Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Polymer Chemistry, Subject Code: CH-501
SYLLABUS REVISED-2015
w.e.f. July-2015

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Unit-I **08**

Polymer & Polymerization: General introduction of polymers; Classification of polymers; Addition polymerization, Condensation polymerization, Co polymerization, Ring opening polymerization their mechanism and kinetics; Kinetic length.

Unit-II **08**

End group analysis: Colligative property measurement, Solution viscosity & molecular size, IR, and NMR of polymers; Viscous flow; Kinetic theory of rubber elasticity; Visco elasticity, Mechanical properties of polymers.

Unit-III **08**

Polymer processing Techniques: Polymer processing & its classification, extrusion, calendering, film blowing, injection moulding, blow moulding, vacuum forming and compression moulding, fibre spinning, films and laminates.

Unit-IV **08**

Some important commercial polymers their preparation and structure I: Nylons, polyester fibers (Terylene, Dacron), vinyl fibers, rubber, copolymers of butadiene and acrylonitrile, polyethylene; Plastics, resins and lacquers, cellulose acetate, cellulose nitrate, cellulose mixed esters and cellulose ethers, polytetrafluoroethylene (Teflon).

Unit-V **08**

Some important commercial polymers their preparation and structure II: Vulcanization of rubber, Synthetic rubber; buna rubber; phenol-formaldehyde resins, ion exchange resins, urea-formaldehyde resins, melamine formaldehyde resins and epoxy resins.

Books recommended:

1. Principles of polymer chemistry: A Ravve, 2nd Edition, Kluwer Academic publications
2. Polymer Science and technology: Joll. R. Fried, Prentice – Hall.
3. Principles of polymer systems: F. Rodriguez, Claude Cohen, C.K. Ober, L.A. Archer, Vth Edition, Taylor & Francis
4. Introduction to polymers: R.J. Young and P.A. Lovell, 2nd Edition, Netron Thornes publications
5. Polymer chemistry – an introduction, Malcolm D. Stevens, Oxford University press.

Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Petroleum Chemistry, Subject Code: CH-502
SYLLABUS REVISED-2015
w.e.f. July-2015

L T P 3 1 0

Unit-I **08**

Introduction, origin of petroleum in nature, carbide theory, anglers theory, modern views; Petroleum exploration in India and their resources; crude oil, natural gas; composition of petroleum; preparation of crude for processing; destruction of natural emulsion of petroleum crude, desalting.

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Unit-II

Fundamentals of preliminary distillation; Methods of petroleum distillation; Distillation of crude petroleum; Treatment of the residual liquid; Processing of liquid fuels such as petroleum and petroleum products; Product profile of refinery distillations and their specification.

Unit-III **08**

Introduction and classification of Liquefied hydrocarbon gases and fuels; Fuels for jet engines and gas turbine engines; Dye intermediates, Lacquers, Solvent and thinners.
Absorptive and adsorptive purification, Sulphuric acid purification, alkaline purification, Hydrofining, New method of purification, demercaptanisation, Stabilization.

Unit-IV **08**

Introduction of petroleum refining, cracking, application of cracking, synthetic petrol, Bergius process, Fischer-Tropsh process, octane number, flash point, determination of flash point, synthesis of pure chemicals from petrochemicals.

Unit-V **08**

Lubricating oils and additives, fuel quality aspects and environment aspects, Case study of Naphtha crakers and their product profile, introduction to quality procedures like ASTM/BIS/IP/DIN.

Books recommended:

1. Fuel technology by Wilfrid Francis and M.C.Peters. Plenum press (1981).
2. Fuel Science and Technology Handbook, James G. Speight. Marcel Dekker (1990)
3. Fuels and Combustion, Samir Sarkar, 2nd.Edition, Orient Longmans (1990) Mumbai.
4. Modern Petroleum refining process, B.K. Bharbana Rao, Oxford and IBH publication
5. Petroleum chemistry and refining , James g. Speight, Taylor and francis publishers
6. Fuel technology by Wilfrid Francis and M.C.Peters. Plenum press (1981).
7. Fuel Science and Technology Handbook, James G. Speight. Marcel Dekker (1990)
8. Fuels and Combustion, Samir Sarkar, 2nd.Edition,Orient Longmans (1990) Mumbai.
9. Petroleum refining, William L. Leffler, Pennwell publication

Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Agrochemistry, Subject Code: CH-503
SYLLABUS REVISED-2015
w.e.f. July-2015

L T P 3 1 0

Unit-I **08**

Organochlorines and Carbamates Insecticides: General Introduction and concept of pesticides, Classification of Insecticides, synthesis, structure activity relationship, mode of action, uses and formulation of following insecticides:
Organochlorines: DDT, HCH (Lindane), Heptachlor and endosulfan; Carbamates: Phenyl carbamates (carbaryl and carbofuran), N-Methylcarbamates (Zectran, Isolan), Oxime carbamates (Oxamil, Methyomyl).

Unit-II **08**

Organophosphorous Insecticides: Synthesis, structure activity relationship, mode of action, uses and formulation of following insecticides:
Organophosphorous: methyparathion, malathion, phosphamidon, dichlorvos, phosdrin, monocrotophos, dicrotophos, fenitrothion, fenthion, chlorpyriphos & phosalone.

Unit-III **08**

Fungicides: Classification and chemistry of following fungicides:
Inorganic; sulfur, copper-oxychloride and organomercurials. Dithiocarbamates; zirum, thirum and zineb. Quinones; chloranil. Antibiotics; kasugamycin and griseofulvin. Benzimidazole; carbendazim, thiabendazole.

Unit-IV **08**

Herbicides: Synthesis and uses of following herbicides:
Aromatic Acid compounds; 2, 4-D, 2, 4, 5-T**.** N, N-dimethylureas; monuron and diuron Anilides; alachlor and butachlor , New high potency herbicides like sulfonylureas

Unit -V **08**

Rodenticides, Molluscicides, QSAR and CAMM: Synthesis and uses of following miscellaneous chemicals;
Rodenticides: Hydroxycoumarin: Dicoumarin, Warfarin Zinc-phosphide and bromodiolone; Molluscides: metaldehyde and carbamates; Quantitative Structure Activity Relationship (QSAR) & Computer Assisted Molecular Modelling (CAMM) in Pesticide Design

Books recommended:

1. Industrial chemistry. B.K.Sharma
2. Chemistry of pesticides by N K Roy
3. Chemistry of pesticides by Kennet A Hussel
4. Hand Book of Agrochemical Industries (Insecticides & Pesticides) by EIRI Board of Consultants & Engineers

Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Cosmetics & Perfumery, Subject Code: CH-504
SYLLABUS REVISED-2015
w.e.f. July-2015

L T P 3 1 0

Unit-I **08**

Cosmetic Raw Materials: Study of Chemical Nature and Utility of Emulsifiers (natural, synthetic and finely dispersed solid), lipid components (oils, fats, waxes), humectants (inorganic, organic and organo-metallic) and perfumes / fragrances (plant oils, animal secretions, chemical substances).

Unit-II **08**

Cosmetic Raw Materials, Face power and lipstick: Study of Chemical Nature and Utility of colours (dyes and pigments), preservatives and antioxidants in cosmetics. Technical requirements, basic components and formulation of face powders and lipstick.

Unit-III **08**

Cosmetic for Skin: Introduction to general skin problems, purpose, types and key ingredients of skin cleansing, skin toners, moisturizers, nourishing, protective (barrier), sunscreen and bleaching products. Antiperspirants and deodorants (mechanism, ingredients and formulation).

Unit-IV **08**

Hair products: Introduction to general hair problems and scalp disorders. Shampoos (requirements, classification, ingredients and special additives for hair condition and scalp health). Hair colourants (temporary, semi-permanent and gradual colourants and their dyeing system). Chemical depilatories.

Unit-V **08**

Herbal Cosmetics: A comprehensive study of the plant materials used in cosmetics. Use of herbs in different forms. Herbal cosmetics for skin (cleaning creams, moisturizing creams, masks, body lotions, massage preparations, nourishing creams). Herbal Cosmetics for hair (conditioners, oils, shampoo, dyes).

Books recommended

1. Perfumes, soaps, detergents and cosmetics-Bhatia, Volume I & II
2. Poucher's Perfumes, Cosmetics and Soaps (Vol. III), Cosmetics (Vol. I & II) - Hilda Butler.

Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Food Chemistry, Subject Code: CH-505
SYLLABUS REVISED-2015
w.e.f. July-2015

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Unit-I **08**

Governmental regulation: Introduction, Food laws and standards: Indian and international food safety laws and standards; Quality and safety assurance in food industry; BIS Laboratory Services and Certification by BIS, Food labeling.

Unit-II **08**

Constituents of foods & their nutritive aspects: Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.

Food additives: Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Bleaching and Maturing agents, Buffering agents, Colouring agents, Sweetening agents & Flavoring agents.

Unit-III **08**

Food processing techniques: Common unit operations, Food deterioration and their control: Heat preservation and processing, Cold preservation and processing Food dehydration, Food concentration & food packaging.

Unit-IV **08**

Food Safety, Risks and Hazards: Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with foods, Prevention methods from food born disease: HACCP method.

Unit-V **08**

Fermentation and other uses of Microorganisms: Industrial uses of bacteria, and yeast lactic acid fermentation, vinegar production, amino acid production, alcoholic fermentation, Bakers yeast, food yeast industrial uses of molds, Microbial Transformation: Type of bioconversion reaction, procedures of biotransformation.

Books recommended:

1. Food Chemistry, Belitz and Gosch, Springer – Verlag Bertin Heiderberg, 2nd Edition, 1999
2. Principles of Human Nutrition, Martin Eastwood, Chapman and Hall, London, I Edition, 1997.
3. Food – The Chemistry of its Components, T.P. Coultate, Royal Soc. Chemistry, 4th Edition, 2002.
4. Food additives, Branan, Alfred Larry, Davidson P. Michae, Food Science and Technology series (35), Morcel Dekker, Inc, 1990.
5. Introduction to food science, Rick Parker, Delmar Learning, U.S.A, I Edition, 2003.
6. Nutrition Science and application, Lori Smolin L.A., Saunders College Publishing, 3rd Edition.
7. Human Nutrition and dietetics, J.S. Barrow, W.P.T James, Churchill Livingstone, 9th Edition, 1993.

Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Bioinorganic and Supramolecular Chemistry, Subject Code: CH-506
SYLLABUS REVISED-2015
w.e.f. July-2015

L T P 3 1 0

Unit-I **08**

Metal ions in Biological functions: A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na+, K+ and Mg2+ ions: Na/K pump; Role of Mg2+ ions in energy production and chlorophyll. Role of Ca2+ in blood clotting, stabilization of protein structures and structural role (bones).

Unit-II **08**

Metalloenzymes: Enzyme, coenzyme, apoenzyme and holoenzyme, Zinc enzymes: carboxypeptidase, carbonic anhydrase and alcohol dehydrogenase. Iron enzymes-catalase and peroxidase. Copper enzymes -superoxide dismutase. Molybdenum enzymes –xanthine oxidase.

Unit-III **08**

Metal-Nucleic Acid Interactions: Metals used for diagnosis and chemotherapy with particular reference to anticancer drugs. cis-platin-indication and contra indications. Administration of drug and its antidote. Reaction, use of antihistamine, mannitol, epinephrine and steroid preparation of drug administration.

Unit-IV **08**

Supramolecular Chemistry: Concepts and language. Molecular recognition: Molecular receptors for different types of molecules including arisonic substrates, design and synthesis of coreceptor molecules and multiple recognition.

Unit-V **08**

Applications of Supramolecular Species/Compounds: (A) Supramolecular reactivity and catalysis. (B) Transport processes and carrier design. (C) Supramolecular devices. Supramolecular photochemistry, supramolecular electronic, ionic and switching devices. (D) Some example of self-assembly in supramolecular chemistry.

Books Recommended:

1. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
2. Bioinorganic Chemistry, I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, University
3. Science Books.
4. Inorganic Biochemistry vols I and II. ed. G.L. Eichhorn, Elsevier.
5. Progress in Inorganic Chemistry, Vols 18 and 38 eds. J.J. Lippard, Wiley.
6. Supramolecular Chemistry, J.M. Lehn, VCH.
7. Bioinorganic Chemistry, M.N. Hughes, Wiley.

Integral University, Lucknow
Department of Chemistry
M.Sc. (Industrial Chemistry), 2nd Year/ 3rd Semester
Subject Name: Industrial Chemistry Practical-3, Subject Code: CH-507
SYLLABUS REVISED-2015
w.e.f. July-2015

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List of Experiments

1. Preparation of Phenol formaldehyde resin.
2. Preparation of Urea formaldehyde resin.
3. Preparation of Nylon 66.
4. Preparation of soap.
5. Preparation of shampoo.
6. Preparation of vanishing cream.
7. Preparation of hand lotion.
8. Preparation of lather shaving cream.
9. Determination of calcium thioglycolate / thioglycolic acid in the depilatories.
10. Determination of lakes and fillers in the given lipstick.
11. Determination of zinc-pyrithione/pH in the given shampoo.
12. Determination of acetic acid content in the given sample of food.
13. Determination of protein content in the given sample of food.
14. Determination of fat content in the given sample of food.
15. Determination of salt content in the given sample of butter.
16. Determination of moisture content in the given sample by K. F. titre.
17. Determination of sugar /glucose content in the given sample.
18. Estimation of ascorbic acid in the given fruit juices.