

CHEMISTRY (CY) – R2021 - CBCS



U21CY201	FUNDAMENTALS OF BIOCHEMISTRY	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

**PRE-REQUISITES:**

- Higher secondary Chemistry

**COURSE OBJECTIVES:**

- To acquire knowledge on structural and functional properties of carbohydrates, proteins, lipids and nucleic acids
- To emphasize the role of biomolecules in metabolic processes in living systems
- To gain knowledge about drugs and their mode of action

**COURSE OUTCOMES:**

Upon completion of the course, the student will be able to

- CO1:** Apply the knowledge of carbohydrates, its reactions and metabolic pathways (Apply)  
**CO2:** Describe the nomenclature, metabolic pathways, degradation and disorders of lipid metabolism in living beings (Understand)  
**CO3:** Elucidate the structure of nucleic acids, its types, DNA and RNA (Understand)  
**CO4:** Outline the classification, structure and properties of amino acids and proteins (Understand)  
**CO5:** Explain the concepts of medicinal chemistry, synthetic drugs and its classification (Apply)

**CO-PO MAPPING:**

COs \ POs	POs													PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	1	-	-	-	-	2	-	1	-	-	1			
CO2	3	1	-	-	-	-	2	-	1	-	-	1			
CO3	3	1	-	-	-	-	2	-	1	-	-	1			
CO4	3	1	-	-	-	-	2	-	1	-	-	1			
CO5	3	1	-	-	-	-	2	-	1	-	-	1			
CO	3	1	-	-	-	-	2	-	1	-	-	1			
Correlation levels:			1: Slight (Low)				2: Moderate (Medium)				3: Substantial (High)				

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**SYLLABUS:****UNIT I CARBOHYDRATES** **6**

Classification of carbohydrates, chemical properties, structure – Monosaccharides – Glucose, disaccharides – Sucrose and polysaccharides – Starch, Digestion and absorption of carbohydrates, metabolic pathways – Glycolysis, glycogenesis, glycogenolysis - TCA cycle

**UNIT II LIPIDS** **6**

Classification of lipids – Simple, compound and derived lipids. Nomenclature of fatty acid, physical and chemical properties of fat – (Hydrogenation, Acid, Iodine and Saponification values, Reichert-Meissl value), Metabolic pathways – Synthesis and degradation of fatty acid (beta oxidation), ketogenesis, Disorders of lipid metabolism

**UNIT III NUCLEIC ACIDS** **6**

Structure of purines and pyrimidines, nucleoside, nucleotide, DNA act as a genetic material, Chargaff's rule, Watson and crick model of DNA – Structure of RNA and its type, Disorder of purines and pyrimidines nucleotide

**UNIT IV AMINO ACIDS & PROTEINS** **6**

Amino acids – Classification – Physical properties, chemical properties of glycine – Proteins- classification, structural organization – Properties and testing

**UNIT V MEDICINAL CHEMISTRY** **6**

Synthetic drugs – Requirement of drug, classification based on chemical structure and therapeutic action. Definition, structure, mode of action and properties – Antibacterial (Sulfonamides, Ciprofloxacin), Anti-inflammatory (Salicylic acid, Indomethacin), Antimalarial (Chloroquine), Analgesics (Aspirin, acetaminophen), Cardiovascular drugs (Barbiturates, Lidocaine), Anesthetics (Benzocaine, Promethazine)

**LIST OF EXPERIMENTS**

1. Qualitative tests for carbohydrates – Glucose, Fructose, Starch
2. Qualitative tests for proteins
3. Qualitative tests for lipids
4. Estimation of blood glucose
5. Estimation of uric acid
6. Estimation of cholesterol
7. Separation of amino acids by TLC

**Contact Periods:**

Lecture:	30 Periods	Tutorial:	- Periods	Practical:	30 Periods	Project	– Periods
						Total	60 Periods

**TEXT BOOKS:**

1. Rafi M. D. "Text book of biochemistry for Medical Student", 2<sup>nd</sup> edition, University Press, 2014
2. David L. Nelson and Michael M, Lehninger, "Principles of Biochemistry", 7<sup>th</sup> edition, W.H. Freeman & Co. Ltd, 2017

**REFERENCES:**

1. Keith Wilson and John Walker, "Principles and techniques of practical biochemistry", 5<sup>th</sup> edition, Oxford University Press, 2009
2. Pamela C. Champe and Richard. A. Harvey, "Lippincott Biochemistry - Lippincott's Illustrated Reviews", 2<sup>nd</sup> edition, Raven publishers, 1994

3. Ashutoskar, "Medicinal Chemistry", 4<sup>th</sup> edition, New age international, 2010.
4. <https://nptel.ac.in/courses/102/106/102106087>

**EVALUATION PATTERN:**

Continuous Internal Assessments				End Semester Examinations	
Assessment I (Theory) (100 Marks)		Assessment II (Practical) (100 Marks)		Theory Examinations (Examinations will be conducted for 100 Marks)	Practical Examinations (Examinations will be conducted for 100 Marks)
*Individual Assignment / Case Study / Seminar / Mini Project / MCQ	Written Test	Evaluation of Laboratory Observation, Record (Rubrics Based Assessments)	Test		
40	60	75	25		
25		25		25	25
50				50	
<b>Total: 100</b>					

  
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CHEMISTRY (CY) – R2021 - CBCS



U21CY202	CHEMISTRY FOR TECHNOLOGISTS	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

**PRE-REQUISITES:**

- Engineering Chemistry

**COURSE OBJECTIVES:**

- To acquire basic knowledge of organic intermediates, reactions mechanism and their applications
- To understand the classification and chemical properties of biomolecules
- To gain knowledge about the synthesis and applications of drugs

**COURSE OUTCOMES:**

Upon completion of the course, the student will be able to

**CO1:** Explain the various reaction intermediates involved in chemical reactions (Understand)

**CO2:** Illustrate the different electrophilic and nucleophilic reactions (Apply)

**CO3:** Outline the classification, structure and properties of carbohydrates, amino acids and proteins (Understand)

**CO4:** Estimate the saponification value, iodine value, total fatty acid content in the soap, oil and explain the cleansing mechanism of soap and detergents (Understand)

**CO5:** Classify the drugs, their synthesis and their mode of action (Understand)

**CO-PO MAPPING:**

COs \ POs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	2	-	-	-	-	2		
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CO4	3	1	-	-	-	-	2	-	1	-	-	2		
CO5	3	1	-	-	-	-	2	-	1	-	-	2		
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Correlation levels:      1: Slight (Low)      2: Moderate (Medium)      3: Substantial (High)

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**SYLLABUS:****UNIT I STRUCTURE AND REACTIVITY**

6

Homolytic and heterolytic fission of a covalent bond – Generation, structure and stability- Free radicals, carbocations, carbanions and carbenes, Classification of organic reactions, Electrophiles and nucleophiles – Types, Aromaticity – Huckel's rule for aromaticity in benzenoid and non-benzenoid compounds, antiaromaticity and homo-aromaticity. Application of intermediates – Carbocation – Pinacol – Pinacolone reaction, Benzilic acid. Carbanion – Michael reaction, Knoevenagel reaction – Free radical – Wohl-Ziegler bromination reaction – Carbene - Reimer-Tiemann reaction, Wolff rearrangement

**UNIT II REACTION MECHANISMS**

6

Electrophilic Reactions:  $S_E1$ ,  $S_E2$ ,  $S_EAr$  – Mechanism, Electrophilic addition – Halogenation of alkene, hydrohalogenation – (addition of HBr on alkene- Markovnikov's rule and anti-Markovnikov's rule), Electrophilic addition – halogenation of ketones, Aromatic substitution – Nitration, Friedel Crafts alkylation, acylation and halogenation. Nucleophilic Reactions:  $S_N1$ ,  $S_N2$ ,  $S_NAr$ , & benzyne-mechanism, Nucleophilic addition of carbonyl – Ammonia derivatives, Grignard's reagent

**UNIT III BIOMOLECULES**

6

Introduction – Classification, structure and chemical properties of monosaccharides – Glucose, fructose, disaccharides – Sucrose and polysaccharides – Starch and cellulose, cellulose derivatives – Carboxy methyl cellulose and gun cotton

Amino acids – Classification, preparation – Strecker, Gabriel phthalimide and physical and chemical properties – Proteins – Composition, classification, chemical reactions and structure

**UNIT IV OILS, FATS, SOAPS AND DETERGENTS**

6

Lipids, Fatty Acids – Introduction, structure and chemical composition of oils and fats – Types, physical and chemical properties – Salt formation, esterification, halogenation, oxidation, analysis of oils, fats and its significance (Acid, Iodine, Saponification values, Reichert- Meissl value) Soaps – Types of soaps, Manufacture of soap – Hot process, Cleansing action of soaps, Detergents – Types of detergents – Cationic, anionic, amphoteric, neutral detergents, Comparison between soaps and detergents

**UNIT V MEDICINAL CHEMISTRY**

6

Drugs, Requirements of drug, Classification based on chemical structure and therapeutic action, Antibacterial agents – Definition, mode of action, synthesis and properties – Sulfonamides, Antimalarial – Definition, mode of action, synthesis and properties (Chloroquine), Analgesics – Definition, mode of action, synthesis and properties – Acetaminophen, Cardiovascular drugs – Definition, mode of action, synthesis and properties – Barbiturates, Anti-inflammatory definition, mode of action, synthesis and properties – Salicylic acid

**LIST OF EXPERIMENTS**

1. Synthesis of cinnamic acid from benzaldehyde
2. Halogenation - Preparation of 2,4,6- tribromo aniline from aniline & Acetylation – Preparation of acetanilide from aniline and bromination.
3. Qualitative tests for carbohydrates and proteins
4. Determination of saponification value of oil / fat
5. Synthesis of Barbituric acid from malonic acid
6. Synthesis of acetaminophen or paracetamol
7. Nitration – Preparation of picric acid

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				Total			60 Periods

**TEXT BOOKS:**


1. Bhal B.S and Arun Bhal, "A Text Book of Organic Chemistry", 22<sup>nd</sup> edition, S.Chand & Co. New Delhi, 2018
2. Jonathan Clayden, Nick Greeves, Stuart Warren and Peter Wothers, Organic Chemistry, Oxford University Press, 2<sup>nd</sup> edition, New Delhi, 2013

**REFERENCES:**

1. Shikha Agarwal, "Engineering Chemistry, Fundamentals and Applications", 1<sup>st</sup> edition, Cambridge University Press, 2015'
2. Ashutosh Kar, "Medicinal Chemistry", 7<sup>th</sup> edition, New Age International Pvt, Ltd., 2010
3. Sharma B.K, Industrial chemistry, 19<sup>th</sup> edition, Krishna Prakashan Media Pvt. Ltd., Meerut, 2011
4. <https://nptel.ac.in/courses/104/106/104106131>

**EVALUATION PATTERN:**

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CHEMISTRY (CY) – R2021 - CBCS



U21MYC02	ENVIRONMENTAL SCIENCE	Category: MNC				
		L	T	P	J	C
		3	0	0	0	0

**PRE-REQUISITES:**

- Nil

**COURSE OBJECTIVES:**

- To gain knowledge about environment, ecological balance and bio-diversity
- To acquire idea on resources and how to conserve it
- To understand about societal problems and its mitigation

**COURSE OUTCOMES:**

Upon completion of the course, the student will be able to

- CO1:** Infer the importance of environment and explain the concept, structure, functions of ecosystem and summarize different values, threats and the need for conservation of biodiversity (Remember)
- CO2:** Explain the types of natural resources and its importance of conservation (Understand)
- CO3:** Classify the types of pollution and propose suitable methods to prevent pollution (Understand)
- CO4:** Outline the various social issues and possible solutions to protect environment for sustainable development (Understand)
- CO5:** Describe the effects of population explosion, trend of population in various countries and understand the role of IT in environment and human health (Understand)

**CO-PO MAPPING:**

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CO3	3	-	-	-	-	-	2	-	1	1	-	1		
CO4	3	-	-	-	-	-	2	-	1	1	-	1		
CO5	3	-	-	-	-	-	2	-	1	1	-	1		
CO	3	-	-	-	-	-	2	-	1	1	-	1		

Correlation levels:      1: Slight (Low)      2: Moderate (Medium)      3: Substantial (High)

*M.S.K. 24/4/23*  
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**SYLLABUS:**

- UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9**
- Definition, scope and importance of environment – Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Food chains, Food webs and Ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems – Pond, lake and river – Biodiversity – Definition, types, values of biodiversity (consumptive use, productive use, social, ethical, aesthetic and option values) – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity due to natural and anthropogenic activity, Conservation of biodiversity
- Case studies – Man and Wildlife conflicts
- Field study – Pond ecosystem and grassland ecosystem
- UNIT II NATURAL RESOURCES 9**
- Forest resources: Use and over – Exploitation, deforestation, Water resources: Use and over-utilization of surface and ground water, conflicts over water, Dams-benefits and problems – Mineral resources: environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: renewable – Solar, geothermal, tidal, hydroelectric power, biomass and non-renewable energy sources – Coal and nuclear energy
- Case studies – Deforestation, water conflicts, Mineral resources exploitation, Usage of fertilisers & pesticides
- UNIT III ENVIRONMENTAL POLLUTION 9**
- Definition – Causes, effects and control measures of Air pollution, Water, Noise, Thermal, Marine pollution. Solid waste management: causes, effects and control measures of municipal solid wastes – Role of an individual in prevention of pollution – Disaster management: Floods, earthquake, cyclone and landslides, climate change, global warming, acid rain, ozone layer depletion. Environmental protection Acts: Air, Water, Forest and wildlife – Objectives and drawbacks.
- Case studies – Air, water, marine and Nuclear pollution
- Case studies, – Floods, Earthquake, cyclone, landslides
- UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9**
- Sustainable development – Urban problems related to energy, consumerism and waste products – water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people – Role of non- government organisation in environmental protection, Role of central and state pollution control boards. 12 Principles of green chemistry. Biomedical waste management – Eco mark and international agreements-Montreal and Kyoto protocol and convention on biological diversity
- Case studies - Resettlement and rehabilitation
- UNIT V POPULATION AND HUMAN WELFARE 9**
- Population growth, variation among nations – Population explosion and its effects – Human health and environment – Environmental hazards – Effect of UV radiation on physical and biological system. Nuclear hazards, water borne disease – Family welfare programme – Women and child welfare – Value education – Human rights – HIV / AIDS – Role of IT in environment and human health. EIA – Aim, objectives and methods
- Case studies – Role of IT in environment protection



**Contact Periods:**

Lecture:	45 Periods	Tutorial:	– Periods	Practical:	-Periods	Project	– Periods
						Total	45 Periods

**TEXT BOOKS:**

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006
2. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2<sup>nd</sup> edition, Pearson Education, 2004

**REFERENCES:**

1. Dharmendra S.Sengar, "Environmental law, Prentice Hall of India", Pvt. Ltd., New Delhi, 2007
2. Erach Bharucha, "Text book of Environmental Studies", Universities Press (I), Pvt. Ltd., Hyderabad, 2015

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