Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2141407 **Date:24/11/2016**

Subject Name:Food Drying & Dehydration

Time:02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 State the following sentences are TRUE or False **14**

1. Dehydration of food is done to change the colour.
2. The removal of water as vapour depends upon external conditions
3. The movement of moisture internally is a function of the physical nature of solid.
4. Drying prevents the mould growth, fermentation and sprouting of grains.
5. Fourier's law of heat conduction is used to find the thermal properties of foods.
6. A solid comprised of free electrons and atoms bound in a periodic arrangement called a lattice.
7. Dry porous solids are very poor heat conductors.
8. EMC of a food product is a thermodynamic property.
9. The SI unit of Moisture diffusivity is m 3 /s.
10. If m.c. on wet basis is 80%, the % m.c. on dry basis 120%.
11. Constant rate drying of foods depends on its bound moisture content.
12. Water activity decreases with increasing temperature.
13. Freeze drying takes place due to liquid diffusion.
14. Fluid bed dryer is an example of hybrid dryer.

Q.2 **(a)** Discuss in brief about (1) Adiabatic efficiency of dryer, (2) COP of dryers, (3) Freeze Dryer. **03**

(b) 1000kg of wheat at 25% (w.b) moisture content is dried to 12% (w.b) moisture content for milling. Calculate amount of water present in fresh and dried wheat. Also calculate the amount of wheat after drying. **04**

(c) List out different advantages of drying. Also list out the different unique features of drying. **07**

OR

(c) A typical food is first dried at a constant rate of 0.24 kg/minute/kg dry matter and reaches to its critical moisture content of 1.42 kg/kg dry matter. Product is having an initial moisture content of 79% (w.b). Find out the total drying time in minutes if final moisture content of the product is 5% (wb). **07**

Q.3 **(a)** Give the advantages and limitations of Superheated Steam Drying. **03**

(b) Discuss the properties of various types of dry food powders. **04**

(c) Differentiate between sun drying and mechanical drying and state their advantages and **07**

disadvantages.

OR

Q.3	**(a)**	Explain the working principle of LSU dryer with a diagram.	**03**
	(b)	Explain Equilibrium Moisture Content. Discuss the importance of water activity.	**04**
	(c)	Discuss the different models to predict thermal conductivity.	**07**
Q.4	**(a)**	Explain the mechanism of mass transfer by capillary action and liquid diffusion during drying of foods.	**03**
	(b)	200kg of paddy at 23% (w.b.) moisture content is dried to 12% (d.b.). Calculate 1. Initial and final moisture content 2. How much moisture is removed 3. What shall be the moisture content when the final weight is 185kg?	**04**
	(c)	What are the different thermal properties, list out its importance in food.	**07**

OR

Q.4	**(a)**	Discuss the basic principle of SSD also mention the factors contributing to the feasibility of SSD.	**03**
	(b)	Discuss the following: Constant rate drying and Falling rate drying.	**04**
	(c)	Discuss different chemical properties of food as quality evaluation parameters.	**07**
Q.5	**(a)**	Calculate the specific heat of Water, Carbohydrate, Protein, Fat and Ash at 25^0C. Make assumptions if required.	**03**
	(b)	What are the different criteria for the selection of industrial dryers?	**04**
	(c)	What are the importance of physical quality like porosity, shrinkage and rehydration?	**07**

OR

Q.5	**(a)**	What is hysteresis? Describe hysteresis graphically along with its phenomena.	**03**
	(b)	Discuss the free moisture and explain thin drying of food products with diagram.	**04**
	(c)	Classify the criteria of fluidized bed dryer and explain the difference between the selections criteria of spray and fluidized bed dryer.	**07**