FACULTY OF SCIENCES

SYLLABUS

FOR

INTERDISCIPLINARY COURSE IN CHEMISTRY (UG)

Examinations: 2019 - 20

GURU NANAK DEV UNIVERSITY
AMRITSAR

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Interdisciplinary Courses in Chemistry (UG)

CYL-001 General Chemistry

Credit: 4-0-0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

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. Radioactivity
   Discovery of Radioactivity
   Nuclear Disintegration
   Nuclear Reactor
   Application of Radioactive 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

7. Chemical Reactions
   Introduction
   Types of chemical reactions
   Speed of reactions and catalysts
   Rate of chemical reactions
   Energies involved in a reactions
   Electrochemicals 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
    Allotrophy of carbon

11. Solutions
    Components of solutions
    Concentrations of solutions
    Solubility of gases
    Solid solutions
    Raoult's Law
    Osmosis
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:
2. Principles of general chemistry by Martin S. Silberberg, Publisher McGraw-Hill
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CYL-004: Introduction to Textiles

Credits/L/T/P: 4/4/0/0 (60hrs.)

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

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SECTION-A
Introduction to fiber, yarn and fabric: (13 hrs.)

Introduction to natural fibers - cotton, silk, wool. Man made fibers - Polyester, Nylon, Acrylic. Regenerated fibers - Viscose, Rayon, Modal, Lyocell. Types of yarn - single or 2 ply yarn, types of fabric i.e. woven, knitted and non woven.

Pre-treatment technology: (10hrs.)

Introduction to desizing and its application method. Scouring process and its process parameters, bleaching processes - H₂O₂ bleaching, hypochlorite bleaching, sodium chlorite bleaching.

SECTION-B
Coloration technology: (13hrs.)

Introduction to the dyeing of different fibers with different colorants. Cotton dyeing with reactive, direct, vat and sulphur dyes. Wool dyeing with acid dyes, metal complex dyes and reactive dyes. Silk dyeing with acid dyes. Polyester dyeing with disperse dyes dyes, nylon dyeing with acid dyes. Acrylic dyeing with basic dyes.

SECTION-C
Printing technology: (12hrs.)

Introduction to printing technology, types of printing method i.e. direct printing, pigment printing, resist printing, discharge printing. Types of machines used in printing i.e. flat bed printing, rotary screen printing, roller printing.
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SECTION-D

Finishing technology: (12hrs.)

Introduction to finishing technology, mechanical finishes- raising, peaching, tumbling, sanforization, chemical finishes- wrinkle free finishes, water and oil repellent, soil and stain release, anti-microbial, UV protection.

Books:

Interdisciplinary Courses in Chemistry (UG)

CYL-005
Garment Care

Credits/L/T/P: 4/4/0/0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
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SECTION A
Chapter 1: General Introduction
Textile fibers; cotton, linen, viscose, polyester, silk, nylon, wool etc, composition of textile fibers, physical and chemical properties of fibers, general introduction to production route for textile fibers, yarn and fabric manufacturing process. [15]

SECTION B
Chapter 2: Textile wet processing
Introduction to wet processing, Singeing, Desizing, Scouring, Bleaching, Mercerization, Dyeing and printing. [5]

Chapter 3: Functional and high performance Textiles/garments
Introduction to Technical Textiles/functional textiles, Medical Textiles, Sportswear, Protective clothing, Home textiles, Automotive textiles etc [5]

Chapter 4: Stains
Classifications of Stains and their removal, Techniques used for stain removal, Stain removal products, Unidentifiable stains. [5]

SECTION C
Chapter 5: Garment Manufacturing processes
Introduction to Garment production process (design to dispatch), sewing of knits, fusing technology and other new methods of garment manufacturing. [15]

SECTION D
Chapter 6: Garment finishing and washing
Introduction to garment finishing processes (UV protection, water proof, permanent press, etc), Denim dyeing and washing processes like stone wash, acid wash and enzyme wash, Bleaching etc. [10]

Chapter 7: Wash Care Labeling of Apparel
Care Label, Basic care label symbols, Care symbols for washing, bleaching, drying, ironing, dry-cleaning, Size and Colour of Care Label, International standards on care labels. [5]
Books:


Interdisciplinary Courses in Chemistry (UG)

EVEN SEMESTER
CYL.0016
Chemistry in Daily Life

Total Hours: 60
Credit: 3-1-0
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

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SECTION-A
Introduction to basic chemistry
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 health care
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
Plastics- polymers- Bakelite and celluloid, polyethylene, polyvinyl 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
Chemistry behind : red and silver liquids in thermometers, disappearing inks, hydrogen peroxide 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, Shatterproof glasses, cool sensation in tooth paste and mouthy fresheners, detection in odorless gas leaks.
**SECTION-D**

**Energy and Chemistry** [14]

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 radioactivity - living with nuclear power,

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

**Text Books:**

5. History, importance, and some basic concept of chirality- Manoj N. Bhoi, Mayuri A. Borad, Hitesh D. Patel
Interdisciplinary Courses in Chemistry (UG)

ODD SEMESTER
CYL.007
Chemical Disasters

Total Hours: 60
Credit: 4-0-0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
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SECTION-A

Introduction

SECTION-B

Types of Chemical Disasters
Nuclear, Radiological and Biological Disasters, Environment Pollution Based Disaster (Air, Water, Soil and Solid Waste Disaster) Chemical and Nuclear Wars, Medical and Drug Related Disaster, Food Poisoning and Pesticides.
Case Studies: Cancer Belt Study, Bhopal Gas Tragedy, Minamata, Mid-Day Meal Food Poising, Eye Camp Operation Failure, Solid Waste Pollution, etc. (15)

SECTION-C

Disaster Management

SECTION-D

Disaster Management Act 2005, Creation of National Disaster Relief Force, National Guidelines and Plans on Disaster Management; Role of Government (Local, State and National), Non-Government and Inter Governmental Agencies. Environment Relief Funds, Role of Insurance in Chemical Disaster Management. (7)

Legal and Environment Considerations
References

1. S. Payment, Nuclear, Biological and Chemical Disasters, the Rosen Publishing Group, Inc., New York, 2006.
Chemistry of Cosmetics and Perfumes

**EVEN SEMESTER**

**CYL-008**

Credits: 4-0-0

(60 Lectures)

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

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**Chemistry of Cosmetics**

**SECTION-A**

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

(5 Lectures)

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

(10 Lectures)

**SECTION-B**

**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.

(15 Lectures)

**Reference Books:**

4. J. Stephan Jellinick,” Formulation and Functions of Cosmetics”, Wiley Interscience, a Division of John Wiley & Sons., Inc.
Perfumes (30 Lectures)

SECTION-C

**Introduction:** History of perfumes, psychological benefits, fragrance and mood, aromatic substances, types of aromatic substances, chemical constituents of aromatic substances, odors of substances from vegetable, animal and artificial origin (10 Lectures)

**Perfume Selection and Evaluation:** Steps in the choice of perfumes, assessing perfume acceptance, techniques for perfume evaluation, safety in perfume usage (5 Lectures)

SECTION-D

**Chemical products in Perfumery:** Chemicals for the extraction of aromatic substances ether, chloroform, benzene, bisulphides of carbon; Chemicals for the preparation of perfumes alcohol, ammonia, almond oil, benzoic acid, borax fats; extraction of odors; separating funnels, hydraulic press, distillation, Articles in perfumery handkerchief, bouquets, aromatic water (15 Lectures)

**Reference Books:**

Interdisciplinary Courses in Chemistry (UG)

EVEN SEMESTER

CYL010  Functional clothing and Apparel  Credits: 4-0-0

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

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SECTION-A

Introduction: Definition and scope for Functional clothing, History of Functional clothing, present and future status of Functional clothing, application areas of Functional clothing. Role of the government in the promotion of functional clothing in India.

Coating and lamination Clothing: Introduction, Material used for coating, substrate used for coating, Methods of coating, Physical properties of coated textiles and application of coated textiles.

Functional composite fabric: Woven structure, knitted, braided and its application in different areas.

SECTION-B

Sports and recreation textiles: Functional requirement of different type of product and their construction. Application areas like Synthetic turfs, sports equipments and apparel.

Electronic-Clothing: Functional requirement of different type of product and their construction. Application of electronic clothing like military and medical etc

Geotextiles: Brief idea about geotextiles and their uses, essential properties of geotextiles, geotextile testing and evaluation, application examples of geotextiles.

Medical textiles: introduction, classification of medical textiles, description and basic requirements of material used for medical textiles.

SECTION-C

Protective Clothing: Brief idea about different type of protective clothing, functional requirement of textiles in defense including ballistic protection materials, thermal insulation, Biological and chemical warfare protection, water proof breathable fabrics and high attitude fabrics, clothing for construction worker and fire fighter suits, pressure garment for deep divers and astronaut’s suits etc

Home textiles: Introduction, basic requirement of home textile, different products etc.
Filtration textiles: introduction, filtration requirements, role of fiber, fabric construction and finishing treatments. Application like Air conditioner, traffic control police, Bikers, fire fighter, RO etc

SECTION-D

Automotive Textiles: Application of textiles in automobiles, requirement and design for different tyres, airbags and belts, methods of production and properties of textiles used in these applications like railways, aero plane, marine etc.

Functional ropes: Types, method of production and applications, functional requirements, structure and properties, and application like parachute, bungge-jumpung, mountain climbing and Rope Bridge.

Other uses of functional cloths: Functional requirements and types of textiles used for disaster management, hiking-trekking, adventure sports etc.

References: