

MANGALORE UNIVESITY
CHOICE BASED CREDIT SYSTEM
COURSE PATTERN AND SCHEME OF EXAMINATION
CORE SUBJECT: CHEMISTRY

| Core/ Elective | Paper Code | Title of the Paper | Instru- ction Hours | Duration of the Examinati on(Hrs.) | Max. Marks | | | Cre- dits |
|--|-------------------------------|---|---------------------------|---|------------|----|-------|--------------|
| | | | | | Exam | IA | Total | |
| I Semester B.Sc. | | | | | | | | |
| Group I Core Subject | Theory BSc CHC- 131 | Chemistry Paper I | 4 | 3 | 80 | 20 | 100 | 2 |
| | Practical BSc CHP- 132 | Chemistry Practical I | 3 | 3 | 40 | 10 | 50 | 1 |
| Group II Elective | Theory BSc CHCE 133 | Food Chemistry & Biomolecules | 2 | 2 | 40 | 10 | 50 | 1* |
| Total number of Credits for Subject in I Semester:04 | | | | | | | | |
| II Semester B.Sc. | | | | | | | | |
| Group I Core Subject | Theory BSC CHC- 181 | Chemistry Paper II | 4 | 3 | 80 | 20 | 100 | 2 |
| | Practical BSc CHP- 182 | Chemistry Practical II | 3 | 3 | 40 | 10 | 50 | 1 |
| Group II Elective | Theory BSc CHCE- 183 | Computer for Chemists & Laboratory Safety Techniques | 2 | 2 | 40 | 10 | 50 | 1* |
| Total number of Credits for Subject in II Semester:04 | | | | | | | | |
| III Semester B.Sc. | | | | | | | | |
| Group I Core Subject | Theory BSC CHC- 231 | Chemistry Paper III | 4 | 3 | 80 | 20 | 100 | 2 |
| | Practical BSC CHP- 232 | Chemistry Practical III | 3 | 3 | 40 | 10 | 50 | 1 |
| Group II Elective | Theory BSc CHCE- 233 | Corrosion and Green Techniques | 2 | 2 | 40 | 10 | 50 | 1* |
| Total number of Credits for Subject in III Semester:04 | | | | | | | | |

IV Semester B.Sc.

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|----------------------------|-------------------------------|----------------------------|---|---|----|----|-----|----|
| Group I Core Subject | Theory BSc CHC- 281 | Chemistry Paper IV | 4 | 3 | 80 | 20 | 100 | 2 |
| | Practical BSc CHP- 282 | Chemistry Practical IV | 3 | 3 | 40 | 10 | 50 | 1 |
| Group II Elective | Theory BSC CHOE- 283 | Chemistry in everyday life | 2 | 2 | 40 | 10 | 50 | 1* |

Total number of Credits for Subject in IV Semester:04

V Semester B.Sc.

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|----------------------------|------------------------------|-----------------------|---|---|----|----|-----|---|
| Group I Core Subject | Theory BSc CHC- 331 | Chemistry Paper V | 3 | 3 | 80 | 20 | 100 | 2 |
| | Theory BSc CHC- 332 | Chemistry Paper VI | 3 | 3 | 80 | 20 | 100 | 2 |
| | Practical BSc CHP- 333 | Chemistry Practical V | 4 | 4 | 80 | 20 | 100 | 2 |

Total number of Credits for Subject in V Semester:06

VI Semester B.Sc.

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|----------------------------|------------------------------|------------------------|---|---|----|----|-----|---|
| Group I Core Subject | Theory BSc CHC- 381 | Chemistry Paper VII | 3 | 3 | 80 | 20 | 100 | 2 |
| | Theory BSc CHC- 382 | Chemistry Paper VIII | 3 | 3 | 80 | 20 | 100 | 2 |
| | Practical BSc CHP- 383 | Chemistry Practical VI | 4 | 4 | 80 | 20 | 100 | 2 |

Total number of Credits for Subject in I Semester to IV Semester:16

Total number of Credits for Core Subject in I-VI Semesters:28

*Credits for Elective Papers will be considered for the entire B.Sc. Programme

I-Semester

Food Chemistry and Biomolecules

UNIT I

Food and Nutrition: Introduction, Terminology used in food chemistry, classification of food, pH of foods., functions. Food as source of energy and structural material. Components of food – Carbohydrates, Proteins, Oils and Fats. Micronutrients-Vitamins, minerals. Chemical substances used in food preparation - water, common salt, baking powder, vinegar. Digestion of food- dissolution in the mouth, digestion in stomach and small intestine, absorption of food. Digestion of carbohydrates, proteins, oils and fats - Explanation. Food Processing. drying, salting, canning, pickling, smoking, packing and refrigeration Food additives, emulsifying agents, Texturing agents, flavoring and coloring agents ,antioxidants, sweeteners ,low caloric sweeteners, artificial sweeteners like glycamates,D-aminoacids,saccharin,aspartame,designer sweetners,sugar alcohols,corn sweeteners

Naturally occurring sweeteners: Stevioside, Monellin,curculin,Pentodin, Isovanillyll sweeteners .
Soft drinks-Components. Effects on health. 12hrs.

Unit-II

Vitamins :Introduction, classification,Fat soluble vitamins, source of vitamin, vitamin D, Niacin, structure and synthesis. Water soluble vitamins, pantothenic acid, cyanocobalamin, synthesis ,structure and deficiency disease's.

Photosynthesis of carbohydrate, mechanism of light phase reaction,.

Proteines : Oxytocin and vasopressin ,chemical synthesis and biological activity.

Antibiotics, Introduction, classification, synthesis of chloramphenicol

Lipids: Introduction, occurrence,biological functions,chemical and physical properties, Derived lipids, cholesterol and its biological functions 12hrs.

Reference Books:

1. Food: The Chemistry of its components-Tom Coultate, Kindle Edition.
2. Food Science and Technology-Geoffrey Campbelt-Platt,Wiley Blackwell, Kindle Edition.
3. Chemistry at Home: Exploring the ingredients in everyday products- John Emsley, Royal Society of Chemistry (2015).
4. Chemistry in daily life - Kripal Singh, Third Edition, Eastern Academy Education, PHI Learning Pvt. Ltd, New Delhi(2012).
5. Chemistry in everyday life-Shardendu Kislaya, Discovery Publishing House Pvt.Ltd(2011).
6. Food chemistry by H.K.Chopra and P.S.Panesar (Narosa Publishing)
7. Organic Chemistry of Natural Products,By Gurudeep R.Charwal(Vol-I and II) ,edited by M.Arora(Himalaya Publishing House)

II semester: Computers for Chemists, Laboratory Safety and Chemotherapy

UNIT I

Computers for Chemists

Basic structure and functioning of computer with a PC as an illustrative example.

Memory, Input/output devices, Secondary storage, Computer languages, Operating systems, Algorithm and Flow chart, programmes and packages, MS-word, EXCEL, PPT, CHEM SKETCH etc.

Demonstration and writing and drawing of chemical formulae and structure through chem sketch.

Plotting the various graphs such as pressure-volume (PV), pressure- temperature (PT), potentiometric, conductometric and colorimetric plots through EXCEL. 8h

LABORATORY SAFETY

Introduction. General laboratory protocols: Basic rules, Good Laboratory Practices. Chemical hazards, safety data sheets, symbols and hazard information, storage procedure, Physical hazards, Health hazards, Reaction hazards. Assessing the risks of hazards. Minimizing the risks of hazards: fume hood, ventilation, fire extinguisher, personal protective equipment's, Preparedness for emergencies from uncontrolled hazards: Importance of reporting incidents, response to common emergencies such as fires, explosions, chemical spills, chemical exposures, injuries. 4h

UNIT II

SERENDIPITY

The role of Chance in making Scientific Discoveries

What is Serendipity- Some Serendipous Inventions in Science; Guncotton, Velcro, Plastic, X-rays, Microwave, Superglue, Mauve, Teflon, Saccharin, Stainless steel, Matches. Role of Serendipity in Drug discovery; Inventions in Chemistry that enabled the modern world. 3h

CHEMOTHERAPY

Introduction. Classification – antibiotics-Chloramphenicol and Pencillin. Synthesis and Uses. Analgesics – Narcotic analgesics and Non-Narcotic analgesics-Examples and their uses. (Simple Synthesis to be included).

Sulphonamides-Preparation of sulphonamides.-Examples and their uses. Antiseptics and disinfectants-Examples and their uses. Hypoglycemic agents –Cancer treatment by Chemotherapy.

A brief account of medicinally important compounds. Compounds of aluminum as pharmaceuticals; compounds of phosphorous as pharmaceuticals; Compounds of iron as pharmaceuticals. Examples and uses. (Only specific examples) 4h

Laboratory Reagents:

Preparation of laboratory reagents and maintenance of electrodes and equipment's. Methods of expressing concentrations of solution, Preparation of reagents for qualitative analysis of organic and inorganic compounds. Precaution and safety measures during reagent preparation. 5h.

References:

1. Laboratory Safety, theory and Practice, 1st Edition, Editors: Anthony Fuscaldo and others Elsevier Publications, 1980.
2. Chemical Laboratory Safety and Security: A Guide to Developing Standard Operating Procedures. National Academies Press (2016). Board on Chemical Sciences and Technology , Division on Earth and Life Studies.
3. Chemistry Laboratory Safety Manual, Indian Institute of Science Education and Research, Tirupati.
4. Laboratory Safety Manual, NCBS, 2016.
5. Pharmaceutical Chemistry by Thyagarajan.
6. Science and serendipity: Famous accidental discoveries, Samira Shackle, Thursday, 2nd April 2015- NEW HUMANIST.
7. The role of serendipity in drug discovery. Thomas A. Ban, MD, FRCP- Dialogues in Clinical Neuroscience, 2006 Sep; 8(3): 335–344.
8. Five Chemistry Inventions that changed the modern world-THE CONVERSATION. June 2, 2015
9. Hannan, Patrick J. (2006). Serendipity, Luck and Wisdom in Research; Universe. ISBN 0-595-36551-5.
10. Practical Chemistry- Dr. O.P.Pandey, D.N. Bajpai, Dr. S. Giri
11. Vogel's Qualitative Inorganic Analysis- G. Svehla
12. Computers and their applications to Chemistry – Ramesh Kamari
13. Computers in Modern Chemistry – A. Kumar

III-Semester : Corrosion and Green Techniques

UNIT I

Corrosion : Introduction, definition, Types of corrosion, Galvanic corrosion, Crevice corrosion, Pitting corrosion, Erosion corrosion, Stress corrosion, Corrosion rate, definition, Factors affecting on corrosion rate

Metallic factor-Purity, Electrode Potential of metal, hydrogen over voltage, nature of corrosion product

Environmental factors-Temperature, pH of the medium, humidity, presence of impurities, electrical conductivity of the medium, velocity of the medium, concentration of the medium.

Prevention of corrosion: Material selection-Metals and alloys, metal purification, non-metallic, Alteration of environment-Changing media, inhibitors, Design-wall thickness, design rules, Coating-Metallic and other inorganic coatings, organic coating

Unit-II

Green Chemistry-Introduction, Principles, atom-economy, Prevention of waste, byproducts, hazardous products/chemicals, water as a solvent for organic reactions, ionic liquids, solidstate-solventless reactions, use of microwaves, careful use of protecting and deprotecting agents, use of catalytic reagents, Phase transfer catalysts and its synthetic applications.

Examples of Green synthesis: Synthesis of adipic acid, catechol, disodium iminodiacetate, Boots synthesis of brufen, Microwave assisted reactions in water-Hofmann elimination, Methyl benzoate to benzoic acid, oxidation of toluene and alcohols

Microwave assisted reactions in organic solvents:-Diels-Alder reaction and decarboxylation reaction, Green synthesis of compostable and widely applicable polylactic acid, plastic from corn.

Limitations of green techniques.

References:

1. Laboratory Safety, theory and Practice, 1st Edition, Editors: Anthony Fuscaldo and others. Elsevier Publications, 1980.
2. Chemical Laboratory Safety and Security: A Guide to Developing Standard Operating Procedures. National Academies Press (2016). Board on Chemical Sciences and Technology , Division on Earth and Life Studies.
3. Chemistry Laboratory Safety Manual, Indian Institute of Science Education and Research, Tirupati.
4. Laboratory Safety Manual, NCBS, 2016.
5. Text book of Physical Chemistry By Puri, Sharma and Pathania
- 6.
7. text book of ElectroChemistry By Glaston
8. Text book of Physical Chemistry By Atkins
9. Text book of Physical Chemistry By Bahl and Bahl
10. Text book of Physical Chemistry By Gurudeep Raj
11. Pharmaceutical Chemistry by Thyagarajan

Semester IV : Chemistry in Daily Life (Open Elective)

UNIT I

Food: Food as source of energy and structural material. Components of food – Carbohydrates, Proteins, Oils and Fats. Micronutrients-Vitamins, minerals. Chemical substances used in food preparation - water, common salt, baking powder, vinegar. Digestion of food- dissolution in the mouth, digestion in stomach and small intestine, absorption of food. Digestion of carbohydrates, proteins, oils and fats - Explanation. Food Processing. Food additives, preservatives and flavours. Explanation with examples for the preservation of food by the use of inhibitors, drying, salting, canning, pickling, smoking, packing and refrigeration. Food safety. Soft drinks- Components. Effects on health. 6 Hrs

Chemistry for our household requirements

Cleansing agents: Chemical composition of Soaps, detergents, dish washers, drain cleaners, bleaching powder, Tooth paste and shampoo. Stain removers – Explanation with some common examples.

Domestic items: Safety matches, wax candles, shoe polish, mosquito coils, household germicides and pesticides-their chemical composition.

Cosmetics: Talcum powder, nail polish, thinners, skin care, hair care, Lipsticks, sun protection lotions and creams, eye shadow and eyebrow pencils, antiperspirants, perfumes and deodorants- explanation with examples. 6 Hrs

UNIT

Chemistry for our future

Alternative sources of energy: Need for the search of renewable sources of energy.

Solar Energy: Basic properties of solar energy. Applications of solar energy. Transformation of solar energy. Solar heat collectors. Solar photovoltaic collectors. Applications of solar collectors. Examples. Solar power plant.

Wind Energy: Basic properties of wind energy. Applications of wind energy. Transformation of wind energy. Wind turbines. Operative characteristics of wind turbines. Wind power plant. Utilization of wind power. Examples. Trends in wind energy utilization.

Hydro power: Basic properties water energy. Transformation of water energy. Hydro power plant. Utilisation of hydro power. Examples. Trends in hydro power utilization. 6hrs.

Hydrogen energy: Production and applications.

Food adulterations-Definition, common harmful effects, detection of adulteration, Prevention, Food adulteration act, artificial ripening of fruits, explanation with examples'. Transformation of biomass energy. Applications of biomass.

Ocean energy- Principles of ocean thermal energy, conversion system. Principles of wave and tidal energy conversion. 6 Hrs

Reference Books:

1. Food: The Chemistry of its components-Tom Coultate, Kindle Edition.
2. Food Science and Technology-Geoffrey Campbelt-Platt,Wiley Blackwell, Kindle Edition.
3. Chemistry at Home: Exploring the ingredients in everyday products- John Emsley, Royal Society of Chemistry(2015).
4. Chemistry in daily life - Kirpal Singh, Third Edition, Eastern Academy Education, PHI Learning Pvt. Ltd, New Delhi(2012).
5. Chemistry in everyday life-Shardendu Kislaya, Discovery Publishing House Pvt.Ltd(2011).

6. Renewable energy sources and emerging technologies-D.P.Kothari, K.C.Singal and Rakesh Ranjan, Eastern Economy Edition.
7. Solar energy: fundamentals and applications- H.P.Garg and J.Prakash, Mc Graw Hill, First Revised Edition.
8. Biomass regenerable energy-D.O.Hall and R.P.Overend, Wiley-Blackwel(1987).
9. Introduction to wind turbine aerodynamics – Alois Peter Schaffarczyk, Springler(2014).
10. Hydrogen and fuel cells: Fundamentals, technologies and applications-Detlef Stolten, Wiley-Vest(2010).
11. New Trends in Green Chemistry - Ahluwalia V.K and Kidwai M.R, Anamalaya Publishers (2005).
12. Green Chemistry - Theory and Practical, Anastas, P.T and Warner J.K : Oxford University Press (1998).
13. Introduction to Green Chemistry- Matlack, A.S. Marcel Dekker (2001).
14. Introduction to Green Chemistry- Ryan, M.A. & Tinnesand, M., American Chemical Society, Washington (2002).
