

**CHE 1262**

**2 credits**

**SEMESTER-II  
FOOD CHEMISTRY**

**3 hours / week**

**Unit 1. Composition of milk (8 hrs)**

Milk-definition - general composition of milk - constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk-colour, odour, acidity, specific gravity, viscosity and conductivity-Reckneckel effect- factors affecting the composition of milk - adulterants, preservatives and neutralizer- examples and their detection- estimation of fat, acidity and total solids in milk.

**Unit 2. Processing and major milk products (8 hrs)**

**Microbiology of milk**- destruction of microorganism in milk-physico- chemical changes taking place in milk due to processing - boiling, pasteurization-types of pasteurization- Bottle, batch and HTST ( High Temperature Short Time) – Vacuum pasteurization- Ultra High Temperature pasteurization.

**Cream** – composition - Chemistry of creaming process –estimation of fat in cream.

**Butter** – composition - theory of churning – desibutter - salted butter - estimation of acidity and moisture content in butter.

**Ghee** - major constituents - common adulterants added to ghee and their detection – rancidity – definition – prevention - antioxidants and synergists- natural and synthetic.

**Unit 3. Principle and methods of preservation (8 hrs)**

Principles and methods of preservation- Asepsis- preservation by high temperature- pasteurization- sterilization- Aseptic canning- preservation by- low temperature – chemicals ,

sulphur dioxide, sodium benzoate, sodium meta bisulphite – drying- filtration- carbonation- sugar- fermentation- salt- acids- oils and spices- antibiotics- Irradiation. Canning and bottling of fruits and vegetables- principles and process of canning- different methods- canning of fruits- canning and bottling of vegetables – canning of curried vegetables- specific requirements for canning of fruits and tomatoes.

#### **Unit 4. Food colorants, additives and flavours (8 hrs)**

**Natural colouring matters-** chlorophylls- carotenoids- anthocyanins- flavanoids- anthocyanins- tannins- quinines and xanthenes betalains

**Synthetic colours** – permitted colours-banned colours-FPO, FSSAC, Agmark.

**Food additives and brominated vegetable oils** - functions and uses of food additives- classification of food additives - B.V.O – substances prohibited in foods - additives to be used with caution

**Food flavours-** flavour compounds- flavanoids- terpenoids- sulfur compounds- other volatile components- types of flavour- developed flavour- processed flavour- added flavour.

#### **Unit 5. Food processing and quality control (8 hrs)**

Fruits and vegetables drying /dehydration- techniques – advantages of dehydration over sun drying.

Freezing – of fruits and vegetables- methods of freezing- sharp freezing – Quick freezing- cryogenic freezing- dehydro- freezing- dehydro freezing- freeze drying.

Quality control in Food processing Industry - F.P.O specification – storage life- permissible limits of preservatives- food toxins.

#### **References:**

1. Robert Jenness and Patom.S., , Principles of Dairy Chemistry, Wiley, New York.
2. Rangappa K.S and Acharya K.T., Indian Dairy Products.
3. Wond F.P., Fundamentals of Dairy Chemistry, Springer.
4. Lampert L.M., Modern Dairy Products, Chemical publishing company Inc., NewYork.
5. Warder, Principles of Dairy Processing, Wiley, New York.
6. Sukumar De, Outlines of Dairy technology.



**CHE 1271**  
**2 credits**

**SEMESTER-I**  
**COSMETICS AND CONSUMER PRODUCTS**

**LS-1**  
**3 hours / week**

**1. Hair care and colorants (8 hrs)**

Hair structure-permanent hair waving-cold waving-shampoos-different types and formulations-hair conditioners and setting lotions-hair straightening-curling.

Hair colorants- hair lighteners and bleaches-temporary colorants-semi and permanent colorants-vegetable dyes-oxidation dyes and modifiers.

**2. Face and body cosmetics (8 hrs)**

Face powder-talcum powder-medicated powder-bleachers-facials-cold creams- sunscreen  
lotions-SPF factor- formulation.

Deodorants-Antiperspirants-distinction between astringents and deodorants- formulation-  
lotions-perfumes-formulation

Lipsticks-classification and formulation

**3. Toiletries and cleansing agents (8 hrs)**

Bath soap- bath powders – bath oils – water softeners-tooth pastes-ingredients-their characteristic functions-mouth washes-shaving creams-after shave preparations

Detergents- classification-formulation-cleansing action-optical brighteners-bleachers-phenoyls-black phenoyls, scented phenoyls.

**4. Candle, Chalk and Crayons (8 hrs)**

Candles-variety of candles-raw materials – machinery- method of candle making- Chalk – dust free chalk-crayons-machines and method

**5. Inks and shoe polish (8 hrs)**

Inks – types-blue, red, black, green and rubber stamp ink-composition-preparation

Shoe polish-basic ingredients-preparation method

**\*Note :**

Preparation of Face Powder, Tooth Power, Candle, Phenoyl, Soap & Detergents, Chalk, inks, and shoe polish will be given in the Laboratory.

**References:**

1. J.V.Simons, Science and the Beauty Business.
2. B.K. Sharma, Industrial Chemistry, Goel publishing & Co, 1995.

**CHE 1272**  
**2 credits**

## **CHEMISTRY IN CRIME INVESTIGATION**

**3 hours / week**

### **Unit 1. Criminology and Forensic science (8 hrs)**

Criminology- definition-nature and scope-types of crimes penology- Indian penal code- Indian evidence act-Indian criminal procedure code.

Forensic science- definition-principles and uses in crime investigation.

### **Unit 2. Finger prints & Tracks-Traces (8 hrs)**

Finger prints-patterns-classification-uses of finger print in crime investigation-direct and latent prints-development by powders- other methods of development- transfer methods of finger prints.

Tracks –Traces-Foot prints-casting of foot prints- residue prints- walking pattern-tire marks-miscellaneous traces & tracks-glass fracture-tool marks-paints-fibres.

### **Units 3. Biological substances and poisons (8 hrs)**

Blood-semen-saliva-sweat-urine-hair-skin-DNA analysis.

Poisons-types and classification-diagnosis of poisoning in the living and in the dead-clinical symptoms-post-mortem appearances-treatment in cases of poisoning- antidotes.

### **Unit 4. Arsons, explosives and Ballistics (8 hrs)**

Natural fires and arson- nature of action of fire-drifts and air supply-burning characteristics.

Explosives-definition-classification-composition and mechanism of explosion-bombs.

Ballistics- classification- internal, external and terminal ballistics-small arms-classification and characteristics-laboratory examination of barrel washing and detection of powder residues by chemical tests.

### **Unit 5. Cyber crimes and documents (8 hrs)**

Cyber crimes- crime through network

Documents-Chemistry of paper and ink-writing paper-carbon paper-chalk-adhesives-sealing waxes-different types of forged signatures-simulated and traced forgeries-inherent signs of forgery models-writing of forged models-writing deliberately modified-use of ultraviolet rays-comparison of type written letters-counterfeit of currency and coins

### **References:**

1. Saferstein, R. (1978), Criminalities and introduction to Forensic Science, Prentice Hall of India.
2. James, T.H. (1987), Forensic Science.



**CHE 3215****MEDICINAL CHEMISTRY****2Credits/3 hrs**

This course intended to impart knowledge about the development of drugs and the need for conversion of drugs into medicines. This course also deals with pharmacokinetics, pharmacodynamics and pharmaceutical marketing.

**Unit – 1 Basic Concepts****8 hrs**

Drug – definition – requirements of an ideal drug – history of drug development – nomenclature of drugs – classification of drugs based on Sources, Chemical structure and Therapeutic actions. – Terminologies – pharmacology, pharmacy, pharmaceuticals, toxicology, chemotherapy, pharmaco – dynamics, pharmaco – kinetics.

**Unit – II Need for Drugs****8 hrs**

Deficiency, disorder and diseases – Disease causing organisms – bacteria – types, fungi, virus and their activities – differences between them – specific diseases caused by various organisms – Immunity, Vaccination – Adverse drug reactions, types and minimisation.

**Unit – III Pharmacokinetics and Pharmacodynamics****8 hrs**

Pharmacokinetics: Introduction – Absorption, distribution, metabolism and excretion (ADME) – LD<sub>50</sub>, ED<sub>50</sub> Therapeutic index.

Pharmacodynamics: Elementary treatment of drug action, mechanism – enzyme stimulation, enzyme inhibition and drug design – Lead, analog, prodrug, Significance of drug metabolism in medicinal chemistry.

**Unit – IV Formulation of Drug****8 hrs**

Need for conversion of drugs into medicine – additives and their role – classification of formulations – route wise and form wise: tablets, capsules, syrups, suspensions, powders, ointment, creams, gels, lotions, sprays suppositories, injections.

**Unit – V Pharmaceutical Marketing:****8 hrs**

Manufacture, packaging, distribution and stocking. Pharmaceutical Market, Pharmacy – Channels of distribution – Wholesaler and retailer – Departmental stores and chain stores – mail order business – Drug house management.

Traits and demands of medical representatives –Salesmanship – Uniqueness of pharma selling– Theories of selling – Planning – Detailing of products.

**References:**

1. G L David Krupadanam, D Vijaya Prasad, K Varaprasad Rao, K L N Reddy C Sudhakar, Drugs, Universities Press, Hyderabad (2001).
2. Graham Patrick, Instant notes – Medicinal chemistry, Pragati Prakashan Viva books (pvt) Ltd, 2002.
3. Alka and Gupta, Medicinal chemistry, Pragati Prakashan, II Edn , 2008.
4. Sekhar mukhopadhyay, Pharmaceutical selling – A text book, Sterling publishers private Ltd.1997.

**2 Credits/3 hrs**

8 hrs

8 hrs

8 hrs

8 hrs

8 hrs

### References:

1. Sukumar De, Outlines of Dairy Technology, Oxford University Press, New Delhi, (2001)
2. Lillian Hoagland Meyer, Food Chemistry, CBS Publishers, New Delhi.(2004)

CHS 1251

**DAIRY CHEMISTRY****NME - 1**  
**2 Credits**  
**3 hrs/week****Unit-I Composition of milk (8Hrs)**

Composition and structure of milk- constituents of milk- lipids, proteins, carbohydrates, vitamins and minerals--Properties of milk-odour,density,viscosity,optical properties, acidity, freezing point-Recknagel's effect- estimation of fats and total solids in milk

**Unit-II Milk processing and preservation (8Hrs)**

Microbiology of milk- Destruction of microorganism in milk- pasteurisation –types of Pasteurisation- bottle, Batch and HTST- ultra high temperature pasteurisation- preservatives and neutraliser

**Unit- III BasicMilk Derivatives (8Hrs)**

Cream- composition- chemistry of creaming process

Butter- composition- desibutter- salted butter

Ghee- major constituents- common adulterants added to ghee and their detection- rancidity – definition- prevention- antioxidants

**Unit- IV- Special Milk(8Hrs)**

Definition- merits- flow diagram for manufacturing- reconstituted milk- homogenised milk – flavoured milk- vitaminised milk- toned milk- imitation milk- condensed milk- definition, composition and nutritive value

**Unit V – Milk products(8Hrs)**

Fermented milk products- definition of culture- cultured cream- cultured butter milk-cheese- unripened cheese- ripened cheese-paneer-yohurt and mazzorola cheese

Ice cream- types- ingredients- manufacture- stabilizer- emulsifiers and their role

Milk powder-skimmed milk powder- whole milk powder- buttermilk powder- types of drying process

**References:**

1. Sukumar De, Outlines of Dairy Technology, Oxford University Press, New Delhi, (2001)
2. Lillian Hoagland Meyer, Food Chemistry, CBS Publishers, New Delhi.(2004)



CHS 1252

**CHEMISTRY IN TODAY'S WORLD***NME-2***2 Credits****3 hrs/week****UNIT I Chemistry of water (8 Hrs)**

Water- sources- impurities in natural water- air in water – Physical properties of water –DO – BOD – COD – Hardness and its disadvantages – softening of water – Potable water – purification of water- distillation–deionisation– reverse osmosis

**Unit-II Industrial Chemistry (8 Hrs)**

Paints, Varnishes, lacquers and adhesives- types - constituents- applications– Ceramics – glasses Inks- types–Printing inks- ingredients- additives- properties of inks– Basics of LED, LCD

**Unit- III Clinical Chemistry (8 Hrs)**

Composition of blood- normal values- blood pH- blood sugar- blood pressure- blood groups- presence of glucose in blood and urine – Cholesterol in urine - diabetes – types- glucose tolerance test-anaemia – ECG – MRI scan

**Unit-IV Agricultural Chemistry (8 Hrs)**

Fertilizer- classification – natural manures- organic manures- chemical fertilizers- biofertilizers- Effect of excess fertilization and manuring- agrochemicals- insecticide – herbicides- fungicides- rodenticide- nematicides

**UNIT V Biological Chemistry (8 Hrs)**

Vitamins -fat and water soluble -physiological functions– biological importance of minerals and trace elements – haemoglobin- function and poisoning– chlorophyll – antioxidants – metals in medicine – metal toxicity.

**References**

1. R. Gopalan and S. Sundaram, Fundamentals of Chemistry, Sultan Chand & Sons, 1998.
2. Ramnaik Sood, Medical laboratory techniques- Methods and interpretation- III edition, Jaypee brothers medical publishers, 1995.
3. B.N. Chakravathy, Industrial Chemistry, Oxford and IBH Publishing Co, New Delhi.
4. G. Mahapatra, Elements of Industrial Chemistry, Kalyani Publishers, New Delhi.
5. B.K. Sharma, Industrial Chemistry, Goel publishing & Co, 1995.



**Objectives**

This course enables the students to understand the various small scale products in the field of hygiene, food and petroleum. Students will be trained to prepare small scale products such as face powder, candles, shoe polish, jam and jelly etc.

**Learning outcome**

After the completion of the course, the students will be able to

- differentiate various aqua based products.
- identify the role of various ingredients in the formulations of surfactants.
- distinguish the impacts of various ingredients added in the food products.
- prepare the various small scale products.
- acquire skills to develop new formulations of products.

**Unit I: Aqua products**

Water- Potable water- standards for potable water –hard water - soft water - water softening - Permutit process - reverse osmosis - desalination of sea water- distilled water - importance- sparkling water - standards for food processing industry - Laboratory and medical grade water (ultra pure water)

**Unit II: Hygiene products**

Soap- toilet soap- shaving soap- medicated soap- transparent coloured soap-cleaning action of soap- Shampoo- formulations - varieties

Laundry aids- laundry tablets- surfactant- foam regulator- anti redeposition agents- peroxide bleach- bleach activator- fabric softner - fragrance

Air freshener - types- toxicity – deodorant and antiperspirant – antiseptic - disinfectants - phenoyls- black phenoyls, scented phenoyls- After shave lotions – sunscreen lotions - SPF factor - formulation.

### **Unit III: Sugar and salt based products**

Jam, Jelly, Marmalade - Technical flow sheet of processing, problems in production – important considerations in jelly making – syrups – Ice cream - types - ingredients - manufacture – stabilizer – emulsifiers – preservatives- types- factors influencing selection of preservatives – pickles – Food colours - natural synthetic – food flavours- flavoured compounds

### **Unit IV: Petroleum based products**

Candles - variety of candles - raw materials - machinery - method of candle making – crayons - machines and method – Shoe polish - basic ingredients - preparative methods – Lipsticks - classification and formulation – Nail polish -formulation – Hair dye and hair colourants – perfumery materials- natural and synthetic.

### **Unit V: Laboratory preparation of small scale products**

Face powder, tooth power, candle, phenoyl, soap & detergents, chalk, inks, stamp pad inks and shoe polish, syrup, jelly.

### **Text books**

1. R.P.Srivatsava, Sanjeev Kumar, Fruits and vegetable preservation, International book distributing company (2006).
2. J.V.Simmons, Science and the Beauty Business,. V.1, The science of cosmetics, Macmillan Education (1989).

### **References**

1. W.A. Poucher, Perfumes, Cosmetics, soaps, Vol 2, The production and manufacture and applications of perfumes, Chapman Hall Ltd, London (1979)
2. John Emsley, Better looking, better living, better loving, Wiley –VCH VerlagGmbh& Co(2007)
3. Sukumar De, Outlines of Dairy Technology, Oxford University Press, New Delhi, (2001)



**Objective:**

This course is intended to impart awareness about healthy human living maintaining a beautiful appearance. There will be a study on hygienic practices, maintaining skin, hair and physique to enhance natural beauty.

**Learning outcomes:**

- Understanding the problems and solutions for hygienic living
- Maintaining the hair and its beautification
- Understanding the functions, problems of skin and making it have a good appeal
- Ways and means to enhance beauty
- Keeping the physique fit

**Unit I: Hygiene and Appearance**

Hygiene and civilisation-bathing and clothing-soap and bath oils and essences -cleansing and cold creams-antiperspirants and deodorants-

Functions of dentifrices-characteristics, ingredients and formulation of tooth pastes/toothpowders- composition and formulation of mouthwashes-naturopathic medical practices-factors affect skin-skin care in different seasons-silver nanoparticles in cosmetics-sources and extraction of perfumes from natural sources.

### **Unit II: Hair and Beauty**

Hair-structure, types and functions-ailments of hair-steps to keep hair healthy-hair care products- composition, characteristics and formulation of shampoos/anti-dandruff shampoos-characteristics, classification and formulation of hair colourants.

Hair waving- chemistry of temporary and permanent hair waving-conditioners-neutralizer-methods of hair straighteners-unwanted hairs-depilation and epilation-shaving preparations before and after shaving.

### **Unit III: Skin and Beauty**

Structure and functions of skin- skin colour- nutrients for skin-problems of the young skin and aging of the skin- raw materials and its characteristics, formulation of skin care products-moisturising creams, nourishing cream and emollient cream- herbal extracts and essential oils in skin care-

Sunshine and suntan-sun protection factor-skin bleaches

Skin creams- cleansing and cold creams-characteristics-types of cleansing creams-general procedure for manufacturing-vanishing cream and its procedure of formulation-sunscreen preparations-principle and formulae.

### **Unit IV: Beauty Enhancers**

Social trends in use of makeup products- colour and pigments in cosmetics-face powder and talcum powder-vanishing and foundation creams-rouges and blushers-eye makeups: mascara, eyeshade, eyeliner, eyebrow and kohl

Lipstick-characteristics of lipstick- basic raw materials and its role in formulation of lipstick-tests for lipsticks

### **Unit V: Physique and Beauty**

Symmetry in human body-height, weight and body mass index-daily habits and health-chemistry of maintaining body structure and appearance-physical exercise- yoga, walking, jogging and gym- wrong postures and effects-food habits and diets-clothing and beauty.

### **References:**

1. B.M.Mithal and R.N.Saha, A handbook of cosmetics, VallabhPrakashan Publication, New Delhi, 2000

Science and the beauty business , John V. Simmons. V.1, The science of cosmetics. Macmillan Education, 1



## SEMESTER-I

## CHEMISTRY IN EVERYDAY LIFE

CHE 1261

2 credits

3 hours / week

In this course an attempt will be made to establish in very simple terms the place of chemistry in modern civilized living. There will be discussions on water, water pollution and its treatment, fertilizers, insecticides, polymer and its applications, explosives and drugs.

**1. Water**

Electrolysis of water – water cycle – air in water – DO – BOD – COD – water pollution – control of water pollution-water treatment- Reverse osmosis- deioniser – Hygroscopy and deliquescence – water in crystals – efflorescence – hard water- soft water – permanent and temporary hardness - removal of hardness – advantage and disadvantage – potable water – standards for drinking water.

**2. Fertilizers and Insecticides**

Classification of fertilizers- natural manures- artificial manures- chemical fertilizers- advantages of artificial fertilizers-bio-fertilizers – insecticides- inorganic insecticides-natural or plant insecticides-organic insecticides (few eg.) -dinitro phenols, DDT, methoxychlor, BHC-pesticides - disadvantages – bio-pesticide- bluegreen algae, vermicompost.

**3. Polymers and Modern materials**

Fibres: Natural and synthetic fibres- cotton, wool, coir, silk, linen, polyester, viscose rayon. Synthetic polymer- organic polymer- inorganic polymer- silicon based polymer and its uses – conducting polymer – biodegradable polymers. Resins: phenol- formaldehyde resins- resins on protective coatings- household appliances –PVC- HDPE-LDPE- Teflon- natural rubber – vulcanization- recycled plastics – polymers in medicinal toilet items.

**4. Explosives**

Explosives- classification-deflagrating or low explosives-characteristics of explosives (few eg.)- nitrocellulose, PETN, TNT, RDX, cordite, gun powder-rocket fuels - propellants- toxic chemical weapons-screening smokes- pyrotechnics-safety matches.

**5. Drugs**

Definition- chemotherapy- antibiotics – analgesics – narcotic analgesics- NSAID – medicines from plants.