FACULTY OF SCIENCES

SYLLABUS

FOR

INTERDISCIPLINARY COURSE IN CHEMISTRY (UG)

Examinations: 2019 - 20

GURU NANAK DEV UNIVERSITY AMRITSAR

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

SECTION-C

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 crabon

SECTION-D

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:

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 Textbook Chemistry Vol. I & II For Class 11 and 12 by Dr. S.P.Jauhar Modern Publishers Books, New Delhi.
5. Pradeep New Course Chemistry Vol. I & II For Class 11 and 12 by S. N. Dhawan, S. C. Khterpal & P. N. Kapil, Pradeep Publication, Jalandhar

CYL-004: Introduction to Textiles

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

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

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 - H_2O_2 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.

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:

1. Colorants and Auxiliaries Vol 1, John Shore, SDC Publishers, UK, 2001.
2. Chemical Technology in the Pre-treatment Processes of Textiles by S.R. Karmakar, Published by Elsevier Publications, The Netherlands.
3. Manufactured Fibre Technology, V B Gupta and V K Kothari, Chapman and Hall, 1997
4. Chemical Finishing of Textiles, by W D Schindler and P J Hauser, Woodhead Publishing Ltd, Aug 2004.
5. Textile printing edited by Leslie W.C. Miles (1994 edition).Chapters (1-8). Published by Society of Dyers and Colourists, Bradfort.

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:
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

Chapter1: 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

Chapter2: 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

Chapter5: 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:

1. Cooklin Gerry, “Garment Technology for Fashion Designers”, OM Book Service, New Delhi, 1997.
2. Horrocks, A. R. & Anand, S, “Handbook of Technical Textiles” (Second Edition) Woodhead Publishing Limited in association with The Textile Institute Abington Hall, Abington Cambridge,England, 2000.
3. Corbman, B. P. “Textiles: fiber to Fabric” (Sixth Edition). The Gregg, McGraw-Hill International Editions, Singapore, 1983.
4. Rao. J.V, “Tablet on Stains” published by Northern India Textile Research Association, Gaziabad, 2006.

EVEN SEMESTER

CYL006

Chemistry in Daily Life

Total Hours: 60 **Credit: 3-1-0**

Mid Semester Examination: 20% weightage

End Semester Examination: 80% weightage

Instructions for the Paper Setters:

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SECTION-A

Introduction to basic chemistry **[6]**

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 **[10]**

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, antiacids, antihistamines, food preservatives and artificial sweeteners.

SECTION-B

Industrial Chemicals **[8]**

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 **[10]**

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, 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:

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

ODD SEMESTER

CYL007

Chemical Disasters

Total Hours: 60 **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

Introduction

Understanding the Concepts and Definitions of Disaster, Hazards, Vulnerability, Risk, Capacity Building. Classification of Disasters, Nature of Chemical Disasters, Causes and Effects of Major Chemical Accidents, Process and Safety System Failures, Technical Errors, Human Errors, Natural Calamities, Terrorist Attacks, Waste Processing. **(15)**

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

Pre-Disaster – Risk Assessment and Analysis, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation –Search and Rescue – Emergency Operation Centre — Relief and Rehabilitation – Post-Disaster – Reconstruction and Redevelopment. On-Site Plans: Standard Operating Procedures, Control Rooms, Safety Officers, Committees for Disaster Management, Rescue Teams, Trainings, Exercises and Drills. Off-Site Plans: Dissemination of Information, Identification of Vulnerable Locations, Damage Assessment and Compensation. **(15)**

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

Safety with Hand and Portable Power Tools, Pressure Vessel Hazards, Safety in Material Handling, Safety with Storage Materials, Transportation of Hazardous Materials, Evaluation of Risk Funding, Catastrophe Insurance Pool, Reserve Funds and Contingent Credit Policies, Legal and Institutional Aspects, Target Groups, Environment Liabilities and Litigations. **(8)**

References

1. S. Payment, Nuclear, Biological and Chemical Disasters, the Rosen Publishing Group, Inc., New York, 2006.
2. S. L. Goel, Encyclopedia of Disaster Management, Deep and Deep Publications, New Delhi, 2009.
3. S. Modh, Introduction to Disaster Management, Macmillan Publishers India Ltd, New Delhi, 2010.
4. P. K. Ray, Disaster preparedness against Accidents, New Age India International, New Delhi, 2006.
5. B. K. Khanna, All you wanted to know about Disasters. New India Publishing Agency, New Delhi, 2005.

EVEN SEMESTER

CYL-008

Chemistry of Cosmetics and Perfumes

Credits: 4-0-0
(60 Lectures)
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.

Chemistry of Cosmetics **(30 Lectures)**

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:

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-Interscience, A Division of John Wiley and Sons., Inc., New York, London, Sydney, Toronto, 1972, Ed. By M.S. Balsam and M.S. Sagarin.
3. Paul Z. Bedoukian, " Perfumery and Flavouring Synthetics" II Edn, Elsevier Publishing Co., Amsterdam, London, New York, 1967.
4. J. Stephan Jellinick," Formulation and Functions of Cosmetics", Wiley Interscience, a Division of John Wiley & Sons., Inc.
5. Mareel IBillot, F.V. Wells," Perfumery Technology" Ellis Harwood Ltd., Halrted Press, a Division of John Wiley & Sons., Inc. New York, London, 1975.
6. Chemistry and Technology of the Cosmetics and Toiletries Industry ed. By D.F. Williams & W.H., Schmitt, Blackie Academic & Professional, London, Ist Edn., 1992.
7. Harry's Cosmeticology, sixth edn. The principles and Practice of Modern cosmetics, Vol. I by R.G. Harry Chemical Publishing Co., Inc., New York, 1973.

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, choloroform, 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:

1. W. A. Poucher, Poucher's Perfumes, Cosmetics and Soaps: Vol 3, Chapman & Hall, 2012, UK.
2. G. W. Askinson, Perfumes and Their Preparation, Waxford College Press, 2003, London.
3. H. Panda, Perfumes and Flavours Technology Handbook, Asia Pacific Business Press Inc., 2010, Delhi.
4. N. Board, Handbook on Herbal Products (Medicines, Cosmetics, Toiletries, Perfumes) National Institute of Industrial Research, 2000, New Delhi.

EVEN SEMESTER

CYL010 Functional clothing and Apparel Credits: 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: 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:

Handbook of Technical Textiles, Ed., A.R. Horrocks and S.C. Anand, Woodhead Publication Ltd., Cambridge.