2022

Food Process Engineering

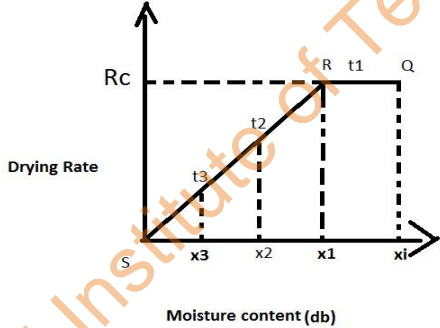*Full Marks: 100*

Time: Three hours

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

*Answer **any five** questions.*

1.	a)	How do you classify the drying equipment?	10
	b)	What is meant by falling rate period? Why do it occur in drying process?	10
2.	a)	Determine the value of constant c and n from Henderson's equation for the following data obtained under two different conditions of EMC studies of sunflower seed.	10
	b)	2oo kg of wheat at 23% moisture content (wet basis) is dried to 12% (dry basis). Calculate the initial moisture content of the paddy (dry basis) and how much moisture is removed during drying?	10
3.		Differentiate the following (any four)	4X5=20
	a)	Thin layer drying and Deep-Bed Drying	
	b)	Falling Film Evaporator and Rising Film Evaporator	
	c)	Wet Bulb temperature and Dry bulb temperature	
	d)	Wet basis and Dry basis of moisture content	
	e)	Forward feeding and backward feeding arrangement in evaporation	
	f)	Evaporation and Distillation	

Table in Question 2a:

Conditions	Relative Humidity, %	Temperature, °C	EMC (% dry basis)
1	50	40	10
2	70	50	13

4.	a)	The humidity ratio of atmospheric air at 20^0C dry bulb temperature (DBT) and 101.32 kPa is 0.012 kg/kg of dry air. Determine a) Relative humidity b) Degree of saturation c) Humid volume (Data given partial pressure of water vapor: 0.019 bar, dew point temperature: 17^0C, Saturation pressure of vapor: 0.032 bar) Refer/Use Psychometric chart for details	3+7=10
	b)	With neat labeled diagram explain humidifier.	3+7=10
5.	a)	A batch of wet solid whose drying rate curve is represented by the following figure is to be dried from 0.40 kg water per kg dry solids to 0.10 kg water per kg dry solids in three hours with constant air conditions. If the EMC = 3 % moisture content in dry basis, calculate the total time required from 35 % to 5 % moisture content in dry basis. 	10
	b)	What do you mean by EMC? Write down the different models associated with EMC of agricultural products	3+7=10
6.	Write short notes on the following (any four)		4X5=20
	a)	Hysteresis effect	
	b)	Calendria Evaporator	

	c)	Relative Humidity	
	d)	Moisture content determination method using hot air oven method	
	e)	Degree of Saturation	
	f)	De-Humidifier	
7.	a)	Describe with a neat diagram spray dryer and its application in food processing.	3+7=10
	b)	List out and discuss different process in psychometric chart with diagram.	10