers should not exceed _____ meters.

2. Write true or false :   1×10=10

(a) Sterilization is a heat treatment process where the micro-organisms and harmful pathogens are destroyed completely.

(b) Mass neither be created nor be destroyed as per laws of conservation of mass.

(c) Bucket elevators is used to transport materials within the plant premises.

(d) Pneumatic conveying is the excellent methods of transporting powders in closed containers.

(e) Hammer mill categorized under grinding.

(f) Ultra-filtration is a classic example of cross-flow filtration.

(g) Diatomaceous earth is used as filter aid.

(h) The tension developed at the drive pulley in transmitting the required powder to move the loaded belt is known as effective tension.

(i) The air velocities inside the flowing pipes of pneumatic conveyors are 50-70 m/sec.

(j) The ball mill is used to reduce the size by impact and sheering.

3. Choose the correct answer :   1×10=10

(a) Belt conveyor is used in

   (i) material transportation over long distance

   (ii) material transportation within the premises

   (iii) Both (i) and (ii) above

   (iv) lifting of materials

(b) HTST pasteurization means

   (i) High temperature simple tank

   (ii) High time short temperature

   (iii) High temperature short time

   (iv) High time small temperature

(c) The hammer mill is used to reduce the size by

   (i) Shear   (ii) Impact

   (iii) Cutting   (iv) Crushing

(d) In which process of size reduction, minimum deformation and rupture results and the new surface created is more or less undamaged ?

(i) Impact   (ii) Compression

(iii) Cutting   (iv) Crushing

(e) The size of the agricultural products may be reduced by

(i) Shear

(ii) Impact

(iii) Crushing an compression

(iv) All of the above

(f) When a material is subjected sudden blow of force in excess of its strength, if fails is called

(i) Shear   (ii) Impact

(iii) Cutting   (iv) Crushing

(g) The process of heat treatment in which partial cooking of product takes place to inactivate and destroy the enzymes is called

(i) Blanching   (ii) Cooking

(iii) Deep-fat frying (iv) Roasting

(h) Transpiration of powder materials inside the plant is taken place using

(i) Bucket elevator

(ii) Belt conveyors

(iii) Pneumatic conveyors

(iv) None of the above

(i) Law of grinding which is more applicable for fine grinding is

(i) Bond's Law

(ii) Kick's law

(iii) Rittinzer's Law

(iv) None of the above

(j) The process of forming crystals from solution is known as

(i) Drying   (ii) Sedimentation

(iii) Evaporation   (iv) Crystallization

PART – B

Marks – 45

4. (a) Write the Law of conservation of mass. 3

 (b) In an evaporator, dilute material enters and concentrated material leaves the system. Water is evaporated during the process. If I is the weight of the dilute material entering the system, W is the weight of water vaporized, and C is the weight of the concentrate, write an equation that represents the total mass balance for the system. Assume that a steady state exists.

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5. (a) Classify various types of material handling / transportation systems.

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 (b) What are the various applications of material handling systems in food processing industries ?

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6. (a) With neat labelled diagram discuss pneumatic conveying system.

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 (b) If moisture content of freshly harvested 100 kg paddy is 24% wb and it is dried to 16% wb, calculate the loss of moisture in drying ?

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7. (a) Discuss the different factors which affect size reduction of agricultural food materials. 2

 (b) What are the various laws of grinding ? Explain them. 7

8. Differentiate the following :

 (a) Crushing and Grinding 3

 (b) Drying and Dehydration 3

 (c) Jaw crusher and Gyratory crusher 3

9. (a) What is meant by Crystallization ? What are the various types crystallizers available in industrially ? 5

 (b) Describe a batch crystallizer with a neat diagram. 4

10. Write short notes on :

 (a) Cake filters 3

 (b) Bonds Law 3

 (c) Screw conveyor. 3