Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Dietetics and Nutrition)
Effective from academic session 2023-2024

Semester II

FYBDN 201 Basic Chemistry

3 credits, Total hours- 30 Hours + 15 Tutorial hours

Course Objectives:

1. Understanding of the fundamental theories and basic concepts of Thermodynamics.

2. Understanding of the fundamental theories and applications of the concepts of dilute solutions, Colligative properties, Electrochemistry, Ionic Equilibrium.

3.Insight into the instrumental methods of spectral analysis and learning about the basic laws of photochemistry and various photochemical processes.

4. Learning about the chemistry of colloids and emulsions.

5. Learning about the chemistry of nanomaterials, the basics of nanotechnology and its related applications in food industries.

SL No.	Course Outcome
1	Outline and illustrate the skills and application of mathematical tools to calculate thermodynamic and kinetic properties
2	Able to understand the relationship between microscopic properties of molecules with macroscopic thermodynamic observables
3	Able to understand the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics
4	Remember and understand the limitations and uses of models for the solution of applied problems involving chemical thermodynamic and kinetics
5	Remember and understand the concept of acid/base equilibria, including pH calculations, buffer behaviour, acid/base titrations, and their relationship to electrophiles and nucleophiles

6	Remember and apply the level of skill required to understand and implement the historical evolution and current revolution that is nanoscience, the fundamental uniqueness of the chemical and physical properties of nanomaterials and their potential impact in science, engineering, medicine, and the environment, the interdisciplinary nature of nanoscience, top down and bottom up methods of nanomaterials preparation, examples of different nanomaterials, applications of nanomaterials with emphasis in food sector

Unit I: Thermodynamics (5 Hours)

Systems: Open, Close, Isolated. Definition with examples of Diathermic and Adiabatic walls. Extensive and

Intensive property. Process: Isothermal, Adiabatic, Isobaric, Isochoric.

First Law of Thermodynamics: Statement and mathematical form.

Internal energy: Definition, Example, Change in internal energy for ideal gas.

Enthalpy: Definition, Example, Change in internal energy for ideal gas.

Heat Capacity: Definition, Classification of heat capacity (Cp and Cv), Expression of Cp and Cv for ideal gas. Reversible and Irreversible Processes: Definition. Work done in both processes for ideal gasses. Adiabatic

Unit II: Dilute solutions (5 Hours) :

Colligative properties Lowering of vapor pressure of solution, elevation of boiling point, freezing point depression, definition, principles, and laws of osmotic pressure.

Unit III: Electrochemistry: (5 Hours)

Electrochemistry I: Conductance of Electrolytic solution. Specific conductance, Equivalent conductance, molar conductance, Ion conductance. Kohlrausch's law of independent migration of ions.

Electrochemistry II: Cell and EMF. Nernst's equation.

Ionic equilibrium: Solubility and solubility product, common ion effect, determination of solubility product by EMF method, ionic product of water, pH, pOH, hydrolysis of salt solutions: Strong acid and weak base, weak acid and strong base, weak acid and weak base, concepts of buffer. Concepts of molarity, normality, molality, equivalent

Unit IV: Reaction Mechanisms: (5 Hours)

Reaction Dynamics: Reaction Laws: Rate and Order. Molecularity. Zero, First, and Second order Kinetics.

Pseudo-molecular and Arrhenius reaction. Transition and Collision state theory.

Unit V: Colloid Chemistry: (5 Hours)

Definition of colloid, principle of colloid formation, types of colloid, colloid preparation, stability of colloid, association of colloid and emulsion.

Unit VI: Photochemistry (5 Hours)

Instrumental methods of spectral analyses, Photochemistry: Lambert's law and Beer's Law, Laws of photochemistry, Photochemical processes.

Reference Books:

1. Engineering Chemistry: Bandyopadhyay and Hazra

2. Physical Chemistry: P.C. Rakshit

3. Organic Chemistry: Finar, vol-1

4. Engineering Chemistry: B.Sivasankar, Tata Mc Graw Hill, 2008

5. A Text book of Engineering Chemistry: S.S.Dara, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003.

6. Engineering Chemistry Simplified: S. Nandi and R. Bhattacharyya, Chayya Prakashani Pvt. Ltd.

7. Advanced practical chemistry, 3rd edition by Subhas C Das.

8. An advanced course in practical chemistry by Ghoshal, Mahapatra and Nad

FYBDN 291 Basic Chemistry

2 credits, Total hours- 30 Hours + 20 hours of self-paced practice

1.Determination of surface tension and viscosity.

2. Determination of hardness of water.

3.Determination of chloride content of water.

4.pH metric titrations.

5.Thin layer chromatography.

6.Preparation and standardization of Mohr's solution by $KMnO_4$ solution.

7.Preparation of standard $K_2Cr_2O_7$ solution and standardization of Mohr's Salt solution.

8.Estimation of Iodine in common salt by standard sodium thiosulfate solution

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FYBDN 202 Food Science

3 credits, Total hours : 30 Hours + 15 Tutorial hours

Course Objective:

Make use of the chemistry that underlies in the Classification, Structure & properties of various calorie giving food components.

Sl No.	Course Outcome (CO)
1	Understand and remember the concept of food groups and their functions
2	Know about pulses and grams
3	Familiarize with milk and beverages.
4	Understand and remember the concept of meat.

UNIT–I (5 Hours)

Food groups: Basic 4, 5&7 food groups. Functional food groups-energy yielding, body building and protective foods (only sources and not properties and functions). Food Pyramid, My Plate. Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Cereals - composition of rice, wheat, effects of cooking on parboiled and raw rice, types of starch, principles of starch cookery, gelatinization. Food group- Grouping of foods, discussion on nutritive value.

UNIT–II (5 Hours)

Pulses and grams – Varieties of pulses & grams, composition, nutritive value, cooking quality of pulses, germination, and its effect. Vegetables - Classification, composition, nutritive value, selection and preparation for cooking, methods and principles involved in cooking. Fruits - Composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning.

UNIT –III (5 Hours)

Beverages - Classification, nutritive value, Milk based beverages- methods of preparing tea and coffee, fruit-based beverages and preparation of carbonated non – alcoholic beverages. Spices and Condiments - Uses and abuses. Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil, factors affecting absorption of oil. Sugar cookery- Stages of sugar cookery, crystallization and factors affecting crystallization.

UNIT–IV (5 Hours)

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder

Egg - Structure, composition, classification, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation.

UNIT–V (5 Hours)

Meat -Structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness, methods of cooking meat and their effects. Poultry – types, composition, nutritive value, selection, methods of cooking.

Fish - Structure, composition, nutritive value, selection of fish, methods of cooking and effects.

Unit-VI (5 Hours)

Food evaluation (Subjective and objective)

Reference Books:

1. Food science, Chemistry and Experimental foods by M. Swaminathan.

2. Food Science by Norman.N.Potter.

3. Experimental study of Foods by Griswold R.M.

4. Food Science by Helen Charley.

5. Foundation of Food Preparation by A.G. Peckam.

6. Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. Orient Longmans Ltd.

7. Food Fundamentals by Mac Williams, John Willy and son's, NewYork.

8. Food Facts & Principles by Shakuntala manay &Shadakhraswamy.

9. Food Science by Srilakshmi , second edition,2002.

FYBDN 202 Food Science Practical:

2 credits, Total hours : 30 hours + 20 hours self-paced practice

1. Measuring ingredients : Methods of measuring different types of food stuffs .

2. Edible portion: Determination of edible portion percentage of different foods (mention name of foods).

3.Cooking methods Moist heat methods – (i) boiling, simmering , steaming, &

Pressure cooking, (ii). Dry heat methods – baking. (iii), Fat as a medium for shallow cooking

and deep fat frying.

4. Methods of cooking and preparations- cereals, pulses (soaked and unsoaked), vegetables, germination & fermentation . Preparation of soups and salads. Prevention of darkening in fruits & vegetables, milk, and milk product (curd, homemade cheese, flocculation).

5. Beverages: Preparation of hot beverages- coffee, tea. Preparation of cold Beverages-fruit drinks & milkshakes.