

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 161404****Date: 05-12-2014****Subject Name: Food Drying & Dehydration****Time: 02:30 pm - 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** (a) Define the following terms **07**
1. Water activity
 2. Dehydration
 3. Coefficient of performance
 4. Novel dryer
 5. Critical moisture content
 6. Equilibrium moisture content
 7. Unheated air drying
- (b) Explain thin bed drying in brief. How much water must be added to potato granules containing 10% moisture (dry basis) to give a final mass of 50 kg with a moisture content of 80% (wet basis)? **07**
- Q.2** (a) What do you mean by equilibrium moisture content (EMC)? Mention the importance of EMC and with help of graphical representation (Moisture content dry basis versus Relative humidity) show EMC, Free moisture, Bound and Unbound moisture. **07**
- (b) Discuss solar energy based dryers. **07**
- OR**
- (b) Explain basic steps in design of vacuum and tray dryer. **07**
- Q.3** (a) Discuss factors affecting structural properties. **07**
- (b) What are the three principal stages in a freeze drying process? Briefly explain each stage. **07**
- OR**
- Q.3** (a) Convert moisture content in dry basis to wet basis and wet basis to dry basis. **04**
1. 140 % (db)
 2. 80 % (db)
 3. 20 % (wb)
 4. 45 % (wb)
- (b) Explain rehydration and rehydration ratio in detail. **03**
- (c) Drying is a simultaneous heat and mass transfer operation. Justify the statement. Explain flash drying in brief. **07**
- Q.4** (a) With help of a labeled diagram, explain the construction and working of a single- stage spray dryer. **07**
- (b) Write short notes on: **07**
1. PHTC dryer
 2. LSU dryer
- OR**
- Q.4** (a) Explain following terms: **07**
1. Fluidized bed drying
 2. Osmotic dehydration

- (b) Explain selection of a dryer in brief. 07
- Q.5 (a) List various novel and hybrid technology. Also explain how new technology is developed 07
- (b) Estimate the time necessary to dry dates from 75% to 20% moisture content (on wet basis) under constant external conditions. Under the conditions of the process, falling rate regime is known to prevail during drying. Linear relation between drying rate and residual moisture is assumed. The initial drying rate (when the moisture content of the dates is 75%) is 0.5 kg water removed per kg dry matter per hour. The moisture content of the dates at equilibrium with the drying air is 8% (wet basis) and the drying surface is 0.81 m² per kg of dry matter. 07
- OR**
- Q.5 (a) What do you mean by deep bed drying of food grains? With help of a schematic diagram, explain the deep bed drying of food grains and write the equations for the time of advance of drying front and decreasing rate period along with total drying time, indicating each variable with proper units. 07
- (b) Discuss quality changes during drying of food materials. 07
