GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3151409
Numerical Concepts in Food Engineering
B.E. 5th SEMESTER

Type of course: Open Elective

Prerequisite: Nil

Rationale: Mathematical reasoning is an important skill for food engineer. Students will learn complete fundamentals of basic balance and transport principles used in food engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Sr. No.	Content	Total Hrs	% Weightage
1	**Heat and Mass Transfer:** Steady state conduction and convection heat transfer, Convective heat transfer coefficients, Radiation heat transfer. Molecular diffusion, Convective mass transfer	**8**	28
2	**Mass and Energy balance:** Steady state operation with no reaction, and with chemical reaction, Unsteady state operation with no reaction. Saturated steam, Superheated steam and Enthalpy balances.	**8**	28
3	**Interpolation and Curve Fittings:** Single interpolation, Double interpolation, Coordinate system, Logarithmic transformations- Semi-log graph and Log-log graphs	**3**	19
4	Rheology of Foods: Measurement of rheological properties, Continuity equations, determination of flow regime, flow of Newtonian fluids in pipe and Non- Newtonian fluids flow.	**5**	25

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**22**	**19**	**19**	**-**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Math Concepts for Food Engineering by Richard W. Hartel
Introduction to Food Engineering by Singh R. P.

Chemical Engineering Hand Book by Perry R. H.

Course Outcome:
After learning the course the students should be able to:

1. Understanding the numerical concepts in mass balance and energy balance
2. Understanding the numerical concepts in heat transfer, mass transfer, gasses and vapors
3. Understanding the modeling rheological behavior of foods and its measurement

List of Experiments:

1. Graphs and curve fittings
2. Interpolation of data in food engineering problems
3. Manipulations of equations and the rules of equations applied to food engineering
4. Numerical problems on Mass balance and Energy balance
5. Determination of flow regime in foods
6. Numerical problems onunsteady state heat transfer and Radiation heat transfer
7. Numerical problems on freezing of food products
8. Molecular diffusion on food products
9. Numerical problems on convective mass transfer
10. Numerical problems on unsteady state heat transfer