

# SKILL ENHANCEMENT COURSES

## SYLLABUS FOR THE **SUBJECT: CHEMISTRY**

for the award of the Degree in

**BACHELOR OF ARTS/ BACHELOR OF SCIENCE/ HONOURS**

(Offered under 4-year UG Degree Programme)

(Credit Based Grading System)  
under NEP 2020

**Batch: 2025–29**



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## GURU NANAK DEV UNIVERSITY AMRITSAR

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Skill Enhancement Courses in Chemistry  
(CBGS) (under NEP 2020) (Batch 2025-29)

**SCHEME**  
**SKILL ENHANCEMENT COURSES**  
**CHEMISTRY**

**SEC-I**

<b>Sr. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits L-T-P</b>	<b>Total Marks</b>
1.		GENERAL CHEMISTRY (THEORY)	3-0-0	75

**SEC-II**

<b>Sr. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits L-T-P</b>	<b>Total Marks</b>
1.		CHEMISTRY IN DAILY LIFE (THEORY)	3-0-0	75

**SEC-III**

<b>Sr. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits L-T-P</b>	<b>Total Marks</b>
1.		CHEMISTRY OF COSMETICS (THEORY)	3-0-0	75

**SKILL ENHANCEMENT COURSES**

**CHEMISTRY**

**(SEC-I)**

**GENERAL CHEMISTRY**

**(THEORY)**

**Time : 3 Hours**

**Credits :L-T-P**

**3-0-0**

**Marks : 75**

**Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION-A**

**1. Introduction**

Chemistry in everyday living  
Branches of chemistry

**2. Nature and Composition of Matter**

Matter and energy  
Separation of mixtures  
Atomic theory of matter  
Atoms and molecules  
Formulae  
Chemicals equations  
Avogadro's Hypothesis  
Mole concept  
Chemical equation

**3. Structure of an Atom**

Atomic structure  
Electrons, Protons and Neutrons  
Models of an atom  
Atomic number and mass number  
Isotopes, Isobars, Isotones, Isodiaphers and Isosteres  
Theories of radiation  
Quantum numbers  
Configuration of atoms

## SECTION-B

### 4. Radio activity

Discovery of Radio activity  
Nuclear Disintegration  
Nuclear Reactor  
Application of Radio active Isotopes

### 5. Periodic Classification of Elements

Modern Periodic table  
Gradation of Properties in groups and periods

### 6. Chemical Bonding

Chemical Bond  
Causes of Chemical Combinations  
Types of Bonding

## SECTION-C

### 7. Chemical Reactions

Introduction  
Types of chemical reactions  
Speed of reactions and catalysts  
Rate of chemical reactions  
Energies involved in are actions  
Electro chemicals cells  
Metallic corrosion

### 8. Oxidation and Reduction

Oxidation and reduction  
Oxidation Reduction  
Reaction/Redox Reaction  
Oxidation Number

### 9. Metals & Non Metals

Occurrence of Metals  
Properties of Metals  
Properties of Non-Metals

### 10. Carbon

Introduction All otophy of  
crabon

### 11. Solutions

Components of solutions  
Concentrations of solutions  
Solubility of gases  
Solid solutions  
Raoult's Law  
Osmosis

## SECTION-D

### 12. Acids, Bases and Salts

Acid and Base  
Salts  
The pH scale  
The pH of solution  
Buffer solutions

### 13. Chemistry in Service of Man

Polymers  
Natural Rubber  
Plastics

### 14. Fertilizers and Pesticides

Fertilizers  
Pesticides

### 15. Cement and Glass

Cement  
Glass

#### Books:

1. General Chemistry by Darrel D. Ebbing and Steven D. Gammon, 9th Edition, Houghton Mifflin company, Boston, New York.
2. Principles of general chemistry by Martin S. Silberberg, Publisher McGraw-Hill
3. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.
4. Modern ABC of Text book Chemistry Vol. I & IIF or Class 11 and 12 by Dr. S.P. Jauhar Modern Publishers Books, New Delhi.
5. Pradeep New Course Chemistry Vol. I & IIF or Class 11 and 12 by S.N. Dhawan, S. C. Khaterpal & P. N. Kapil, Pradeep Publication, Jalandhar

**SKILL ENHANCEMENT COURSE  
CHEMISTRY  
(SEC-II)  
CHEMISTRY IN DAILY LIFE**

**Time : 3 Hours**

**Credits :L-T-P  
3-0-0  
Marks : 75**

**Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION-A**

**Introduction to basic chemistry**

**[10]**

Atoms – the building blocks of matter, composition or structure of atoms, atomic number, mass number and isotopes, the periodic table, building molecules, types of bonding: covalent, ionic, metallic and weak (hydrogen and Vander Waals). The states of matter: Solid, liquid and gases.

**Chemistry of life and healthcare**

Origin of life, water, fundamental substance of life carbohydrates, proteins, lipids, nucleic acid, vitamins, minerals and hormones- source- applications and diseases due to deficiency.

Drug classification, importance of chirality in drugs, therapeutic action of different classes of drugs: analgesic, antipyretics, tranquilizers, antiseptics, disinfectants antimicrobials and antibiotics, antacids, antihistamines, food preservatives and artificial sweeteners.

**SECTION-B**

**Industrial Chemicals**

**[13]**

Plastics-polymers-Bakelite and cell uloid, polyethylene, poly vinyl chloride, polystyrene, polypropylene.

Dyes-Classification based on mode of application and structure-paints-ingredients-drying-pigments- types and properties- varnish.

Soaps and detergents-their difference, micelle formation, cleansing action of soaps and detergents.

**Chirality**

Basic concept, Chirality in nature with examples pertaining to Carvone and Limonene, Importance of Chirality in drugs: Cetrizine, Albuterol, Darvon-Novrad. Thalidomide: A tragic reminder of Chirality.

**SECTION-C**

**Chemistry in surroundings**

**[12]**

Chemistry behind: red and silver liquids in thermometers, disappearing inks, hydrogenperoxide stored in dark bottles, blue color in blue jeans, variation of sea shells in color, discoloration of old paintings, hair coloring products, permanent hair straightening, no tear phenomenon of shampoos, fire extinguishers, puffiness of pastry, chlorine addition in swimming pools, Working of bullet proof vest, Alcohol free cosmetics, Difference between hard and soft contact lenses, superglue, Shatter proof glasses, cool sensation in toothpaste and mouthy fresheners, detection in odorless gas leaks.

**SECTION-D****Energy and Chemistry****[10]**

Fuel, petroleum and oil, coal, natural gas, nuclear energy, wind energy, water energy, energy from garbage and biomass, Solar energy- fuel from sunlight-splitting of water hydrogen from sunlight-hydrogen economy –fuel cells-batteries- photovoltaics-stealing the sun.

Nuclear energy- nuclear fission and fusion- production of electricity by nuclear reactor-radioactivity and hazards of radio activity- living with nuclear power,

**Case Studies:** Hiroshima and Nagasaki nuclear disaster, Chernobyl disaster, Mayapuri radio logical incident, Minamata Bay disaster, Bhopal gas tragedy, Jilin chemical plant explosion, Chevron oil explosion,

**Text Books:**

1. Basic Books in Science–A series of books that start at the beginning, Book 5, Atoms, Molecules, Matter,– the stuff of Chemistry, Roy Mc Weeny, 2007
2. General Chemistry, Darrel ID. Ebbing, Steven D. Gammon, 9<sup>th</sup> edition, Houghton Mifflin Company, Boston, USA, 2007
3. Chemistry in daily life–Kirpal Singh, PHI Pvt Ltd, New Delhi, 3<sup>rd</sup> edition, 2012.
4. Chemistry Connections-Kerry K. Karukstis and Gerald R. Van Hecke, 2<sup>nd</sup> edition.
5. History, importance, and some basic concept of chirality-Manoj N. Bhoi, Mayuri A. Borad, Hitesh D. Patel

**SKILL ENHANCEMENT COURSES**  
**CHEMISTRY**  
**(SEC-III)**  
**CHEMISTRY OF COSMETICS**

**Time : 3 Hours**

**Credits :L-T-P**

**3-0-0**

**Marks : 75**

**Instructions for the Paper Setters:**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION-A**

**(15 Lectures)**

**Raw Materials for various types of Cosmetics:** Surfactants and their types; Additives (thickeners, foam stabilizers, pearlescent agents, conditioning agents, etc.) Oil components (Mineral oil, Natural oils, and Synthetic oils); Waxes (Natural and Synthetic); Silicone oils; Cream bases; Emulsifiers; Humectants; Aerosol Propellants.

**SECTION-B**

**(10 Lectures)**

**Essential Oils:** Chemistry and methods of preparation, Production of essential oils with special reference to the following; Eugenol, Geraniol, Sandalwood oil, eucalyptus oil, rose oil, Jasmone, Civetone, Muscone.

**SECTION-C**

**(10 Lectures)**

**Preparation and uses of the following:** Hair dye; hair spray; shampoo; suntan lotions; Face powder; Lipstick, Talcum powder; Nail enamel; Creams (Cold, Vanishing and Shaving creams); Antiperspirants and artificial flavours; Dental products.

**SECTION-D**

**(10 Lectures)**

**Quality control, preservation, testing and packaging of cosmetics:** Inspection of raw materials, containers, finished products and packaging material; environmental problems; testing of cosmetics by spectroscopic techniques.

**Reference Books:**

1. Earnest Guenther, "The Essential Oils" vol. I Robert E. Kreiger Publishing Co. Huntington, New York, 1972.
2. M.S. Balsem, S.D. Genshon, M.M. Rieger, E. Sagarin, S.J. Strianase, "Cosmetics, Science and Technology, Vol. I, II and III, Wiley-Inter science, A Division of John Wiley and Sons., Inc., New York, London, Sydney, Toronto, 1972, Ed. By M.S. Balsam and M. S. Sagarin.
3. J. Stephan Jellnick, "Formulation and Functions of Cosmetics", Wiley Inter science, a Division of John Wiley & Sons., Inc.
4. Chemistry and Technology of the Cosmetics and Toiletries Industry. By D.F. Williams & W.H., Schmitt, Blackie Academic & Professional, London, 1st Edn., 1992.
5. Harry's Cosmetic ology, sixth edn. The principles and Practice of Modern cosmetics, Vol. I by R.G. Harry Chemical Publishing Co., Inc., New York, 1973.
6. W.A. Poucher, Poucher's Perfumes, Cosmetics and Soaps: Vol 3, Chapman & Hall, 2012, UK.
7. E. Board of consultants & Engineers, Cosmetics Processes and Formulations Handbook.
8. H. Bennett, F.A.I.C. The new cosmetic formulary, Chemical Publishing Company, INC. New York. 1970
9. N. Board, Handbook on Herbal Products (Medicines, Cosmetics, Toiletries, Perfumes) National Institute of Industrial Research, 2000, New Delhi.