

## LECTURE SCHEDULE

**Department: Dairy Chemistry**

**Course No. - DTC-121**

**Credit Hrs. -3 (2+1)**

**Course Title: Physical Chemistry of Milk**

**Course Teacher: Dr. Binita Rani**

### Theory

S. No.	Topics to be covered	No. of Classes
1	Constituents and gross composition of milk of different species and breeds of milch animals.	01
2	Distinction between true and colloidal solution, lypophilic & lypophobic solution.	01
3	Properties of colloidal systems, Gels-their formation and properties.	01
4	Milk as a colloidal system and its stability.	01
5	Elementary idea about emulsion.	01
6.	Density and specific gravity, pyknometer method, hydrometer lactometer. Density and specific gravity of milk, effect of various processing variables on the density and specific gravity of milk.	02
7	Surface tension, surface energy interfacial tension. Surface tension of mixtures.	01
8	Surface tension of milk and the factors affecting it	01
9	Viscosity- Definition of viscosity, Newtonian and Non-Newtonian liquids, Stokes Law, influence of temperature and concentration of solute on viscosity.	02
10	Viscosity of milk, evaporated milk and condensed milk.	01
11	Refractive index. Colligative Properties of Dilute Solution	01
12	Vapour pressure, Raoults Law, Depression of freezing point, Elevation of boiling point.	01
13	Freezing point and boiling point of milk. Osmosis and Osmotic pressure.	01
14	Inter-relation of colligative properties.	02
15	Electrolytes; non-electrolytes, ionic mobility, electrical conductance, Ostwald Dilution Law, Kohlrawsch Law, Electrical conductance of milk.	01
16	Dissociation of water, ionic product of water, concept of pH and pOH and their scale.	01
17	Bronsted Lewis concepts of acids and bases, dissociation constants of acids and bases.	01
18	Salt-their hydrolysis. Buffer solutions	01
19	Derivation of Henderson – Hasselbach equation and it application, buffer capacity and buffer index, milk as a buffer system.	02
20	Equilibrium of electrolytes.	01
21	pH indicators.	01

22	Oxidation- Reduction: Redox potential, Nernst equation, electrochemical cells.	01
23	Hydrogen, glass and calomel electrodes.	01
24	Redox system of milk.	01
25	The nature of isotopes, radio isotopes.	01
26	Half life period of radio isotopes.	01
27	Some of the important radio isotopes.	01
28	Occurrence of radio nuclide in milk & milk products.	01
29	The spectrum of electromagnetic radiation, the laws of Lambert and Beer, visible, and ultra-violet Spectroscope. Mention of mass, NMR spectroscopy.	02
	Total	34

### **Practical (DTC-121)**

<b>S. No.</b>	<b>Practical to be covered</b>	<b>No. of Classes</b>
1	Determination of density and specific gravity of milk using pycnometer, hydrometer and lactometer.	01
2	Determination of viscosity of milk using Ostwald viscometer.	01
3	Determination of surface tension of milk using Stalagmometer.	01
4	Interfacial tension between water-oil phase. Determination of freezing point of milk.	01
5	Preparation of a buffer solution.	01
6	Determination pH of buffer solution and milk electrometrically.	01
7	Determination of acidity of milk electrometrically.	01
8	Determination of electrical conductance of milk.	01
9	Determination of redox potential of milk.	01
10	Coagulation of milk using electrolytes.	01
11	Determination of refractive index of skim milk and whey.	01
12	Titration of amino acid in the presence and absence of formaldehyde.	01
	Total	12

### **Suggested Reading:**

1. A text book of dairy chemistry by Ling E. R. 2008 J.V. Publ. House, New Delhi
  2. Text book of dairy chemistry by Mathur MP, Datta R.D. & Dinakar, P 2005, ICAR Publ., New Delhi.
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