

**B.Sc. CHEMISTRY - SYLLABUS****(Under CBCS w.e.f. 2017 – 2018 onwards)**

Degree :	B.Sc.	Branch :	BIOCHEMISTRY	PART III
Subject Code :	17UCYA11	Title of the Paper :	CHEMISTRY FOR BIOCHEMISTS - I	ALLIED
Semester :	I	No. of Hours / Week :	4 HOURS	No. of Credits: 4
OBJECTIVES: To impart the knowledge of				
❖ Basic concepts in organic chemistry and stereochemistry.				
❖ Concept of acids & bases, biological importance of osmosis & basic concepts in thermodynamics.				
UNIT – I :	<u>FUNDAMENTAL CONCEPTS OF ORGANIC CHEMISTRY</u> (12 Hours)			
Vital force theory – Tetravalency of carbon – Catenation – Classification and characterization of Organic Compounds – Functional groups and its characteristics – Organic reagents and its classification – Organic reactions and its types: addition, substitution, elimination, rearrangement & polymerization (examples only) – Nomenclature of Organic compounds (aliphatic only) – Trivial names – IUPAC system.				
UNIT – II :	<u>STEREOMERISM</u> (12 Hours)			
a) <u>Optical Isomerism</u> : Chiral Centre – Conditions – Enantiomers – Diastereomers – Epimers and Anomers – Optical isomerism of lactic acid and tartaric acid – Racemisation – Resolution of racemic mixture				
b) <u>Geometrical Isomerism</u> : Conditions for existence – Cis-trans isomerism of maleic acid and fumaric acid.				
UNIT – III :	<u>CONCEPT OF ACIDS & BASES</u> (12 Hours)			
Arrhenius, Bronsted-Lowry and Lewis Concept – Relative strength of acids and bases – Ionic product of water – pH and pOH – pH meter – Buffer solutions and its types – Henderson equation – Biological applications of buffer solutions – Basic concept of Electrolytes and their ionization – Significance of Electrolytes in human body.				
UNIT – IV :	<u>SOLUTIONS</u> (12 Hours)			
Definition – Types of solutions – Concentration – Solvent – Solute – Molecular weight – Equivalent weight – Various ways of expressing concentration – w/w, w/v, v/v, %, ppm, molarity, molality and normality (Problems involving direct substitution only) – Osmosis and its applications – Isotonic solutions and its biological importance – Hypertonic and Hypotonic solutions – Reverse Osmosis and its applications.				
UNIT – V :	<u>THERMODYNAMICS</u> (12 Hours)			
Importance – Terms used in Thermodynamics – Open, Closed & Isolated system – State function and Path function – Extensive and Intensive properties – Reversible and Irreversible processes – Statement and Mathematical form of First Law of Thermodynamics – Limitation of First Law of Thermodynamics – Statement of Second Law of Thermodynamics – Spontaneous process – Entropy – Physical significance of Entropy – Gibb's free energy and its significance.				
References:				
1) A Text Book of Organic Chemistry by B.S.Bahl & Arun Bahl., S.Chand & Co. Ltd., 1996.				
2) Text Book of Organic Chemistry by P.L.Soni & H.M.Chawla, Sultan Chand & Sons – 29 th Edition 2012.				
3) Essentials of Physical Chemistry by B.S.Bahl, Arun Bahl & G.T.Tuli, S.Chand & Co. Ltd., 2012.				
4) Principles of Physical Chemistry by Puri, Sharma & Pathania, Vishal Publishing Co., 2011.				



Degree	: B.Sc.	Branch	: BIOCHEMISTRY	PART III
Subject Code	: 17UCYA21	Title of the Paper	: CHEMISTRY FOR BIOCHEMISTS - II	ALLIED
Semester	: II	No. of Hours / Week	: 4 HOURS	No. of Credits: 4
OBJECTIVES	<p>To impart the knowledge of</p> <ul style="list-style-type: none"> ❖ Pharmaceutical aids, therapeutic uses of drugs and biological importance of alkaloids & terpenoids. ❖ Surface chemistry & applications of colloids. 			
UNIT – I	: <u>ALKALOIDS AND TERPENOIDS</u>			(12 Hours)
	<p>a) <u>Alkaloids</u>: Definition – Occurrence – Extraction – Functions – General properties – Classification – Structure and biological importance of the following alkaloids: Cocaine, Nicotine, Morphine, Piperine and Atropine.</p> <p>b) <u>Terpenoids</u>: Definition – Occurrence – Isolation – Isoprene rule – Classification – General properties – Structure and biological importance of the following Terpenoids: Citral, Geraniol, Menthol and Camphor.</p>			
UNIT – II	: <u>DRUGS</u>			(12 Hours)
	<p>a) <u>Antibiotics</u>: Definition – Condition – Classification – Structure and Therapeutic uses of Penicillin, Streptomycin, erythromycin & Ofloxacin.</p> <p>b) <u>Antipyretics & Analgesics</u>: Definition – Structure and uses of Aspirin, Paracetamol, Morphine, Pethidine.</p> <p>c) <u>Antimalarials</u>: Study of Chloroquine, Quinine.</p> <p>d) <u>Arsenical Drugs</u>: Study of Salvarsan-606 & Neosalvarsan.</p>			
UNIT – III	: <u>PHARMACEUTICAL AIDS</u>			(12 Hours)
	<p>a) <u>Organic Pharmaceutical Aids</u>: Preservation, Antioxidants, Emulsifying agents, Colouring, Flavouring and Sweetening Agents, Stabilizing Agents, Ointment bases and solvents (Explanation with example)</p> <p>b) <u>Organic Diagnostic Aids</u>: Drugs used for X-ray Contrast Media (BaSO₄), Sodium diatrizoate Injection – Drugs used to test organ function (Fluorescein Sodium, Sulfobromophthalein Sodium) – Determination of blood volume and Haemopoietic Function.</p>			
UNIT – IV	: <u>SURFACE CHEMISTRY</u>			(12 Hours)
	<p>a) <u>Adsorption</u>: Definition – Mechanism of adsorption – Types of adsorption – Physical and chemical adsorption – Factors influencing adsorption – Adsorption of solutes from solution – Application of adsorption – Ion-exchange adsorption and its application.</p> <p>b) <u>Catalysis</u>: Definition – General characteristics of catalytic reactions – Types of catalysts (Positive, negative, auto) – Types of catalysis (Homogeneous and Heterogeneous) – Acid-base catalysis – Theories of catalysis (adsorption and intermediate compound formation theory) – Catalytic poisons – Catalytic promoters – Enzyme catalysis.</p>			



UNIT – V	: <u>COLLOIDS</u>	(12 Hours)
	a) Colloidal state of matter – Various types – Classification. b) Sols – Characteristics of lyophilic and lyophobic sols – Dialysis – Electro osmosis – Electrophoresis – Protective action – Hardy-Schulze law – Gold number. c) <u>Emulsion</u> : Definition – Types – Emulsifier with examples. d) <u>Gels</u> : Classification and preparation. e) Application of colloids (Smoke precipitation, Sewage disposal, Artificial rain, Classification of municipal water, Cleaning action of soap).	
References	1) Natural Products Chemistry by Jagdamba Singh, S.M.Ali & Jaya Singh, Pragati Prakashan, 1 st Edition, 2010. 2) Text Book of Organic Chemistry by P.L.Soni & H.M.Chawla, Sultan Chand & Sons – 29 th Edition 2012. 3) A Text Book of Pharmaceutical Chemistry by Jayashree Ghosh, S.Chand & Co. Ltd., 2012. 4) Essentials of Physical Chemistry by B.S.Bahl, Arun Bahl & G.T.Tuli, S.Chand & Co. Ltd., 2012. 5) Principles of Physical Chemistry by Puri, Sharma & Pathania, Vishal Publishing Co., 2011.	

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Degree	: B.Sc.	Branch	: BIOCHEMISTRY	PART III
Subject Code	: 17UCYAP1	Title of the Paper	: VOLUMETRIC ANALYSIS	ALLIED
Semester	: II	No. of Hours / Week	: 2 HOURS	No. of Credits:2
Objective:	<u>VOLUMETRIC ANALYSIS</u> (2 Hours / Week) A double titration involving making up of the solution to be estimated or single titration involving making up of the solution to be estimated and the preparation of a primary standard.			
I	<u>ACIDIMETRY & ALKALIMETRY</u> 1) Titration between a strong acid and strong base. 2) Titration between a strong acid and weak base. 3) Titration between a weak acid and strong base.			
II	<u>PERMANGANIMETRY</u> 4) Titration between Potassium Permanganate and Oxalic Acid. 5) Titration between Potassium Permanganate and Ferrous Sulphate. 6) Titration between Potassium Permanganate and Mohr's Salt.			
III	<u>EDTA TITRATIONS (Demonstration only)</u> 7) Estimation of Ca^{2+} present in water using EDTA. 8) Estimation of Mg^{2+} present in water using EDTA.			
(SUMMATIVE EXAMINATION WILL BE HELD AT THE END OF SECOND SEMESTER)				

Summative Examination at the end of semester II

Max.marks-100

Distribution of Marks: Internal - 40 Marks, External - 60 Marks, Duration of Examination: **3hrs****External examination**

Record Notebook	: 10 marks
Procedure writing	: 10 marks
Experiment	: 40 marks
Total	: 60 marks

For Analysis, if the student has

< 2% error	- 40 marks
2-3% error	- 30 marks
3-5% error	- 20 marks
> 5% error	10 marks

**B.Sc. CHEMISTRY - SYLLABUS****(Under CBCS w.e.f. 2017 - 2018 onwards)**

Degree	B.Sc.	Branch	:	MICROBIOLOGY	PART III
Subject Code	17UCYA12	Title of the Paper	:	CHEMISTRY FOR BIOLOGISTS - I	ALLIED
Semester	I	No. of Hours / Week	:	4 HOURS	No. of Credits:4
OBJECTIVES To impart the knowledge of ❖ Atomic structure, application of radioisotopes, biological importance of osmosis, concept of acids and bases and buffer solutions. ❖ Basic concepts of organic chemistry and pharmaceutical aids.					
UNIT - I: <u>ATOMIC STRUCTURE AND RADIOACTIVITY</u> (12 Hours) Constituents of Atom – Atomic number – Mass number – Isotopes – Isobars – Shapes of orbitals – Aufbau principle – Hund's rule – Pauli's exclusion principle – Electronic configuration of atoms – Salient features of modern periodic table. Radioisotopes – Tracer technique – Applications in the field of Medicine, Biology, Agriculture and Industry.					
UNIT - II: <u>CONCEPT OF ACIDS AND BASES</u> (12 Hours) Arrhenius, Bronsted-Lowry and Lewis Concept – Relative strength of acids and bases – Ionic product of water – pH and pOH – pH meter – Buffer solutions and its types – Henderson equation – Biological applications of buffer solutions – Basic concept of Electrolytes and their ionization – Significance of Electrolytes in human body.					
UNIT - III <u>SOLUTIONS</u> (12 Hours) Definition – Types of solutions – Concentration – Solvent – Solute – Molecular weight – Equivalent weight – Various ways of expressing concentration – w/w, w/v, v/v, %, ppm, molarity, molality and normality (Problems involving direct substitution only) – Osmosis and its applications – Isotonic solutions and its biological importance – Hypertonic and Hypotonic solutions – Reverse Osmosis and its applications.					
UNIT - IV <u>FUNDAMENTAL CONCEPT OF ORGANIC CHEMISTRY</u> (12 Hours) Vital force theory – Tetravalency of carbon – Catenation – Classification and characterization of Organic Compounds – Functional groups and its characteristics – Organic reagents and its classification – Organic reactions and its types: addition, substitution, elimination, rearrangement & polymerization (examples only) – Nomenclature of Organic compounds (aliphatic only) – Trivial names – IUPAC system.					
UNIT - V: <u>PHARMACEUTICAL AIDS</u> (12 Hours) a) <u>Organic Pharmaceutical Aids:</u> Preservation, Antioxidants, Emulsifying agents, Colouring, Flavouring and Sweetening Agents, Stabilizing Agents, Ointment bases and solvents (Explanation with example) b) <u>Organic Diagnostic Aids:</u> Drugs used for X-ray Contrast Media (BaSO ₄), Sodium diatrizoate Injection – Drugs used to test organ function (Fluorescein Sodium, Sulfobromophthalein Sodium) – Determination of blood volume and Haemopoietic Function.					



REFERENCES:

- 1) Essentials of Physical Chemistry by B.S.Bahl, Arun Bahl & G.T.Tuli, S.Chand & Co. Ltd., 2012.
- 2) A Text Book of Pharmaceutical Chemistry by Jeyashree Ghosh, S.Chand & Co. Ltd., 2012.
- 3) A Text Book of Organic Chemistry by B.S.Bahl & Arun Bahl., S.Chand & Co. Ltd., 1996.
- 4) Principles of Physical Chemistry by Puri, Sharma & Pathania, Vishal Publishing Co., 2011.



Degree : B.Sc.	Branch : MICROBIOLOGY	PART III
Subject Code : 17UCYA22	Title of the Paper : CHEMISTRY FOR BIOLOGISTS – II	ALLIED
Semester : II	No. of Hrs/Week : 4 HOURS	No. of Credits:4

OBJECTIVES:

To impart the knowledge of

- ❖ Biomolecules like alkaloids, terpenoids, carbohydrates, amino acids, proteins and nucleic acids.
- ❖ Basic principles & instrumentation of biochemical techniques, colorimetry & chromatography.

UNIT – I: BIOMOLECULES-I

(12 Hours)

Carbohydrates: Definition – Classification – Mono-saccharides – Characteristic properties of glucose and fructose – Uses – Disaccharides – Sucrose and maltose – Manufacture and properties – Polysaccharides – Study of starch and cellulose (Structure only) – applications – Colour reactions.

UNIT – II: BIOMOLECULES-II

(12 Hours)

Amino Acids: Definition – Essential and non-essential amino acids – Classification – Properties – Zwitterion and isoelectric point.

Proteins: Definition – Various classification – Detailed study of structure – Biological functions – Colour reactions.

Nucleic Acids: Types – RNA & DNA – Differences between them – Elementary idea about their biological functions.

UNIT – III: BIOMOLECULES-III

(12 Hours)

a) Alkaloids: Definition – Occurrence – Extraction – Functions – General properties – Classification – Structure and biological importance of the following alkaloids: Cocaine, Nicotine, Morphine, Piperine and Atropine.

b) Terpenoids: Definition – Occurrence – Isolation – Isoprene rule – Classification – General properties – Structure and biological importance of the following Terpenoids: Citral, Geraniol, Menthol and Camphor.

UNIT – IV: COLORIMETRY

(12 Hours)

Light spectrum – Its wave length region – Principle of colorimetry – Beer Lambert's law – Molar extinction coefficient – Instrumentation – Methods of colour measurement – Colorimeter – Photoelectric Colorimeter – Spectrophotometer – Applications.

UNIT – V: CHROMATOGRAPHY

(12 Hours)

Introduction – Classification – Principle and detailed study of column, thin layer, paper and gas chromatography – Gel electrophoresis.

REFERENCES:

- 1) A Text Book of Organic Chemistry by B.S.Bahl & Arun Bahl., S.Chand & Co. Ltd., 1996.
- 2) Text Book of Organic Chemistry by P.L.Soni & H.M.Chawla, Sultan Chand & Sons–29th Edition 2012.
- 3) Natural Products Chemistry by Jagdamba Singh, S.M.Ali & Jaya Singh, Pragati Prakashan, 1st Ed, 2010.
- 4) Elements of Analytical Chemistry by R.Gopalan, P.S.Subramanian & K.Rengarajan, Sultan Chand & Sons – Reprint of 3rd Edition, 2011.
- 5) Analytical Chemistry by Gurdeep.R.Chatwal, Himalaya Publishing House, 1st Edition, 2008.



Degree	: B.Sc.	Branch	: MICROBIOLOGY	PART III
Subject Code	: 17UCYAP1	Title of the Paper	: VOLUMETRIC ANALYSIS	ALLIED
Semester	: II	No. of Hrs/Week	: 2 HOURS	No. of Credits: 2
VOLUMETRIC ANALYSIS (2 Hours / Week)				
A double titration involving making up of the solution to be estimated or single titration involving making up of the solution to be estimated and the preparation of a primary standard.				
I	<u>ACIDIMETRY & ALKALIMETRY</u>			
	1) Titration between a strong acid and strong base.			
	2) Titration between a strong acid and weak base.			
	3) Titration between a weak acid and strong base.			
II	<u>PERMANGANIMETRY</u>			
	4) Titration between Potassium Permanganate and Oxalic Acid.			
	5) Titration between Potassium Permanganate and Ferrous Sulphate.			
	6) Titration between Potassium Permanganate and Mohr's Salt.			
III	<u>EDTA TITRATIONS (Demonstration only)</u>			
	7) Estimation of Ca ²⁺ present in water using EDTA.			
	8) Estimation of Mg ²⁺ present in water using EDTA.			

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Distribution of Marks: Internal - 40 Marks External - 60 Marks

Duration of Examination: **3hrs****External examination**

Record Notebook : 10 marks

Procedure writing : 10 marks

Experiment : 40 marks

Total : 60 marks

For Analysis, if the student has

< 2% error - 40 marks

2-3% error - 30 marks

3-5% error - 20 marks

> 5% error 10 marks