

M. TECH. (DAIRY TECHNOLOGY)

SEMESTER- I

Course Code	Course Title	L-T-P	Credits
MAS-701	Advanced Engineering Mathematics	3-1-0	4
MAS-711	Statistics- I	2-0-2	3
COMP-805	Computer Programming	2-0-2	3
DT-810	Dairy Chemistry and Microbiology	2-0-2	3

SEMESTER- II

Course Code	Course Title	L-T-P	Credits
MAS – 715	Statistics –II	2-0-2	3
DT-811	Dairy Plant Management	3-0-0	3
DT-812	Advances in Dairy Processing-I	2-0-2	3
DT- 815	Dairy Equipment Design & Plant Layout	3-0-0	3
DT-817	Dairy Plant Instrumentation & Process Control (Elective)	3-0-0	3
APFE- 810	Food Plant Design (Elective)	3-0-0	3

SEMESTER - III

Course Code	Course Title	L-T-P	Credits
DT-805	Quality Assurance in Dairy Industry (Elective)	2-0-2	3
DT-813	Advances in Dairy Processing – II	2-0-2	3
DT-814	Steam & Refrigeration Engineering	2-0-2	3
APFE- 801	Food Process Equipment Design (Elective)	2-0-4	3
DT-780	Seminar- I	0-0-2	1

SEMESTER - IV

Course Code	Course Title	L-T-P	Credits
DT-880	Seminar- II	0-0-2	1
DT- 899	Dissertation	0-0-30	15

SYLLABUS OF MASTERS OF TECHNOLOGY IN DAIRY TECHNOLOGY

I SEMESTER

MAS-701 ADVANCED ENGINEERING MATHEMATICS (3-1-2) 4 Credits

Gamma, Beta and Legendre's functions, Euler's equations, Lang-range equations, the Rix method, the Green's functions. Solzane Woirestrass theorem in finite products.

Laplace transforms, Inverse Laplace Transforms, and application to differential equations. Fourier series, Fourier transforms, Solution of non-linear algebraic and transcendental equation by Regula falsi method. Newton Raphson method.

Newton's forward and backward interpolation formula divided differences. Trapezoidal Rule, Simpson's $\frac{1}{3}$ rule, Numerical Solution of Ordinary differential equations by Runge Kutta Method, Picard's equations.

MAS 711 STATISTICS I (2-0-2) 3 Credit

Standard Deviation, Coefficient of variation, standard error of mean.

Theory of Probability: equally likely, mutually exclusive events, definition of probability, addition & multiplication theorems of probability & problems on theorems of probability & problems based on them.

Normal & Binomial Distributions.

Simple correlation and regression, Multiple- regression, Multiple & partial –correlation.

Testing of Hypothesis: Concepts of Hypothesis, Degrees of freedom, Level of significance, Type I & Type II errors. X^2 , t, F- tests (definition, applications & problems based on these tests)

COMP 805 **COMPUTER PROGRAMMING** **(2-0-2)** **3**
Credits

1. Algorithms & Flow Charts
2. 'C' Programming
 - (i) Preliminaries
 - (ii) Constants & Variables
 - (iii) Arithmetic Expressions
 - (iv) Input – Output statements
 - (v) Control Statement
 - (vi) Looping Statements
 - (vii) Subscripted Variables
 - (viii) Elementary Format Specifications
 - (ix) Logical statements & Decision tables
 - (x) Functions & Subroutines
3. Computer oriented numerical methods
 - (a) Solution of Non- Linear Equation
 - (i) Bisection Method
 - (ii) Newton Method
 - (b) Numerical integration
 - (i) Trapezoidal Method
 - (ii) Simpson's 1/3 & 3/8 rule
 - (c) Curve Fitting
 - (i) Construction of forward, backward difference table
 - (ii) Interpolation
4. Application of statistical packages

Practical List

1. To find the largest among three numbers.
2. To check whether a given string is a palindrome or not
3. To find factorial of a given number by iteration
4. To find whether the given integer is a prime number.
5. To find sum n terms of series: $a \cdot n^2/2! + n^3/3! - n^4/4! + \dots$
6. To find the sum and average of n integers using a linear array.
7. To read n umbers from the keyboard and display these numbers in the reverse order their entry.
8. To search a given number within a linear array.
9. To generate the fibbonacci series.

10. To find factorial of a given number using a function.
11. To deduce error involved in polynomial equation.
12. To find out the root of the Algebraic and Transcendental equations using Bisection, regula-falsi, Newton Raphson and Iterative methods. Also give the rate of convergence of roots in tabular form for each these methods.
13. To implement Newton's forward and backward Interpolation formula
14. To implement Gauss forward and backward, Bessel's Sterling and Everett's Interpolation formula
15. To implement Newton's Divided difference and Lagrange's Interpolation formula.
16. To implement numerical differentiations.
17. To implement Numerical integration using trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
18. To implement least square method for curve fitting.

DT- 810
Credit

DAIRY CHEMISTRY & MICROBIOLOGY

2-0-2 = 3

Chemistry and Metabolic functions of different milk products, compositions and properties of milk and milk products, Effect of processing on various constituents of milk in relation to physical, chemical and functional properties, chemical spoilage of milk; processing and waste treatments.

Introduction to milk micro-organisms. Effect of processing on milk micro-organisms Vis-a-vis milk preservation. Physical and Chemical factors affecting microbial growth and decay.

Instrumental measurements of colour, viscosity, tenderness, specific gravity, size and size distribution, firmness, texture etc. of various milk products. Analysis of major constituents, such as moisture, fat, protein and carbohydrates of milk and milk products, pH and acidity measurements.

Use of common bacteriological apparatus and equipment and their uses, cleaning of glassware and preparation for sterilization. Preparation of smears and staining. Preparation of nutrients, Broth and nutrient agar; estimation of bacteria by Agar plate. Method and Direct Microscopic count; microbial analysis of drinking water.

III SEMESTER

DT-814 STEAM AND REFRIGERATION ENGINEERING

(1-1-2) 3 Credits

Properties of Steam

Introduction, Formation of Steam, Total Heat (or Enthalpy) of Water, Latent Heat of Steam, Dryness Fraction, Wetness Fraction, Total Heat (or Enthalpy) of Wet Steam, Total Heat of Superheated Steam, Advantages of Superheating Steam Use of Steam Tables, Specific Volume of Steam, Volume of Superheated Steam, External Work Done during Evaporation, Internal

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Energy of Steam, Entropy of waters, Entropy of Evaporation's Entropy of Wet Steam s_g , Entropy of Superheated Steam,

Temperature Entropy Diagram for Water and Steam, Isothermal Lines on Temperature Entropy Diagram, Adiabatic Lines on the Temperature Entropy Diagram, Mollier Diagram or Total Heat Energy Chart for Steam, Methods of Heating and Expanding the Steam, Determination of Dryness Fraction of Steam; Type of Steam.

Boilers

Definition, Classification of Boilers, Comparison of Fire Tube and Water, Tube Boilers, Essentials of a Good Boiler, Factors Affecting Boiler Selection, Simple Vertical Boiler, Fraser Culman Boiler, Cochran Boiler, Lancashire Boiler, Cornish Boiler, Locomotive Boiler, Nestler Oil Fired Boiler, Babcock and Wilcox Boiler, Stirling Boiler, High Pressure Boilers, The Benson Boiler, The Loeffler Steam Generator, The Volex Steam Generator, La Mont Boiler, Boiler Mountings, Boiler Accessories, Steam Dryers or Separators, Steam Trap, Pressure Reducing Valve.

Performance of Boilers

Equivalent Evaporation, Factor of Evaporation, Boiler Efficiency, Efficiency of Economiser, Boiler Horse Power, Heat Losses in a Boiler, Heat Balance Sheet of a Boiler, Methods of Minimising the Heat Loss through Different sources, Boiler Draught, Natural Draught, Determination of the Height of Chimney, Determination of the Diameter of Chimney, Condition for Maximum Discharge through a Chimney, Efficiency of the Chimney, Artificial Draught, Steam jet Draught, mechanical Draught, Water treatment for boiler operation, Water Effluent treatment, Germicidal activity of chlorine, hypochlorites & chloramines. General consideration in cleaning, Detergents for cleaning. Pollution Control, Natural cycles of waste decomposition, concept of BOD-Measurement. Kinetics of biological growth, kinetics of biological decay. Application of kinetics to biological treatment Reactor with recycles. Trickle filter model Design of an aerated tank without recycle Design of trickle filter system.

Introduction.

Brief History of Refrigeration, Unit of Refrigerating Capacity, Thermodynamic State of a Pure Substance, Pressure-Temperature Diagram, Other Phase Diagrams, Thermodynamic Systems and Energy Conservation Equations, The First Law of Thermodynamics, Steady Flow Energy Equation,

Production of Low Temperatures, Expansion of a Liquid with Flashing, Reversible Adiabatic Expansion of a Gas, Irreversible Adiabatic Expansion (Throttling) of a Real Gas, Thermoelectric Cooling, Adiabatic Demagnetization.

Application of Second Law of Thermodynamics

The Second Law of Thermodynamics, A Refrigerating Machine - The Second Law Interpretation, Heat Engine, Heat Pump and refrigerating Machine, Best Refrigeration Cycle.

Vapour Compression System

Vapour Compression Cycle, Pressure Enthalpy Diagram and Calculations, Actual Vapour Compression Cycle.

Refrigerants

Selection of a Refrigerant, Thermodynamic Requirements, Chemical Requirements, Physical Requirements, Refrigerant Piping and Design. Secondary Refrigerants, Using Mixed Refrigerants.

Multi pressure Systems

Cascade Systems

Refrigerant Compressors

Types of Compressors, Thermodynamic Processes during Compression, Rotary Compressors, Screw Compressors, and Centrifugal Compressors.

DT-813 ADVANCES IN DAIRY PROCESSING -II (2-0-2) 3
Credits

1. Recent Developments in Yoghurt Manufacture.
2. Modern Cheese making: Hard Cheeses
3. Modern Cheese making: Soft Cheeses
4. Developments in Frozen-products Manufacture
5. Physical Properties of Dairy Products.
6. Modern Laboratory Practice-1 : Chemical Analyses
7. Modern Laboratory Practice - 2: Microbiological Analyses
8. Technology for the Developing Countries

DT-805 QUALITY ASSURANCE IN DAIRY INDUSTRY (2-0-2) 3
Credits

