53 (FPT 503) FPEN

2014

FOOD PROCESS ENGINEERING

Paper : FPT 503

Full Marks : 100

Time : Three hours

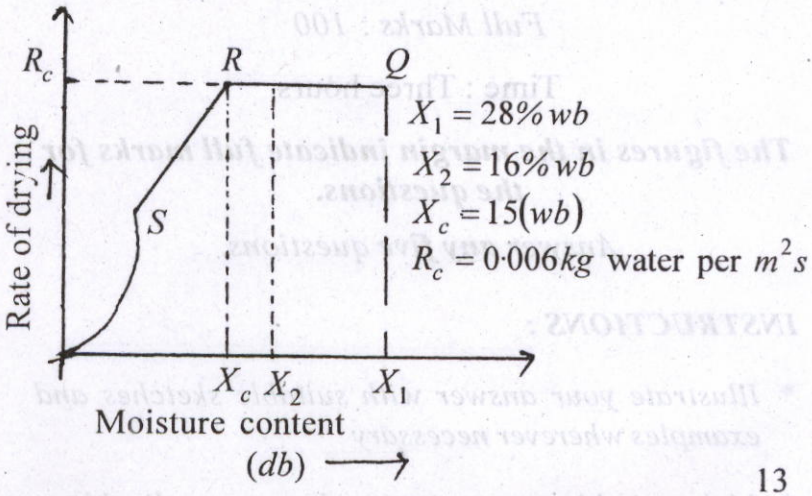
The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

INSTRUCTIONS :

* *Illustrate your answer with suitable sketches and examples wherever necessary*
* *Make suitable assumption(s) wherever applicable.*
* *Preferably, write the answers in sequential order.*
* *Refer psychrometric chant for Qn. no. 4.*

1. *(a)* A batch drying process of 100*kg* food powder whose drying curve represented by following figure is dried from 28% moisture content (wb) to 16% moisture content (wb) at a constant rate of $0{\cdot}006\ kg/m^2s$. The critical moisture content is 15%. Estimate the batch drying time if drying surface is $0{\cdot}03m^2$ per *kg* of dry weight.



13

(b) 1000*kg* of parboiled paddy is to be dried from 32% moisture content (*wb*) to 13% moisture content (wb). Calculate the amount of moisture to be evaporated. 7

2. *(a)* A continuous single-effect evaporator is to be fed with 5000 *kg/h* of solution containing 1 wt% solute. The feed is at temperature of 303*K*. It is to be concentrated to a solution of 2 wt% solute. The evaporation is at atmospheric pressure (101·3 *KPa*) and the area of evaporator is 69·7 m^2. Saturated steam supplied at 143·3 *KPa* for heating. Calculate the amounts of vapour and liquid product and the overall heat transfer coefficient. 12

(b) Calculate the equilibrium moisture content of brinjal seed at relative humidity of 10% and temperature of 50°*C* using Hendenson's equation. Given that constants '*C*' is $6{\cdot}5\times10^{-6}$ and '*n*' is 1·8. 8

3. *(a)* A Filtration test was carried out with particular product slurry, on a Laboratory Filter Press under a constant pressure of 140 *KPa* and volumes of filtrate were collected as follows :

Filtrate vol. (m^3)	0·023	0·037	0·049	0·061	0·068
Time (*min*)	10	20	30	40	50

The area of laboratory filter was 0·1M^2. In a plant scale filter, it is desired to filter a slurry containing the same material and under a pressure of 400 *KPa*. Estimate the quantity of filtrate that would pass through in 2 *hour* if the area of the filter is 3·09M^2. 12