Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – WINTER 2013

Subject Code: 131405 **Date: 26-11-2013**

Subject Name: Introduction to Food Processing Technology

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)** Explain the concept of mass balance in steady and non-steady state unit operations with the help of a suitable example. A single strength (fresh) mango juice with 10 % soluble solids is concentrated to 55% soluble solids in an evaporator. To improve the flavor of the final product, a certain amount of single strength juice is added to the concentrated juice so that the concentration of the final mixture becomes 40%. If the inlet juice flow rate is 1200 kg/h fresh juice, calculate **07**

(i) Water evaporation rate.
(ii) How much fresh juice per hour is being added back?
(iii) Rate of production of final product.

(b) Classify food materials and list major components of foods. State primary composition of the following products: Milk, Fruits, Cereals, Legumes, Vegetables and Spices and condiments. **07**

Q.2 **(a)** Explain the law of conservation of energy in process unit operations with the help of a suitable example. The Cheese processing section of a plant requires water to be heated from 20 °C to 80 °C @ 50 kg/s. To achieve this, saturated steam at 152 °C taken from a boiler is injected into a coil in direct contact with the water. The steam condenses in the coil and becomes liquid water at 90 °C. Draw a neat flow diagram depicting the process and calculate the amount of steam required to heat the water as stated above. **07**

Take specific heat of water = 4.2 kJ/kg and latent heat of condensation of steam = 2267 kJ/kg.

(b) State the functions of foods and define nutrients. Describe functions of various food nutrients in brief. Explain recommended daily allowances (RDA) of nutrients and state its significance. **07**

OR

(b) Discuss food as a source of nutrients. What is meant by Recommended nutrients and food refining? **07**

Q.3 **(a)** Discuss the status of food industry in India with relevant data and scope. Explain its need and importance. Describe future growth prospects in terms of revenue and employment generation. **07**

(b) State the need and importance of industrial training and exposure in the field of food processing. Discuss the steps needed to start a small scale food processing industry in a rural area. Enumerate the major operations involved in food industry. **07**

OR

Q.3 **(a)** Write short note on the following: **07**

1. PFA
2. Obesity
3. Heating as a method of food preservation.

(b) What are unit operations? Name and explain in detail various unit operations employed in food industries along with equipments and machinery used. **07**

Q.4 **(a)** State the use of steam tables in food engineering calculations. With the help of a neat diagram explain different phases of steam formation starting from ice to superheated steam. Define the following terms: **07**

(i) Enthalpy (ii) Latent heat
(iii) Sensible heat (iv) Specific heat

(b) Write meaningful notes on the following with examples: **07**

(i) Drying (ii) Distillation (iii) Packaging
(iv) Size reduction (v) Blanching

OR

Q.4 **(a)** Give the importance of blanching in the processing of fruits and vegetables. Briefly discuss the working of steam blancher and hot-water blancher. **07**

(b) Write meaningful notes on the following: **07**

(i) Pasteurization (ii) Wet bulb Temperature (iii) Relative Humidity
(iv) RTE Food (v) Centrifugation

Q.5 **(a)** What is psychometric chart? State its uses in food processing. Draw a neat labeled diagram of psychometric chart indicating various variables and processes and explain what is dry bulb temperature and dew point temperature. **07**

(b) Discuss the need and applications of instrumentation and control in food industry? Enumerate the instruments to measure the following: **07**

(i) Temperature (ii) Humidity (iii) Pressure (iv) ^{o}Brix (v) Colour
(vi) Power (vii) Fluid flow

OR

Q.5 **(a)** Explain the functions and importance of food minerals and vitamins. Explain in detail the causes of food spoilage and various methods of preservation. **07**

(b) Explain the following: **07**

(i) Food Quality (ii) Food Laws (iii) Cleaning and Grading
(iv) Moisture content (dry basis) (v) Heat exchangers

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