



# **KONGU ARTS AND SCIENCE COLLEGE**

**(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)**

**ERODE – 638 107**

**B.Sc (Biochemistry)**



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**2021-2022**



KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

ERODE - 638 107

DBT STAR COLLEGE SCHEME

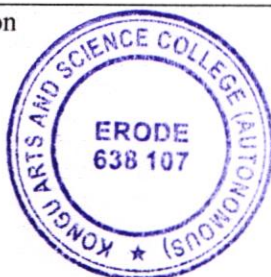
**B.Sc BIOCHEMISTRY**

(For the Candidates admitted during the Academic Year 2021 - 2022 and onwards)

**SCHEME OF EXAMINATION – CBCS PATTERN**

Part	Course Code	Course Title	Inst. Hrs /Week	T/P	Examination Details				Credits
					Duration in Hours	CIA	ESE	Total Marks	
<b>SEMESTER I</b>									
I	21T01/21H01/ 21M01/21F01/ 21S01/	Language - I	6	T	3	50	50	100	4
II	21E01	English - I	6	T	3	50	50	100	4
III	21UAPCT101	Core I -Professional English - I	4	T	3	50	50	100	4
	21UAPCT102	Core II-Chemistry of Biomolecules	4	T	3	50	50	100	4
	-	Core Biochemistry Practicals - I	2	P	-	-	-	-	-
	21UAPAT103	Allied I: Chemistry - I	4	T	3	30	45	75	3
	-	Allied Practicals I: Chemistry	2	P	-	-	-	-	-
IV	21ES01	Foundation Course I: Environmental Studies *	2	T	1 Hour 40 Minutes	-	50	50	2
<b>TOTAL</b>			<b>30</b>					<b>525</b>	<b>21</b>
<b>SEMESTER II</b>									
I	21T02/21H02/ 21M02/21F02/ 21S02	Language - II	6	T	3	50	50	100	4
II	21E02	English - II	6	T	3	50	50	100	4
III	21UAPCT201	Core III -Professional English - II	4	T	3	50	50	100	4
	21UAPCT202	Core IV - Tools and Techniques in Biochemistry	4	T	3	50	50	100	4
	21UAPCP203	Core Biochemistry Practicals - I	2	P	3	30	45	75	3
	21UAPAT204	Allied II: Chemistry -II	4	T	3	30	45	75	3
	21UAPAP205	Allied Practicals I: Chemistry	2	P	3	25	25	50	2
IV	21VE01	Foundation Course II: Value Education *	2	T	1 Hour 40 Minutes	-	50	50	2
<b>TOTAL</b>			<b>30</b>					<b>650</b>	<b>26</b>

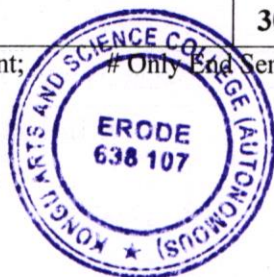
\* - ESE Online Mode of Examination



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Part	Course code	Course Title	Inst. Hrs /Week	T/P	Examination Details				Credits
					Duration in Hours	CIA	ESE	Total Marks	
<b>SEMESTER III</b>									
I	21T03/21H03/ 21M03/21F03/ 21S03/	Language - III	6	T	3	50	50	100	4
II	21E03	English - III	6	T	3	50	50	100	4
III	21UAPCT301	Core V -Enzyme and Enzyme Technology	4	T	3	50	50	100	4
	21UAPCT302	Core VI - Cell Biology and Genetics	3	T	3	50	50	100	3
	-	Core Biochemistry Practicals II	2	P	-	-	-	-	-
	21UAPAT303	Allied III: Biomathematics	4	T	3	30	45	75	3
IV	21UAPST304	Skill Based I - Fundamentals of Microbiology	3	T	3	30	45	75	3
	21BT01	Basic Tamil@	2	T	-	75	-	75	2
	21AT01	Advanced Tamil#			3	-	75		
	21UAPNT305	Non-major Elective - I			3	-	75		
<b>TOTAL</b>			<b>30</b>					<b>625</b>	<b>23</b>
<b>SEMESTER IV</b>									
I	21T04/21H04/ 21M04/21F04/ 21S04	Language - IV	6	T	3	50	50	100	4
II	21E04	English - IV	6	T	3	50	50	100	4
III	21UAPCT401	Core VII - Intermediary Metabolism	4	T	3	50	50	100	4
	21UAPCP402	Core Biochemistry Practicals II	3	P	6	30	45	75	3
	21UAPAT403	Allied IV: Python Programming	3	T	3	30	45	75	3
	21UAPAP404	Allied Practicals II: Python Programming Lab	3	P	3	25	25	50	2
IV	21UAPST405	Skill Based II: Nanotechnology and Clinical trials	3	T	3	30	45	75	3
	21BT01	Basic Tamil@	2	T	-	75	-	75	2
	21AT01	Advanced Tamil#			3	-	75		
	21UAPNT406	Non-major Elective - II			3	-	75		
<b>TOTAL</b>			<b>30</b>					<b>650</b>	<b>25</b>

@ Only Continuous Internal Assessment; # Only End Semester Examination



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Part	Course code	Course Title	Inst. Hrs /Week	T/P	Examination Details				Credits
					Duration in Hours	CIA	ESE	Total Marks	
<b>SEMESTER V</b>									
III	21UAPCT501	Core VIII-Human Physiology and Medical Terminology	5	T	3	50	50	100	4
	21UAPCT502	Core IX - Clinical Biochemistry	5	T	3	50	50	100	4
	21UAPCT503	Core X-Molecular Biology	5	T	3	50	50	100	4
	21UAPCP504	Core Biochemistry Practicals III	5	P	6	30	45	75	3
	-	Core Biochemistry Practicals IV	3	P	-	-	-	-	-
	21UAPET505 / 21UAPET506 / 21UAPET507/ 21USW01	Elective I / SWAYAM Courses	4	T	3	50	50	100	4
IV	21UAPST508	Skill Based III - Clinical Nutrition	3	T	3	30	45	75	3
	21UAPIT01	Internship / Institutional Training \$	Grade System						
<b>TOTAL</b>			<b>30</b>					<b>550</b>	<b>22</b>
<b>SEMESTER VI</b>									
III	21UAPCT601	Core XI - Medicinal Biochemistry	5	T	3	50	50	100	4
	21UAPCT602	Core XII -Plant Biochemistry and Plant Therapeutics	5	T	3	50	50	100	4
	21UAPCT603	Core XIII -Immunology	4	T	3	50	50	100	4
	21UAPCP604	Core Biochemistry Practicals IV	5	P	6	30	45	75	3
	21UAPEP605 / 21UAPET606 / 21UAPET607	Elective II	4	P T T	6 3 3	50	50	100	4
	21UAPET608 / 21UAPET609 / 21UAPEV610	Elective III	4	T T V	3 3 3	50	50	100	4
	IV	21UAPST611	Skill Based IV- Bioinformatics	3	T	3	30	45	75
V	21NS01/21NC01/ 21YR01/ 21RR01/ 21EC01/ 21ET01/ 21SC01/21PE01	Extension Activities (NSS / NCC / YRC / RRC / Eco Club /Ethics Club / Science Forum / Physical Education) @	-	-	-	50	-	50	1
<b>TOTAL</b>			<b>30</b>					<b>700</b>	<b>27</b>
<b>TOTAL</b>			<b>180</b>					<b>3700</b>	<b>144</b>

**Institutional Training:** Students have to undergo Institutional Training during May-June for a period of 21 days (at the end of 4<sup>th</sup> Semester) and the report of the same to be submitted.

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LIST OF ALLIED COURSES		
Allied - I	21UAPAT103	Chemistry-I
Allied - II	21UAPAT204	Chemistry-II
Allied - III	21UAPAT303	Biomathematics
Allied - IV	21UAPAT403	Python Programming
Allied Practicals - I	21UAPAP205	Chemistry Practicals
Allied Practicals - II	21UAPAP404	Python Programming Lab

LIST OF NON-MAJOR ELECTIVE			
	Course Code	Course Name	Offered to ( Dept. Name)
NME - I	21UAPNT305	Public Health and Hygiene	Computer Science
NME - II	21UAPNT406	Nutritional Diet Therapy	Computer Science

LIST OF SKILL BASED COURSES		
SkillBased - I	21UAPST304	Fundamentals of Microbiology
SkillBased - II	21UAPST405	Nanotechnology and Clinical trials
SkillBased - III	21UAPST508	Clinical Nutrition
SkillBased - IV	21UAPST611	Bioinformatics



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LIST OF ELECTIVE COURSES			
Elective-I / Swayam Courses	21UAPET505	A	rDNA Technology
	21UAPET506	B	Plant and Animal Biotechnology
	21UAPET507	C	Microbial Genetics
Elective-II	21UAPEP605	A	Bioinformatics Practicals
	21UAPET606	B	Nanomaterials and Nano medicine
	21UAPET607	C	Genomics and Proteomics
Elective-III	21UAPET608	A	Diagnostic Biochemistry
	21UAPET609	B	Sports Biochemistry
	21UAPEV610	C	Project^
^ Jointly evaluated by Internal and External Examiners			

LIST OF EXTRA CREDIT COURSES			
Advanced Learners Course I	21UAPAL407	A	Biophysics
	21UAPAL408	B	Phytochemistry and Phytochemical Techniques
Advanced Learners Course II	21UAPAL509	A	Cancer Biology
	21UAPAL510	B	Entrepreneurship Development in Life Sciences and Health Care

*Dr. A. K. Vidya*

**Dr. A. K. Vidya**  
Chairman, Board of Studies,  
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Sem.	Course Code	Core I: Professional English I	Total Marks: 100		Hours / Week	Credits
I	21UAPCT101		CIA: 50	ESE: 50	4	4

**Course Objectives:**

1. To develop the language skills of students
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence
3. To focus on developing students' knowledge of domain specific registers and the required language skills

**Course Outcomes (CO): On completion of the course, students should be able to**

CO 1	Identify the correct usage of vocabulary and grammar in speaking and writing	K1 - K4
CO 2	Demonstrate the language skills through academic writing	
CO 3	Apply the communicative skills by responding to given situations	
CO 4	Communicate leadership quality and team building	
CO 5	Analyze the information in various circumstances	

**K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create**

**Unit - I | Communication**

Listening: Listening to audio text and answering questions -Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

**Unit - II | Description**

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning-

Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition-Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

**Unit - III | Negotiation Strategies**

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

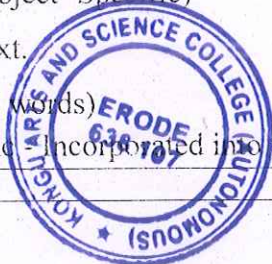
Speaking: Brainstorming. (Mind mapping).


Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific Incorporated into the LSRW tasks



  
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**Unit - IV Presentation Skills**

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

**Unit - V Critical Thinking Skills**

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading: Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

Skill Development Activities	Max. Marks (10)
Creation of a Mindmap	3
Interpreting a Interview by a Subject Expert	3
Reading and Summarizing a Subject related Research Article	3
Punctuality	1

**TEXT BOOK**

- Professional English for Life Sciences - TANSICHE

**REFERENCE BOOK**

- A Handbook of English for Engineers and Technologists. BS Publications. Eliah P, 2003.
- English for Professionals, Vayu Education of India, Dr.Sheema Miglani & Shikha Goyal, 2010.
- Business English, Tata McGraw-Hill Edition, Dona J.Young, 2012

**WEB RESOURCES**

- <https://www.classcentral.com/course/swayam-business-english-communication-10097>

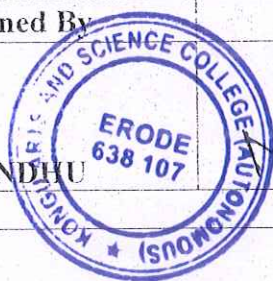
Course Designed By

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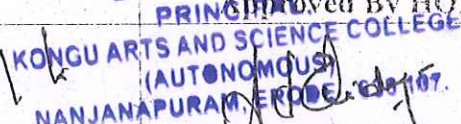
**DR. N. RAMAN**

Principal

*Cindhu*  
Ms. R. S. CINDHU



*Sangeetha*  
Dr. N. SANGEETHA



*A.K. Vidya*  
Dr. A. K. VIDYA

## QUESTION PAPER PATTERN


<b>Time: 3 hours</b>	<b>Max. Marks: 50</b>
<b>SECTION - A (10 X 1 = 10 Marks)</b> (Vocabulary) (MCQ, Info-gap questions –domain specific vocabulary)	<b>SECTION-B (4 X 10 = 40 Marks)</b> (Reading :Two long domain-specific comprehension passages with questions pertaining to understanding and analysis – 20 Marks) (Writing: Descriptive/narrative/persuasive writing questions pertaining to domain-specific vocabulary – 20 Marks)

## Mapping of COs with POs and PSOs:

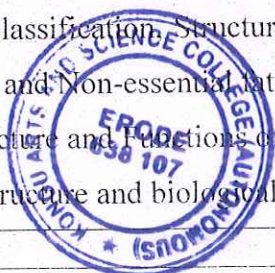
CO \ PO/PSO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	M	M	M	S	M	S	S	S	S
CO 2	S	S	S	M	M	M	S	M	S	S	S	M
CO 3	S	S	S	S	M	M	S	M	S	S	S	M
CO 4	S	S	S	S	M	M	S	M	S	S	M	M
CO 5	S	S	S	S	M	M	S	S	S	S	S	S

S - Strong, M - Medium, L - Low



  
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Sem.	Course Code	Core II: Chemistry of Biomolecules	Total Marks: 100		Hours / Week	Credits
I	21UAPCT102		CIA: 50	ESE: 50	4	4
<b>Course Objectives:</b>						
1. To learn about the chemistry and structures of biomolecules 2. To know the properties of different biomolecules 3. To understand the physiological functions of biomolecules						
<b>Course Outcomes (CO): On completion of the course, students should be able to</b>						
CO 1	Relate the classifications of various Biomolecules					K1 - K4
CO 2	Illustrate the structure of carbohydrates, lipids, amino acids and nucleic acids					
CO 3	Compare and Contrast the features of various Biological molecules					
CO 4	Interpret the biological importance of carbohydrates, lipids, amino acids, proteins, nucleic acids, vitamins and minerals					
CO 5	Analyze the properties and applications of complex Biomolecules					
<b>K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create</b>						
<b>Unit - I</b>	<b>Carbohydrates</b>					
Definition, Classification and Functions of Carbohydrates. Isomerization - Stereoisomerism and Optical isomerism of sugars, Cyclic structure, Epimers, Anomers and Mutarotation. <b>Monosaccharides:</b> Structure, Properties and Functions of Glucose and Fructose. <b>Disaccharides:</b> Structure, Occurrence and Functions of Sucrose, Lactose and Maltose. <b>Polysaccharides:</b> Structure, Occurrence and Functions of Starch, Glycogen, Cellulose, Chitin, Inulin, Hyaluronic acid, Chondroitin sulfate and Heparin. <b>Artificial sweeteners:</b> Structure, Properties and Uses of Saccharin and Aspartame.						
<b>Unit - II</b>	<b>Lipids</b>					
Definition, Classification and Biological role of lipids <b>Simple lipids:</b> Properties and Characterization of fats – Hydrolysis, Saponification, Halogenation, Acetyl number, Rancidity of fats, Reichert-Meissel number. <b>Compound lipids:</b> Structure and Functions of Phospholipids and Glycolipids. <b>Derived lipids:</b> Classification, Structure and Properties of Saturated and Unsaturated fatty acids; Difference between Essential and Non-essential fatty acids. <b>Plant sterol:</b> Structure and Functions of Ergosterol and Stigmasterol; <b>Animal sterol:</b> Structure and biological significance of cholesterol.						

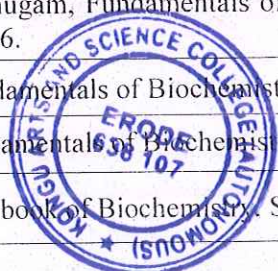


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<b>Unit - III</b>	<b>Amino Acids and Proteins</b>
<p><b>Amino acids:</b> Definition, Amino acids as ampholytes, Classification of amino acids based on chemical nature, Chemical reaction of amino acids due to carbonyl and amino groups. Importance of Essential and Non-essential amino acids.</p> <p><b>Peptide bond:</b> Structure and significance of peptide bond, Identification of N (Sanger's and Edman degradation method) and C (Hydrazinolysis) terminal residues.</p> <p><b>Protein structure:</b> Levels of structure in Protein Architecture - Primary structure (Insulin), Secondary structure (Keratin), Tertiary structure (Myoglobin) and Quaternary Structure (Hemoglobin). Forces stabilizing the structure of proteins</p>	
<b>Unit - IV</b>	<b>Nucleic acids</b>
<p><b>Nucleic acids:</b> Structure of Purines and Pyrimidines; Nucleosides and Nucleotides.</p> <p><b>DNA:</b> Watson Crick model of DNA - Chargaff's rule, Characteristic features of DNA; Forms of DNA, Properties of DNA - Denaturation and Renaturation.</p> <p><b>RNA:</b> Structure and functions of mRNA, tRNA and rRNA.</p> <p><b>Karyotyping:</b> Principle and Applications of Karyotyping.</p>	
<b>Unit - V</b>	<b>Vitamins and Minerals</b>
<p><b>Vitamins:</b> Definition, Classification, Sources, Biological importance and Deficiency symptoms of Fat soluble vitamins and Water soluble vitamins</p> <p><b>Minerals:</b> Definition, Classification, Sources, Functions and Deficiency symptoms of Macro minerals (Na, K, Ca, P, Mg, S and Cl) and Micro minerals (Fe, Zn, Mn, I, Cu, Mo and F).</p> <p><b>Natural pigments:</b> Biological significance of Chlorophyll, Carotenoids and Anthocyanin.</p>	

Skill Development Activities	Max. Marks (10)
Assignment	3
Quiz	3
Model Preparation	3
Punctuality	1

TEXT BOOKS	
1.	Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Wolters Kluwer (India) Pvt. Ltd, 8 <sup>th</sup> Edition, 2016.
2.	A.C. Deb, Fundamentals of Biochemistry, La Vergne : New Central Book Agency, 11 <sup>th</sup> edition, 2020
3.	J. L. Jain, Fundamentals of Biochemistry, 7 <sup>th</sup> edition, S. Chand Publishing, 2016.
4.	S. Nagini, Textbook of Biochemistry, Scitech Publications, 2 <sup>nd</sup> Edition, 2007



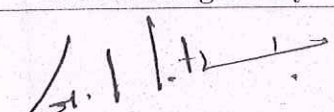
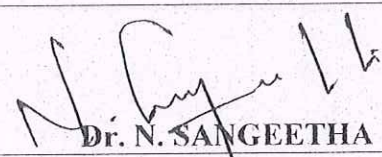
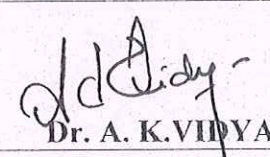
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**REFERENCE BOOKS**

1	A.L. Lehninger, D.L. Nelson, M.M. Cox, M.M., Principles of Biochemistry, W.H.Freeman Publishers, 7 <sup>th</sup> Edition, 2017.
2	Garrett & Grisham, Principles of Biochemistry, Saunders College Publishing, 4 <sup>th</sup> Edition, 2010
3	Lubert stryer, Biochemistry. Freeman and company, 9 <sup>th</sup> Edition, 2019
4	S.C. Rastogi, V.N. Sharma, Anuradha Tanden, Concepts in Molecular biology, 1 <sup>st</sup> Edition, 2007

**WEB RESOURCES**

1	<a href="https://epgp.inflibnet.ac.in/">https://epgp.inflibnet.ac.in/</a>
2	<a href="https://byjus.com/neet/important-notes-of-biology-for-neet-biomolecules/">https://byjus.com/neet/important-notes-of-biology-for-neet-biomolecules/</a>

<b>Course Designed By</b>	<b>Verified By</b>	<b>Approved By HOD</b>
 Mr. G. KARTHIKEYAN	 Dr. N. SANGEETHA	 Dr. A. K. VIDYA

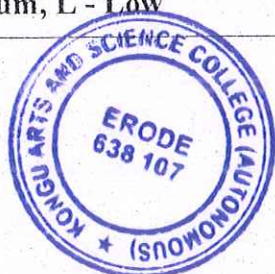
**QUESTION PAPER PATTERN**

<b>Time: 3 hours</b>	<b>Max. Marks: 50</b>	
<b>SECTION-A (10 X 1 = 10 Marks)</b> Answer ALL questions Choose the correct answer Two questions from each unit	<b>SECTION-B (5 X 3 = 15 Marks)</b> Answer ALL questions Either or type Two questions from each unit	<b>SECTION - C (5 X 5 = 25 Marks)</b> Answer ALL questions Either or type Two questions from each unit

**Mapping of COs with POs and PSOs:**

PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	M	S	S	M	M	S	S
CO 2	S	S	M	M	M	M	S	S	M	M	S	S
CO 3	S	S	M	M	M	M	S	S	S	S	S	S
CO 4	S	S	M	M	M	M	S	S	S	S	S	S
CO 5	S	S	M	M	M	M	S	S	M	M	S	S

S - Strong, M - Medium, L - Low



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Sem.	Course Code	Core Biochemistry Practicals - I	Total Marks: 75		Hours / Week	Credits
			CIA: 30	ESE: 45		
I & II	21UAPCP203				2	3

(Examination at the end of Second Semester)

**Course Objectives:**

- To enable the students to learn the basic biochemical calculations
- To enable the students to learn the qualitative analysis procedures of Biomolecules
- To enable the students to know the techniques of pH meter and Separation procedures

**Course Outcomes (CO): On completion of the course, students should be able to**

CO 1	Exhibit Knowledge on Biochemical calculations	K1 – K5
CO 2	Develop laboratory skills required for qualitative analysis of Carbohydrates	
CO 3	Get practical exposure with identification of Amino acids	
CO 4	Acquire practical knowledge on qualitative analysis of Lipids	
CO 5	Learn the techniques of pH measurement and chromatography for buffer preparation and separation of samples respectively	

**K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create****Unit - I Biochemical Calculations**

Preparation of Molar solutions, Normal solutions and Percentage solutions [v/v, w/v].

**Unit - II Qualitative Analysis of Carbohydrates**

- Monosaccharides - Glucose, Fructose, Xylose,
- Disaccharides - Sucrose, Maltose and Lactose.
- Polysaccharides - Starch and Dextrin.

**Unit - III Qualitative Analysis of Proteins and Amino acids****i) Proteins - Precipitation reactions of proteins, Colour reactions of proteins****ii) Amino acids**

- |               |             |               |
|---------------|-------------|---------------|
| a) Histidine  | b) Tyrosine | c) Tryptophan |
| d) Methionine | e) Cysteine | f) Arginine   |

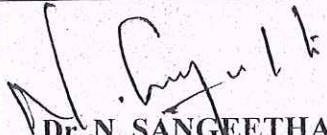
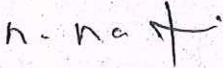
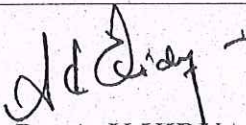
**Unit - IV Qualitative Analysis of Lipids**

- |                        |                        |                              |
|------------------------|------------------------|------------------------------|
| a) Solubility test     | b) Iodine test         | c) Test for free fatty acids |
| d) Emulsification test | e) Saponification test | f) Test for glycerol         |


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Unit - V		Group and Demonstration Experiments		
Group Experiments - Preparation of buffer and its pH measurements using pH meter.				
Demonstration Experiment				
Separation of Amino acids by Paper Chromatography				
Separation of Lipids by Thin Layer Chromatography				
<b>TEXT BOOKS</b>				
1	David T Plummer. An Introduction to Practical Biochemistry, McGraw-Hill Book Company (UK) Ltd., London, 3 <sup>rd</sup> edition, 1987.			
2	Pattabiraman, Laboratory Manual in Biochemistry, ASM publications, 1987.			
3	NPTEL Online Course on Experimental Biochemistry			
4	S. Shanmugam, T. Sathish Kumar, K. Panner Selvam, Laboratory Handbook on Biochemistry, Published by Asoke K. Ghose PHI Learning Private Ltd, 2010.			
5	Beedu Sashidhar Rao, Vijay Deshpande, Experimental Biochemistry, I.K.International Private Ltd., 2005			
<b>REFERENCE BOOKS</b>				
1	J.Jayaraman, Practical Biochemistry, New Age International, 2001			
2	S. Sadasivsam, A. Manickam, Biochemical methods, New Age International publishers, 3 <sup>rd</sup> Edition, 2016			
<b>WEB RESOURCES</b>				
1	<a href="http://biotech01.vlabs.ac.in/">http://biotech01.vlabs.ac.in/</a>			
2	<a href="https://biocyclopedia.com/index/biotechnology_methods/biochemistry/qualitative_tests.php">https://biocyclopedia.com/index/biotechnology_methods/biochemistry/qualitative_tests.php</a>			
<b>Course Designed By</b>		<b>Verified By</b>		<b>Approved By HOD</b>
 Dr. N. SANGEETHA		 Mr. R. RASU		 Dr. A. K. VIDYA
<b>QUESTION PAPER PATTERN</b>				
<b>Carbohydrates</b>	<b>Amino acids / Proteins / Lipids</b>	<b>Procedure (for 2 Experiments)</b>	<b>Viva Voce</b>	<b>Record</b>
15	10	10	05	05



  
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Mapping of COs with POs and PSOs:												
PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	M	S	S	M	M	S	S
CO 2	S	S	M	M	M	M	S	S	M	S	S	S
CO 3	S	S	M	M	M	M	S	S	M	M	S	S
CO 4	S	S	M	M	M	M	S	S	M	M	S	S
CO 5	S	S	M	M	M	M	S	S	M	S	S	S

S - Strong, M - Medium, L - Low



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Sem.	Course Code	Allied I: Chemistry - I	Total Marks: 75		Hours / Week	Credits
I	21UAPAT103			CIA: 30	ESE: 45	4

**Course Objectives:**

- To understand the importance of Atomic structure and chemical bonding
- To know the basic concepts of isomerism and facts of solutions & chemical kinetics.
- To gain the knowledge about Phytochemistry and Industrial Chemistry

**Course Outcomes (CO): On completion of the course, students should be able to**

CO 1	Illustrate the structural elucidation of organic compounds.	K1 - K4
CO 2	Summarize the fundamentals of physical chemistry	
CO 3	Recall the bonding mechanisms and theories of inorganic compounds	
CO 4	Establish the knowledge in polymer chemistry	
CO 5	Classify the different laws of physical chemistry	

**K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create**

**Unit - I | Nuclear Chemistry and Molecular orbital Theory**

**Laboratory principles:** Safety and Hygiene in the Chemistry Lab: Storage and Handling of Chemicals. Antidotes and First Aid procedures in chemistry lab.

**Nuclear Chemistry:** Definition of Atoms, Molecules, Proton, Neutron, Electron, Atomic weight, Atomic number, Isotopes, Isobars, Isotones, **Nuclear Fusion and Nuclear Fission.**

**Chemical bond:** Definition of Covalent bond, Ionic bond, Coordinate covalent bond, Hydrogen bond and Vander Waal's Forces.

**Molecular Orbital Theory:** Concepts of M.O. Theory – Comparison of Bonding and Anti-bonding molecular orbitals, Bond order, Diamagnetism and Para magnetism. Applications of M.O Theory – H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> and F<sub>2</sub>.

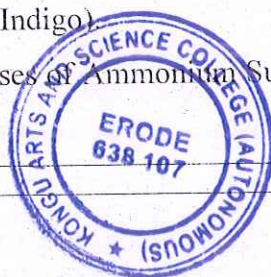
**Unit - II | Plastics, Silicones, Dyes and Fertilizers**

**Plastics:** Preparation, Properties and Uses of Poly Vinyl Chloride, Teflon, Polythene and Epoxy Resins. Difference between thermoplastic and Thermosetting polymers.

**Silicones:** Preparation, Properties and Uses.

**Dye:** Definition of Chromophore and Auxochrome. Preparation, Properties and Uses of Azo dye (Methyl orange) and Vat dye (Indigo).

**Fertilizers:** Preparation and uses of Ammonium Sulphate, Ammonium Nitrate, Urea and Triple Super Phosphate.



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<b>Unit - III</b>	<b>Covalent bond, Polar effects and Stereoisomerism</b>
<p><b>Covalent Bond:</b> Orbital Overlap, Hybridization, Geometry of organic molecules - CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>6</sub>H<sub>6</sub>.</p> <p><b>Polar Effects:</b> Inductive effect, Electromeric, Mesomeric and Steric effects.</p> <p><b>Stereoisomerism:</b> Optical isomerism - Elements of symmetry, Isomerism in Tartaric acid, Racemization and Resolution, Geometric isomerism - Maleic acid and Fumaric acid.</p>	
<b>Unit - IV</b>	<b>Solutions and Chemical kinetics</b>
<p><b>Solutions:</b> Definition of Normality, Molality and Molarity. Types of Solutions, Raoult's law: Statement, Ideal solution - Deviation from ideal behavior, Binary liquid mixtures, Fractional Distillation.</p> <p><b>Chemical Kinetics:</b> Introduction, Difference between the Order and Molecularity of the reaction, Methods of Determination of Order of reaction, Effect of Temperature on the reaction rate.</p>	
<b>Unit - V</b>	<b>Photo Chemistry and Metallic Bond</b>
<p><b>Photochemistry:</b> Definition of Photochemical reaction, Comparison of Thermal and Photochemical reaction, Laws of Photochemistry - Grothus Drapers law and Stark Einstein's Law, Quantum yield; Photosensitization - Fluorescence, Phosphorescence and Chemiluminescence.</p> <p><b>Metallic Bond:</b> Electron Gas, Pauling and Band Theories, Semiconductors - Extrinsic and Intrinsic.</p>	

#### Skill Development Activities

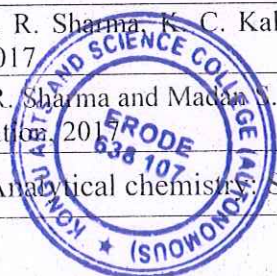
1. Chart/Model preparation on atomic structure of elements
2. Report on different types of fertilizers and dyes used in industries around your locality
3. Summary on any one Noble Laureate and his contribution in Chemistry

#### TEXT BOOKS

1	R. D. Madan, Advanced Inorganic Chemistry, S. Chand & Company, 5 <sup>th</sup> Edition, 2005
2	B. S. Bahl and Arun Bahl, Advanced Organic Chemistry, S. Chand and Company Ltd, 1 <sup>st</sup> Edition, 2017
3	B. S. Bahl, G. D. Tuli and Arun Bahl, Essential of Physical Chemistry, S. Chand and Company Ltd, 3 <sup>rd</sup> Edition, 2007
4	Dr. V. Veeraiyan, Allied Chemistry Paper I & II, 2 <sup>nd</sup> Edition, HpH publications, Chennai

#### REFERENCE BOOKS

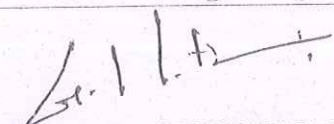
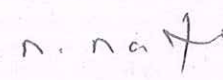
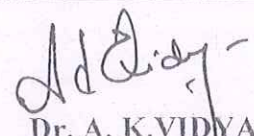
1	B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, 33 <sup>rd</sup> Edition, Vishal Publication, 2017
2	B. R. Puri, L.R. Sharma and Madan S.P. athania, Elements of Physical chemistry, 30 <sup>th</sup> Edition, Vishal Publication, 2017
3	R.Gopalan, Analytical chemistry, S.Chand & Co., 2007.



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**WEB RESOURCES**

- 1 <https://epgp.inflibnet.ac.in/>
- 2 <http://chemed.chem.purdue.edu/gcnchem/beginners.html>

Course Designed By	Verified By	Approved By HOD
 <b>Mr. G. KARTHIKEYAN</b>	 <b>Mr. R. RASU</b>	 <b>Dr. A. K. VIDYA</b>

**QUESTION PAPER PATTERN**


<b>Time: 3 hours</b>	<b>Max. Marks: 45</b>	
<b>SECTION-A (5 X 1 = 5 Marks)</b> Answer ALL questions Choose the correct answer Two questions from each unit	<b>SECTION-B (5 X 3 = 15 Marks)</b> Answer ALL questions Either or type Two questions from each unit	<b>SECTION - C (5 X 5 = 25 Marks)</b> Answer ALL questions Either or type Two questions from each unit

**Mapping of COs with POs and PSOs:**

PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO 1</b>	M	S	M	M	M	M	S	S	M	M	S	S
<b>CO 2</b>	M	S	M	M	M	M	S	S	S	M	S	S
<b>CO 3</b>	M	S	M	M	M	M	S	S	M	M	S	S
<b>CO 4</b>	M	S	M	M	M	S	S	S	S	M	S	S
<b>CO 5</b>	S	S	M	M	S	M	S	S	M	S	S	S

S - Strong, M - Medium, L - Low



  
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Sem.	Course Code	Allied Practicals - I Chemistry	Total Marks: 50		Hours / Week	Credits
			CIA: 25	ESE: 25		
I & II	21UAPAP205				2	2

(Examination at the end of Second Semester)

**Course Objectives:**

- To understand the principles of volumetric analysis.
- To analyse the hardness of water from different sources
- To know about the analysis of organic compounds

**Course Outcomes (CO): On completion of the course, students should be able to**

CO 1	Practice the preparation procedure of normal and molar solutions.	K1 – K5
CO 2	Develop the experience in handling of glass wares and accurate chemical laboratory skill.	
CO 3	Estimate the acid and base solutions by volumetric analysis	
CO 4	Examine the methods of organic analysis	
CO 5	Distinguish the various organic compounds.	

**K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create****Unit I - III Volumetric Analysis**

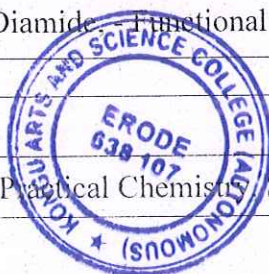
1. Estimation of Sodium hydroxide using Standard Sodium carbonate.
2. Estimation of Hydrochloric acid using Standard Oxalic acid.
3. Estimation of Oxalic acid using Standard Sulphuric acid.
4. Estimation of Ferrous sulphate using Standard Mohr salt solution.
5. Estimation of Calcium
6. Estimation of Magnesium
7. Determination of Hardness of Water using EDTA

**Unit IV - V Qualitative Organic Analysis: Systematic Analysis**

1. Detection of Element - Nitrogen compounds only.
2. To distinguish between Aliphatic and Aromatic compounds.
3. To distinguish between Saturated and Unsaturated compounds.
4. Functional group tests for Phenols, Acids (mono and di), Aromatic primary amine, Carbohydrates, Monoamide and Diamide. Functional groups characterized by Confirmatory test

**TEXT BOOKS**

- 1 A. O. Thomas, Practical Chemistry, Scientific Book Centre, Cannanore, 2003



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## REFERENCE BOOKS

- i A. Venkateshwaran, R. Veeraswamy and A. R. Kulanthaivelu, S.Chand & Company Limited, 1<sup>st</sup> Edition, 2001

## WEB RESOURCES

- 1 <https://vlab.amrita.edu/index.php?sub=2&brch=193>
- 2 [http://www.iscnagpur.ac.in/study\\_material/dept\\_chemistry/3.1 MIS and NJS Manual for Organic Qualitative Analysis](http://www.iscnagpur.ac.in/study_material/dept_chemistry/3.1_MIS_and_NJS_Manual_for_Organic_Qualitative_Analysis)

Course Designed By

Verified By

Approved By HOD

S. Natarajan

n. rasu

Dr. A.K. VIDYA

Mr. S. NATARAJAN

Mr. R. RASU

Dr. A.K. VIDYA

## QUESTION PAPER PATTERN

Volumetric Analysis

Organic Analysis

Record

8

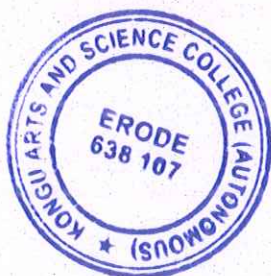
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05

## Mapping of COs with POs and PSOs:

CO \ PO/PSO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	M	M	S	M	S	S	S	M	S	M
CO 2	S	M	M	M	S	M	S	S	M	S	M	S
CO 3	S	M	M	M	S	M	S	S	S	S	S	M
CO 4	S	M	M	M	S	M	S	M	M	S	S	S
CO 5	S	M	M	M	S	M	S	S	S	M	S	M

S - Strong, M - Medium, L - Low



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Sem.	Course Code	Core III: Professional English II	Total Marks: 100		Hours / Week	Credits
II	21UAPCT201		CIA: 50	ESE: 50	4	4

**Course Objectives:**

1. To develop the language skills of students
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence
3. To focus on developing students' knowledge of domain specific registers and the required language skills

**Course Outcomes (CO): On completion of the course, students should be able to**

CO 1	Identify the correct usage of vocabulary and grammar in speaking and writing	K1 - K4
CO 2	Demonstrate the language skills through academic writing	
CO 3	Apply the communicative skills by responding to given situations	
CO 4	Communicate leadership quality and team building	
CO 5	Analyze the information in various circumstances	

**K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create**

**Unit - I | Communicative Competence**

Listening – Listening to two talks/lectures by specialists on selected subject specific topics - (TED Talks) and answering comprehension exercises (inferential questions)

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions)

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages

**Unit - II | Persuasive Communication**

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication

Speaking: debates – Just-A Minute Activities

Reading: reading texts on advertisements ( on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay.

**Unit - III | Digital Competence**

Listening to interviews (subject related)

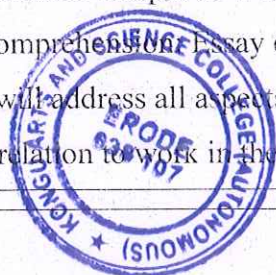
Speaking: Interviews with subject specialists (using video conferencing skills)

Creating Vlogs (How to become a vlogger and use vlogging to nurture interests – subject related)

Reading: Selected sample of Web Page (subject area) Writing: Creating Web Pages

Reading Comprehension of Essay on Digital Competence for Academic and Professional Life.

The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area.



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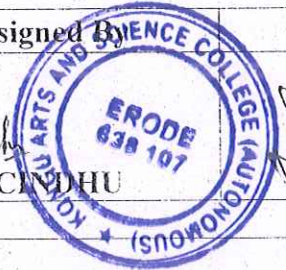
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<b>Unit - IV</b>	<b>Creativity and Imagination</b>
Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – E.g. <a href="https://www.youtube.com/watch?v=tpvicScuDy0">https://www.youtube.com/watch?v=tpvicScuDy0</a> )	
Speaking: Making oral presentations through short films – subject based Reading : Essay on Creativity and Imagination (subject based)	
Writing – Basic Script Writing for short films (subject based)	
- Creating blogs, flyers and brochures (subject based)	
- Poster making – writing slogans/captions (subject based)	
<b>Unit - V</b>	<b>Workplace Communication &amp; Basics of Academic Writing</b>
Speaking: Short academic presentation using PowerPoint	
Reading & Writing: Product Profiles, Circulars, Minutes of Meeting. Writing an introduction, paraphrasing	
Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis)	
Capitalization (use of upper case)	

Skill Development Activities	Max. Marks (10)
Creation of a Mindmap	3
Interpreting a Interview by a Subject Expert	3
Reading and Summarizing a Subject related Research Article	3
Punctuality	1

TEXT BOOKS	
1	Professional English For Life Sciences II–TANSICHE
REFERENCE BOOKS	
1	A Handbook of English for Engineers and Technologists, BS Publications, Elish P, 2003.
2	English for Professionals, Vayu Education of India, Dr.SheemaMiglani&ShikhaGoyal, 2010.
3	Business English, Tata McGraw-Hill Edition, Dona J.Young, 2012
WEB RESOURCES	
1	<a href="https://www.classcentral.com/course/swayam-business-english-communication-10097">https://www.classcentral.com/course/swayam-business-english-communication-10097</a>
<b>Course Designed By</b>	<b>Verified By</b>
Ms. R. S. CHIDHU	Dr. N. SANGEETHA
<b>Approved By HOD</b>	
Dr. A. K. VIDYA	

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QUESTION PAPER PATTERN												
Time: 3 hours								Max. Marks: 50				
SECTION-A (10 X 1 = 10 Marks) (Vocabulary) (MCQ, Info-gap questions –domain specific vocabulary)								SECTION-B (4 X 10 = 40 Marks) (Reading :Two long domain-specific comprehension passages with questions pertaining to understanding and analysis – 20 Marks) (Writing: Descriptive/narrative/persuasive writing questions pertaining to domain-specific vocabulary – 20 Marks)				
Mapping of COs with POs and PSOs:												
CO \ PO/PSO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	M	M	M	S	M	S	S	S	S
CO 2	S	S	S	M	M	M	S	M	S	S	S	M
CO 3	S	S	S	S	M	M	S	M	S	S	S	M
CO 4	S	S	S	S	M	M	S	M	S	S	M	M
CO 5	S	S	S	S	M	M	S	S	S	S	S	S
S - Strong, M - Medium, L - Low												



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Sem.	Course Code	Core IV: Tools and Techniques in Biochemistry	Total Marks: 100		Hours / Week	Credits
II	21UAPCT202		CIA: 50	ESE: 50	4	4

**Course Objectives:**

- The course will help students to acquaint with basic instrumentation, principle and procedure of various sophisticated instruments
- To get a comprehensive overview of the principles and applications of the instruments.
- This will enable the students to implement the use of these techniques in biological research and in discovering new products.

**Course Outcomes (CO): On completion of the course, students should be able to**

CO 1	Discuss the features of various biochemical tools	K1 - K4
CO 2	Distinguish the principles of different biochemical techniques	
CO 3	Determine the protocols involved in the techniques of chromatography, electrophoresis and centrifugation.	
CO 4	Focus the applications of analytical techniques and biomedical equipments	
CO 5	Memorize the working procedure of instruments used in biochemistry laboratory	

**K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create**

**Unit - I | pH Meter and Buffer Systems**

**pH meter:** Principle, Types of Electrode - Glass Electrode, Reference Electrode; pH scale; Henderson-Hasselbalch equation.

**Buffer:** Buffer solutions, Buffer systems of Blood - Bicarbonate, Phosphate and Hemoglobin Buffer system.

**Various ways of expressing and conversion of concentration of solutions:** Molality, Molarity, Normality, Mole fraction, Percentage Solution (v/v, w/v). Simple problems to be worked out.

**Unit - II | Chromatography**

**Chromatography:** Principle, Techniques and Applications of Paper, Thin layer, Ion-exchange, Affinity, Gel Permeation, Adsorption chromatography.

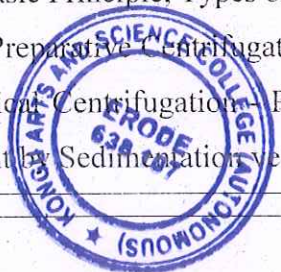
Principle, Instrumentation and Applications of GLC and HPLC.

**Unit - III | Electrophoresis and Centrifugation**

**Electrophoresis:** Principle, Techniques and Applications of Agarose gel electrophoresis, SDS-PAGE, Isoelectric focusing, Immunoelectrophoresis.

**Centrifugation:** Basic Principle, Types of centrifuge - Bench top, High speed.

**Ultra centrifuge:** Preparative Centrifugation - Differential and Density Gradient for Separation of Cell Organelles. Analytical Centrifugation - Principle, Instrumentation and Applications. Determination of Molecular weight by Sedimentation velocity method

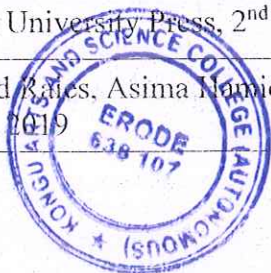


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<b>Unit - IV</b>	<b>Spectrophotometer and Biomedical Instruments</b>
<b>Spectrophotometer:</b> Beer Lambert's Law, Types - Difference between Single beam and Double beam spectrophotometer. Principle, Instrumentation and Applications of Colorimeter, UV and Visible Spectrophotometer, Fluorimeter and Flame photometry.	
<b>Biomedical Instruments:</b> Principle and Applications of ECG, EEG, CT Scan, Doppler, MRI Scan.	
<b>Unit - V</b>	<b>Tracer Techniques and Immunochemical techniques</b>
<b>Tracer Techniques:</b> Radio isotopes - Penetrating ability, Types of Radioactive decay, Units of Radioactivity.	
<b>Detection and Measurement of Radioactivity:</b> Principle, Techniques and Applications of GM counter, Scintillation counter, Autoradiography. Applications of Radio isotopes.	
<b>Immunochemical techniques:</b> Principle, Technique and Applications of Radio Immuno Assay (RIA) and Fluorescent Immuno Assay (FIA).	

Skill Development Activities	Max. Marks (10)
Assignment	3
Quiz	3
Group Discussion	3
Punctuality	1

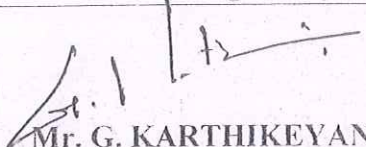
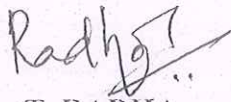
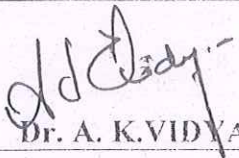
TEXT BOOKS	
1	B. K. Sharma, Instrumental method of chemical analysis, Krishna Prakashan Media (P) Ltd., 1 <sup>st</sup> edition, 2014
2	Dr. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies, 2002
3	A. Upadhyay, K. Upadhyay and N. Nath, Biophysical Chemistry - Principles and Techniques, Himalaya Publishing House Pvt. Ltd, 4 <sup>th</sup> Edition, 2016
REFERENCE BOOKS	
1	Kudesia V.P. Sawhaney H, Instrumental method of chemical analysis, 1989
2	Plummer, D. T, An Introduction to Practical Biochemistry, McGraw Hill Education, 3 <sup>rd</sup> Edition, 2001
3	Keith Wilson and John Walker, Practical Biochemistry, Principles and Techniques, Cambridge University Press, 2 <sup>nd</sup> Edition, 2000
4	Mohammad Rafiq, Asima Noida, Gulzar Ahmad, Analytical Biochemistry, Book Enclave, 1 <sup>st</sup> Edition, 2019



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## WEB RESOURCES

1	<a href="https://epgp.inflibnet.ac.in/">https://epgp.inflibnet.ac.in/</a>
2	<a href="https://www.biologydiscussion.com/biochemistry/top-6-tools-of-biochemistry-their-principles-and-applications/11135">https://www.biologydiscussion.com/biochemistry/top-6-tools-of-biochemistry-their-principles-and-applications/11135</a>
3	<a href="http://ecoursesonline.iasri.res.in/course/view.php?id=282">http://ecoursesonline.iasri.res.in/course/view.php?id=282</a>

Course Designed By	Verified By	Approved By HOD
 Mr. G. KARTHIKEYAN	 Mrs. T. RADHA	 Dr. A. K. VIDYA

## QUESTION PAPER PATTERN


Time: 3 hours		Max. Marks: 50
<b>SECTION-A (10 X 1 = 10 Marks)</b> Answer ALL questions Choose the correct answer Two questions from each unit	<b>SECTION-B (5 X 3 = 15 Marks)</b> Answer ALL questions Either or type Two questions from each unit	<b>SECTION - C (5 X 5 = 25 Marks)</b> Answer ALL questions Either or type Two questions from each unit

## Mapping of COs with POs and PSOs:

PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	S	S	S	M	M	S	S
CO 2	M	S	M	M	M	S	S	S	M	S	S	S
CO 3	S	M	M	M	S	S	S	S	M	S	S	S
CO 4	S	M	M	M	S	S	S	S	S	S	S	S
CO 5	S	M	M	M	S	S	S	S	M	M	S	S

S - Strong, M - Medium, L - Low



  
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