Total No. of Questions : 7]          [Total No. of Printed Pages : 4

# PG DIPLOMA IN FOOD SCIENCE AND TECHNOLOGY (PGDFT)

### Term-End Examination

### June, 2014

### MFT–003 : (FOOD PROCESSING AND ENGINEERING)

Time : 2 Hours]                    [Maximum Marks : 70

*Note* :– Attempt any *Five* questions. All questions carry equal marks. Question No. **5** is compulsory.

1. (a) Define specific heat, thermal conductivity and explain their applications in food processing.  4

   (b) Write the importance of surface heat transfer coefficient and solve the following problem.

   Sugar solution is being heated in a jacketed pan made from stainless steel, 1.6 mm thick. Heat is supplied by condensing steam at 200 kPa gauge in the jacket. The surface transfer coefficients are, for condensing, steam and for the sugar solution, 12,000 and 3,000 J $m^{-2}$ $s^{-1}$ $°C^{-1}$ respectively, and the thermal conductivity of stainless steel is 21 J $m^{-1}$ $s^{-1}$ $°C^{-1}$. Calculate the quantity of steam being condensed per minute if the transfer surface is 1.4 $m^2$ and the temperature of the sugar solution is 83°C. Given steam tables value of saturation temperature of steam at 200 kPa gauge/300 kPa Absolute is 134°C, and the latent heat = 2164 kJ $kg^{-1}$.  10

2. (a) Differentiate between sorting and grading with appropriate examples of these operations. 4

(b) What are the important factors to be considered for design of belt conveyors and bucket elevators. 6

(c) Write importance of material balance in process calculations and for a solution of common salt in water is prepared by adding 20 kg of salt to 100 kg of water, to make a liquid of density 1323 kg $m^{-3}$. Calculate the concentration of salt in this solution as a (a) weight/weight fraction, (b) weight/volume fraction, (c) mole fraction, (d) molar concentration. 4

3. (a) Give an idea about crushing efficiency through empirical relationships given by Rittinger's and Kick's law. 6

(b) List the application of machanical centrifungation in the food industry. 8

4. (a) Write short notes on any *three* :

(i) Bulk Density

(ii) Angle of repose

(iii) First law of thermodynamics

(iv) Storage conditions of fruit and vegetables

(v) Blanching

(vi) Importance of sorting. 2×3=6

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(b) Expand the following any *eight* :

   (i)  CA      (ii)  MA      (iii)  CAP

   (iv) HPP    (v)  OH      (vi)  PFE

   (vii) HHP   (viii) Ds    (ix)  LPG

   (x)  CNG   (xi) CFTRI  (iii)  MOFPI      1×8=8

5. Fill in the blanks :

(i) Size reduction ratio is the average size of the feed particle .................. by the average size of the product particle.

(ii) Ultrasonic homogeniser use .................. sound waves.

(iii) Flame peeler consists of .................. belt which transports and rotates the material through a furnace heated to temperature above .................. .

(iv) Pneumatic conveyor are used for conveying fine granular or powder material such as .................. .

(v) Tapping often is an effective method of .................. control.

(vi) Velocity = Distance/ .................. .

(vii) Canning is a process in which food materials are sealed .................. in a container.

(viii) Most important factor in proper storage of oil seeds is there .................. .

(ix) Major food preservation techniques are based on the delay or prevention .................. growth.

(x) High pressure processing refers to the application of high hydrostatic pressure to food in a range of 100 to ................. MPa.

(xi) Expression is the process of mechanically ................. liquid out of liquid containing solids.

(xii) Thermal diffusivity is the ratio of thermal conductivity to ................. capacity.

(xiii) Hammer mills are widely used for ................. and fibrous material.

(xiv) Flotation washing employs ................. differences between food units and contaminants.          1×14=14

6. (a) What are factors affecting efficiency of expression of juices from fruits ?          7

   (b) Write a detailed note on microwave heating of foods in terms of source, frequency, applications in food drying and limitations.          7

7. (a) Write a preliminary report on establishing dairy plant with its proposed layout. You can assume your own scale of operation and scope of the plant.          10

   (b) Describe Ohmic heating as a process of food preservation with its advantages and limitations.          4

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