

PROFILE OF THE DEPARTMENT

For every problem solution lies in *science* and therefore science has assumed paramount importance in the growth & development of any nation. Therefore, for the youth, science has become the most sought-after career option these days. Of the science subjects, *Biochemistry*, in particular, has a major role to play in shaping the nation's economy and improving the living conditions of the people at large. One cannot imagine life without the interference of *Biochemistry*. It is intertwined with the very existence of human beings in good and sound health which is the life-blood of any individual.

In a developing country like ours, there is a great demand for *Biochemists*. With this in view, the Management of Viswa Bharati Education Society, which sponsored the Chaitanya P.G. College has come forward to introduce the subject of *Biochemistry* at the PG level during 1996-1997. With a limited intake, the present intake is 30+3 seats under NRI/Management quota.

It is a matter of pride for us to say that this course was introduced at this college even before it could be introduced at the University. Thus this affiliated college of Kakatiya University took the lead for the growth and development of the course which ultimately paved the way for its introduction in the university constituent college.

We have on faculty teachers, who work with devotion, commitment, and discipline for the orderly growth and development of the institution and this has resulted in excellent standards making it a prestigious institution in the city among university constituent and affiliated colleges under the jurisdiction of Kakatiya University by getting distinctions and University ranks every year.

Taking autonomy as an advantage the department has introduced CBCS into its curriculum introducing electives which is very useful for the enhancement of skills of a student in the field of science. The department has introduced Food technology as a skill enhancement open elective for all groups of students which has an industrial outlook and helps student community to improve job opportunities in their skill area.

HISTORY OF THE DEPARTMENT

- It's a matter of pride for us to say that the course M.Sc. (Biochemistry) was introduced at this college even before it could be introduced at the University.

GENESIS OF THE DEPARTMENT

- Introduced in the year 1996-1997 with an intake of 5 students.
- From 1999 it was upgraded to an intake of 20.
- As on today it has an intake capacity of 30, with additional 5 seats under NRI/management quota.
- Now CBCS curriculum is followed.

The Department of Biochemistry has achieved the status of Autonomy in the year 2008. Taking Autonomous status as an advantage our BOS has framed syllabi according to the needs of modern industry. After the achievement of University status in the year 2019 we have introduced B.Sc., Nutrition, Dietetics & Food Science at the U.G. level and M.Sc., Food Technology and Quality Assurance, M.Sc., Clinical Nutrition & Dietetics at P.G. level. These courses have more opportunities in the commercial market as Food Science & Technology has been emerged as one of the growing area for the development of Economy. Our Board of Studies members include eminent personalities in the field of science with a vast research experience. Even our Alumni with research and industrial exposure, are giving their suggestions to impart quality for our course according to the needs of industry.

Significant achievements of the department or faculty

- The Dept. provides diagnostic services to the staff & students of this college.
- The Dept. ensures medical fitness to NCC cadets.
- Students prepare their own serum profiles in the Clinical Biochemistry lab.
- Bagging Top ranks in the
- University Entrance test for PG admissions is an annual feature of this Dept.
- CBCS curriculum.
- Excellent Course structure and introduction of skill-based open electives from II year of graduation.
- Dedicated teachers and students who have research orientation works as an ideal combination for projects.
- Excellent placements for the graduates in the topmost companies and industries.

- Students are being taken round the Scientific Organizations every year with a view of exposing the students in the wake of privatization, globalization and scientific explosion.
- Successfully finished a UGC-SERO project by our faculty K. V. N. Rajeswari entitled, “Performance of enzymes of Biotechnological importance under high pressures and its’ applications in food processing” with a total financial assistance of Rs. 1,75,000.
- Offers various avenues for students to improve their skills and to understand their areas of interest and importance for further specialization.
- Social Involvement Program (SIP): The students of the department are encouraged to go for SIP, along with an NGO under the supervision of faculty who are also involved in this SIP. They conduct SIP in underprivileged areas like orphan homes, schools for blind, etc.
- The faculty have attended seminars and workshops.
- The students have been actively involved in various community service activities.
- From 2012 onwards three BOS meetings were held and the syllabus was revamped. Skill enhancement papers are designed.
- Mrs. K.V.N. Rajeswari, faculty member delivered a guest lecture on “Bioinformatics” at Dept. of Biochemistry, Kakatiya University, Warangal.
- Prof. S. Suma has given a series of guest lectures in Prof. Jayashankar Telangana State Agriculture College, Warangal
- Prof. S. Suma has given a series of guest lectures in Agriculture College, Palem
- Prof. S. Suma chaired a session in international conference organised by Research India Foundation held on 14th-15th October 2021
- Prof. S. Suma is an external BOS member, Dept. of Biochemistry, MG University, Nalgonda
- Prof. S. Suma is an BOS member, Dept. of Agriculture, CDU, Hanamkonda
- Prof. S. Suma is a scientific advisory for Pravara Innovatives Private Ltd., Hyderabad
- Prof. S. Suma is a life member for Advaita Innovative Research Association.
- Prof. S. Suma is a paper reviewer- Research Journal of Pharmacy and Technology and Associate editor Journal of BioScientia, CDU, Hanamkonda

ALUMNI

The majority of the students enroll themselves in the Alumni Association after the completion of their course.

Alumni cell of the Department of Biochemistry

- Madhu. D
Hyderabad Medical Representative, Aristo Pharma,
- Thakur Sunil Singh
Labs. Medical Representative, Dr. Reddy's
- Ch. Ravi Chandra Analyst, Instrumentation, Sipra Labs.
- K. Rajkumar
Health Care Limited. Medical Representative, Akumentis
- G. Jyothsna
centre, Hyderabad. Research Analyst, Bioaxis DNA research
- Vahini Lecturer, Vashishta Degree College,
Nirmal.
- Naveen
centre, Hyderabad. Research Analyst, Bioaxis DNA research
- Vinod Kumar Research fellow, U.S.A.
- Madhu. D
Hyderabad Medical Representative, Aristo Pharma,
- K. Sathish
Chemicals, Hyderabad. Supervisor, Production Unit in Hermis
- B. Shirisha
Hyderabad Research Associate, In Vivo Biotech,
- Srikanth
Hyderabad Research Associate, In Vivo Biotech,
- Deepthi
Hyderabad Research Associate, In Vivo Biotech,
- B. Surender Wipro Vista, Bangalore
- P. Charanya Wipro Vista, Bangalore
- K. Shirisha Wipro Vista, Bangalore
- R. Sandeep Vishnu Chemicals, Hyderabad.
- B. Nagalaxmi Core Biotech, Hyderabad.
- Jayasree Group-II officer, Telangana state
- B.Sreelatha Group-II officer, Telangana state

.....and many more.

Collaborations:

The department has MOUs with leading Biochemical and Biotechnology industries& prominent Academic &Research Institutes namely,

1. Jeeva Lifesciences, Uppal, Hyderabad.
2. Pravara Innovates Pvt. Ltd, Hyderabad
3. Department of Biochemistry, Kakatiya Govt. Degree & P.G. College, Hanamkonda
4. Department of Biochemistry, Osmania University, Hyderabad
5. Department of Biochemistry, M.G. University, Nalgonda.

The Department proposes to have more collaborations/ Action plans:

- ▶ **The Department proposes to organize a workshop on “Enzyme assays” and**

S.NO.	NAME OF THE FACULTY	DESIGNATION	CONTACT INFORMATION
1	PROF. S. SUMA	PROFESSOR & HEAD OF THE DEPARTMENT	MOBILE: +919849243305 E-mail: sumareddy197420@gmail.com
2	PROF. G. SHYAM PRASAD	PROFESSOR	Phone: +918686563395 ; +91970503765 E-mail: shyamprasad1919@yahoo.com

“Bioinformatics” for teachers according to the revised syllabus.

- ▶ **Planning to encourage students to participate in Diabetes, and nutritional awareness campus in nearby villages.**
- ▶ **The Department proposes to have collaborative projects with medical and research institutes.**
- ▶ **The department proposes to organize an industrial tour to IISC, Bengaluru, IICB, Kolkata, CDRI, and Lucknow.**
- ▶ **Planning to encourage students to apply for more Summer Research Fellowship Programs offered by different National Research Institutes like CCMB, CDFD, IISC etc.**

3	DR. K.V.N.RAJESHWARI	ASSISTANT PROFESSOR	Phone:+919849109370 E-mail: kvnrajeswari@gmail.com
4	DR. A. JAHNAVI	ASSOCIATE PROFESSOR	Phone:+918712700975 E-mail: jahnavichandu.enjapuri@gmail.com
5	B.SOUJANYA	ASSISTANT PROFESSOR	Phone:+918008982235 E-mail: soujanyabilakanti@gmail.com
6	SOHEL RANA SHAIK	ASSISTANT PROFESSOR	Phone:+919382616073 E-mail: krara2133@gmail.com

Contact Information:

Courses offered

U.G. Level: B.Sc. (Biotechnology, Biochemistry, Chemistry)
B.Sc. (Nutrition, Dietetics & Food Science)

P.G. Level: M.Sc. (Biochemistry)
M.Sc. (Medical Biochemistry)
M.Sc. (Food Technology & Quality Assurance)
M.Sc. (Clinical Nutrition & Dietetics)

Ph.D. In Biochemistry

CBCS COMMON CORE SYLLABI FOR B.Sc. BTBCC

SEMESTER - I							
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS	Internal Marks	External Marks	Total Marks

	English	AECC-I	2	2	15	35	50
	Basic Computer Skills	AECC-II	2	2	15	35	50
	Core I	CC1 - A	4	4	30	70	100
	Core II	Biomolecules	4	4	30	70	100
	Core III	CC1 - C	4	4	30	70	100
	Core I Lab	CC1 - A - P	3	2	15	35	50
	Core II Lab	Biomolecules	3	2	15	35	50
	Core III Lab	CC1 - C - P	3	2	15	35	50
	Seminar		3	2	15	35	50
	TOTAL		28	24	180	420	600

SEMESTER - II							
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS	Internal Marks	External Marks	Total Marks
	English	AECC-III	2	2	15	35	50
	Environmental Sciences	AECC-IV	2	2	15	35	50
	Core I	CC2 - A	4	4	30	70	100
	Core II	Bioenergetics & Enzymology	4	4	30	70	100
	Core III	CC2 - C	4	4	30	70	100
	Core I Lab	CC2 - A - P	3	2	15	35	50
	Core II Lab	Enzymology	3	2	15	35	50
	Core III Lab	CC2 - C - P	3	2	15	35	50
	Seminar		3	2	15	35	50
	TOTAL		28	24	180	420	600

SEMESTER - III							
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS	Internal Marks	External Marks	Total Marks
	Open elective	SEC-I	4	4	30	70	100
	Core I	CC3 - A	4	4	30	70	100
	Core II	Intermediary metabolism	4	4	30	70	100
	Core III	CC3 - C	4	4	30	70	100
	Core I Lab	CC3 - A - P	3	2	15	35	50
	Core II Lab	Titrimetry	3	2	15	35	50
	Core III Lab	CC3 - C - P	3	2	15	35	50
	Seminar		3	2	15	35	50
	TOTAL		28	24	180	420	600

SEMESTER - IV							
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CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS	Internal Marks	External Marks	Total Marks
	SEC-II A	SEC-II	4	4	30	70	100
	Core I	CC4 - A	4	4	30	70	100
	Core II	Hormone Biochemistry & Immunology	4	4	30	70	100
	Core III	CC4 - C	4	4	30	70	100
	Core I Lab	CC4 - A - P	3	2	15	35	50
	Core II Lab	Immunology	3	2	15	35	50
	Core III Lab	CC4 - C - P	3	2	15	35	50
	Seminar		3	2	15	35	50
	TOTAL		28	24	180	420	600

SEMESTER - V							
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS	Internal Marks	External Marks	Total Marks
	SEC-III B	SEC-IIIA	4	4	30	70	100
	Core I	DSE1 - A	4	4	30	70	100
	Core II	Nutrition & Clinical Biochemistry	4	4	30	70	100
	Core III	DSE1 - C	4	4	30	70	100
	Core I Lab	DSE1 - A - P	4	2	15	35	50
	Core II Lab	Clinical Biochemistry	4	2	15	35	50
	Core III Lab	DSE1 - C - P	4	2	15	35	50
	Seminar		3	2	15	35	50
	TOTAL		31	24	180	420	600

SEMESTER - VI							
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS	Internal Marks	External Marks	Total Marks
	SEC-IV C	Tools of Biochemistry /Human Physiology	4	4	30	70	100
	Core I	DSE2 - A	4	4	30	70	100
	Core II	Molecular Biology & Regulation of gene expression	4	4	30	70	100
	Core III	DSE2 - C	4	4	30	70	100
	Core I Lab	DSE2 - A - P	4	2	15	35	50
	Core II Lab	Molecular Biology	4	2	15	35	50
	Core III Lab	DSE2 - C - P	4	2	15	35	50
	Seminar		3	2	15	35	50
	TOTAL		31	24	180	420	600

S.No.	SEMESTER	CREDITS	MARKS
1	I	24	600
2	II	24	600
3	III	24	600
4	IV	24	600
5	V	24	600
6	VI	24	600
		144	3600

AECC: Ability Enhancement Compulsory Course	08 credits
SEC: Skill Enhancement Course	16 credits
CC : Core Compulsory	72 credits
DSE: Discipline Specific Elective	36 credits
Seminars	12 credits
Total	144 credits

Non CGPA Courses **12 credits***

NCC	2 credits
NSS	2 credits
Community Service	2 credits
Extra Curricular activities	2 credits
Farming	2 credits
Sports and Games	2 credits

***Non CGPA courses credits are not counted for CGPA calculation. Student should acquire minimum 4 Non CGPA credits to get degree.**

DEPARTMENT OF BIOCHEMISTRY
B.Sc. BIOCHEMISTRY
SEMESTER-I
SUBJECT: BIOMOLECULES (THEORY)
SEMEST TOTAL HOURS: 60 **CREDITS: 4**

Course level Learning objectives: Upon completion of this paper, students will be able to develop skills in:

- Learn the elements present in biomolecules and the difference monomers and polymers.
- List the four major complex biomolecules found in living cells, three of which are found on food labels and the basis for grouping of biomolecules into those four groups.
- For each group of biomolecules learn the name of its generic monomer (simple unit) and polymer (complex structure) and their function.
- Carbohydrates: o Identify their chemical elements and the difference between simple sugars and complex carbohydrates. o Compare and contrast the structure and function of the following carbohydrates and where they are found: glucose, glycogen, starch, cellulose, chitin.
- Proteins: Identify their chemical elements and functional groups .
- Recognize the structure of an amino acid and the peptide bond that connects di-, tri, and polypeptides. Recognize the presence of 20 amino acids and that not all are essential amino acids.
- Summarize the function of proteins and recognize the importance of the three dimensional shape of a protein on its function and the role of non-covalent bonds in maintaining the shape of a protein.
- Explain protein denaturation and the effect of heat on protein structure and function.
- Lipids: Identify their chemical elements and learn their property of insolubility in water. o Identify the three groups of lipids.
- Compare and contrast saturated, mono-unsaturated, and poly-unsaturated fatty acids. Explain the importance of poly-unsaturated fatty acids and why omega-3 and omega-6 fatty acids are considered essential. List sources of polyunsaturated fatty acids.
- Nucleic Acids: Identify their chemical elements and components of a nucleotide. Describe the function of DNA Compare and contrast the 2 types of nucleic acids: DNA and RNA.

Unit I: Carbohydrates and Glycobiology

Monosaccharides - structure of aldoses and ketoses, ring structure of sugars, conformations of sugars, mutarotation, anomers, epimers and enantiomers, structure of biologically important sugar derivatives, oxidation of sugars. Formation of disaccharides, reducing and nonreducing disaccharides. Polysaccharides – homo- and heteropolysaccharides, structural and storage polysaccharides. Structure and role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharides). Carbohydrates as informational molecules.

Unit II: Lipids

Lipids – classification and general properties of lipids. Fatty acids, glycerol, ceramide. Storage lipids - triacyl glycerol and waxes. Structural lipids in membranes – glycerophospholipids, galactolipids and sulpholipids, sphingolipids and sterols. Structure, distribution and role of membrane lipids. Lipids as signals and cofactors. Eicosanoids-structure & functions.

Unit III: Amino acids

Structure and classification, physical, chemical and optical properties of amino acids. Naturally occurring peptides. Structural organisation of proteins. Protein denaturation and renaturation. Proteolytic enzymes.

Unit IV: Nucleic acids

Nucleotides - structure and properties. Nucleic acid structure – Watson-Crick model of DNA. Structure of major species of RNA - mRNA, tRNA and rRNA. Nucleic acid chemistry- UV absorption, effect of acid and alkali on DNA.

Course Learning Outcomes:

- Understand biochemistry at the atomic level, reactions involved with biomolecules.
- Understand the difference between monosaccharides, disaccharides and polysaccharides. storage and structural polysaccharides.
- Learn the molecular structures of 20 amino acids, differentiating essential and non-essential amino acids, biologically important modified amino acids and their functions.
- Recognize the structural levels of organization of proteins, 3D structure of proteins, its functions, denaturation etc.
- Have a clear idea of biomembranes, behavior of amphiphatic lipids in water, formation of micelles, bilayers, vesicles, membrane composition and fluid mosaic model
- Recognize lipid and, lipoproteins. Describe how lipids, cholesterol, prostaglandins etc. are synthesized.
- chemical elements and components of a nucleotide. DNA double helix, denaturation, biological importance of RNA, types of RNA and their functions.
- Compare and contrast saturated, mono-unsaturated, and poly-unsaturated fatty acids. Explain the importance of poly-unsaturated fatty acids and why omega-3 and omega-6 fatty acids are considered essential. List sources of polyunsaturated fatty acids.
- Nucleic Acids: Identify their chemical elements and components of a nucleotide. Describe the function of DNA. Compare and contrast the 2 types of nucleic acids: DNA and RNA.

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
4. Textbook of Biochemistry – West.E.S.,Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell,V.W., McGraw- Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

**BIOMOLECULES (PRACTICALS)
SEMESTER – I**

CREDITS: 2

Course Learning Objectives: Upon completion of this practical, students will be able to develop skills in:

- Learn Good laboratory practices in a biochemistry laboratory.
- Learn safety and precautionary measures for working in a laboratory.
- To obtain skill and proficiency in Qualitative analysis of biomolecules like Carbohydrates, amino acids and proteins, lipids, nucleic acids.
- Learn to handling glass wares, minor equipment for conducting experiments.
- To obtain skill in separation techniques using paper chromatography and TLC

1. Safety measures in laboratories.
2. Qualitative analysis of Biomolecules:-
 - (a) Carbohydrates
 - (b) Lipids
 - (c) Amino acids and proteins
 - (d) Nucleic acids
3. Determination of pKa of acetic acid and glycine.
4. Separation techniques:
 - (a) Separation of amino acids by paper chromatography.
 - (b) Separation of plant pigments by TLC.

Course Learning Outcomes:

- Understanding Good laboratory practices in a chemistry/biochemistry laboratory.
- Learn safety and precautionary measures for working in a laboratory.
- Develop skill and proficiency in Qualitative analysis of biomolecules like Carbohydrates, amino acids and proteins, lipids, nucleic acids.
- Use of handling of glass wares, minor equipment for conducting experiments.
- Develop skill in separation techniques using paper chromatography and TLC

References:

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and VijayDeshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

**B.Sc. BIOCHEMISTRY
SEMESTER-II**

BIOENERGETICS & ENZYMOLOGY (THEORY)

SEMEST TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives: Upon completion of this paper, students will be able to develop skills in:

Bioenergetics:

- Learn the chemistry behind the energy of life.
- Be able to differentiate between potential and kinetic energy.
- Understand that an organism's metabolism transforms matter and energy, following the laws of thermodynamics.
- Define the first and second law of thermodynamics.
- Explain how energy coupling works.
- Understand the concept of Gibbs Free Energy.
- Know that ATP powers cellular work through exergonic and endergonic reactions.

Enzymology:

- define differences between enzymes and normal catalytic substances
- recognize the enzymes chemical structure
- explain cofactor and coenzymes
- express Important coenzymes and the groups they transfer
- recognize biological coenzymes
- explain activity of catalyticcenter
- define factors that effect enzyme activity

- explain heat, pH , concentration and the other factors on the effect of activity
- recognize K_m
- define conformation changes of enzyme
- define enzyme specificity
- explain allosteric enzymes
- define activators and inhibitors
- recognize activators and inhibitors

Unit-I: Biological Energy Transformations:

Free energy, Exergonic and endergonic reactions, High energy phosphates, ATP cycle. Interconversion of Adenine nucleotides and phosphate cycle. Redox reactions, Standard Redox potential of some Biochemically important reactions.

Unit-II: Biological Oxidations:

Ultra-structure of mitochondria, Chloroplast, ATP Synthase. Electron transport chain and carriers involved. Oxidative Phosphorylation, Uncouplers , Substrate level phosphorylation, Cyclic and non-cyclic photophosphorylation. Mitchell's Chemiosmotic theory.

Unit-III: Enzymes:

Introduction to biocatalysis, differences between chemical and biological catalyst, Nomenclature and Classification of enzymes. Definition of Holoenzyme, Apo-Enzyme, Cofactor. Enzyme specificity. Active site, Principles of activation energy, transition state. Interaction between enzyme and substrate- Lock and Key Theory, Induced fit models.

Unit-IV: Enzyme Inhibition:

Factors affecting the Enzyme activity like -substrate concentration, P^H , temperature, Michaelis-Menten equation for uni-substrate reaction (derivation not necessary), significance of K_M and V_{Max} . Enzyme inhibition- irreversible and reversible, types of reversible inhibitions- competitive and non-competitive. Allosteric enzymes, Feedback inhibition. Isoenzymes, Ribozyme.

Course Learning Outcomes:

- Understand the fundamental energetics of biochemical processes, chemical logic of metabolic pathways. Knowing indetail about concepts to illustrate how enzymes and redox carriers and the oxidative phosphorylation machinery occur.

- Understand the utilization of proton gradient to drive the formation of high energy bonds and high energy compounds.
- To provide a deeper knowledge in fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes. Discussion on current applications and future potential of enzymes.
- understand of rate of reactions and order of reactions, and inhibitions and their kinetics. To gain knowledge on enzyme catalysis and isoenzymes and on multienzyme complexes.
- Understanding the concepts of standard redox potential and the enzymes in biological oxidations. A brief account of Mitochondria and chloroplast structure, ATPase (oxidative phosphorylation)
- Describe structure, functions and the mechanism of action of enzymes. Learning kinetics of enzyme catalysed reactions and enzyme inhibitions and regulatory process. Ability to perform immobilization of enzymes. Exposure of wide applications of enzymes and future potential.

References:

- 1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.**
- 2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.**
- 3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .**
- 4. Textbook of Biochemistry – West.E.S.,Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.**
- 5. Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons.**
- 6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell,V.W., McGraw- Hill**
- 7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott**
- 8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.**
- 9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.**

ENZYMOLGY (PRACTICALS) SEMESTER – II

CREDITS: 2

- Understand skill and proficiency in calibration of p^H meter.
- Understand the concepts of mole, molarity, normality etc.
- Understand skills to prepare buffer solutions.
- Learn enzyme inhibition and peroxidation reactions.
- Learn skills in assaying enzymes Amylase, Acid phosphatase, Alkaline phosphatase.
- Understand to immobilise enzymes like Amylase.
- Learn effects of different factors like Temperature and p^H on enzyme activity.

- 1. Calibration of p^H meter.**
- 2. Buffer preparation and determination of p^H**
- 3. Preparation of normal and molar solutions.**
- 4. Identification of Peroxidase activity.**
- 5. Assay of Amylase.**
- 6. Assay of Acid Phosphatase.**
- 7. Assay of Alkaline Phosphatase.**
- 8. Effect of Temperature and p^H on enzyme activity**
- 9. Immobilization of Amylase.**
- 10. Enzyme Inhibition (e.g. Catalase)**

Course Learning Outcomes:

- Develop skill and proficiency in calibration of p^H meter.
- Understanding of the concepts of mole, molarity, normality etc. and to apply them in preparations of solutions of desired strengths.
- Develop skills to prepare buffer solutions.
- Demonstration of inhibition and peroxidation reactions.
- Develop skills in assaying enzymes Amylase, Acid phosphatase, Alkaline phosphatase.
- Develop skills in immobilisation of enzymes like Amylase.
- Demonstrate effect of different factors like Temperature and p^H on enzyme activity.

References:

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and VijayDeshpande.

**B.Sc. BIOCHEMISTRY
SEMESTER-III
CORE-II INTERMEDIARY METABOLISM (THEORY)
SEMESTER-III**

SEMEST TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- **Understanding the importance of high energy compounds, electron transport chain, synthesis of ATP under aerobic and anaerobic conditions.**
- **To acquire knowledge related to the role of TCA cycle in central carbon metabolism, importance of anaplerotic reactions and redox balance.**
- **To understand the consequences of perturbations in the carbon metabolism in relation to various health disorders such as diabetes and cancer.**

- To learn to utilize the knowledge that differences in the properties of metabolic enzymes of the host and pathogens can be exploited for the development of new drugs.
- To gain insights into metabolic engineering for the production of useful biomolecules

Unit-1:

Carbohydrate Metabolism:

Glycolysis pathway, energy yield, Glycogenesis, Glycogenolysis, TCA cycle & its regulation, ATP yield, Anapleurotic reactions of TCA cycle. Pentose-phosphate shunt, Gluconeogenesis. Disorders of carbohydrate metabolism: Glycogen storage diseases.

Unit-II:

Lipid Metabolism:

Lipid Metabolism: Lipolysis, β -oxidation, energy yield, role of Carnitine. Fatty Acid Synthase complex, Lipogenesis (Denovo synthesis of Fatty acid), elongation of Fatty acid (Mitochondrial elongation). biosynthesis of TAG, Phospholipids (Lecithin and Cephalin). Disorders of lipid metabolism: Atherosclerosis

Unit-III:

Amino Acid Metabolism:

General reactions of amino acids metabolism: transamination, deamination, decarboxylation. Urea cycle, regulation and biological significance. Metabolism of Glycine, Phenylalanine, Tyrosine, Serine, Methionine and Threonine. Inborn errors of amino acids: Phenyl alanine & Tyrosine metabolism.

Unit-IV:

Nucleic Acid metabolism:

Biosynthesis and regulation of Purines and Pyrimidines, Denovo and Salvage pathways. Catabolism of Purines and Pyrimidines. Biosynthesis of deoxy ribonucleotides, ribonucleotides and thymidylate synthesis and their significance. Disorders of nucleic acid metabolism (Gout, Lesch Nyhan syndrome)

Learning outcomes:

- Define major pathways of intermediary metabolism of biomolecules and discuss their bioenergetics, physiological adaptation, metabolic reactions along with regulation, localization and cellular compartmentalization.
- Correlate the metabolic activity of tissues and organs with their function
- Inborn errors in metabolism and diseases associated with it.

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.

3. **Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons.**
4. **Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.**
5. **Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.**
6. **Harper’s Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill**
7. **Biochemistry-Lippincott’s Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott**
8. **Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.**
9. **Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt**

SEMESTER – III

CORE-2: TITRIMETRY (PRACTICALS)

Learning Objectives:

- **Acquire skill and proficiency in titration.**
 - **Understand the concept of quantification using titration reactions.**
 - **Acquire skills to prepare reagents (titrant or titrator)**
1. **Estimation of glucose by BQR method.**
 2. **Estimation of amino acid by formal titration.**
 3. **Estimation of Vitamin-C by 2,6-DCPIP method.**
 4. **Determination of iodine number of edible oil.**
 5. **Determination of saponification of fat/oil.**
 6. **Determination of acid value of fats**
 7. **Estimation of calcium.**
 8. **Estimation of chlorides.**
 9. **Determination of Ion-Exchange capacity of a resin.**

Learning Outcomes:

- **Develop skill and proficiency in titrations.**
- **Understanding the concepts of preparing reagents using standards.**
- **Develop skills in estimation of analytes.**
- **Develop skills in quantification of analytes and using a reference standard.**

References:

1. **Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.**
2. **Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern**

SEMESTER-IV

CORE-2 HORMONE BIOCHEMISTRY & IMMUNOLOGY (THEORY)

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with broad and balanced knowledge of the key concepts of the functioning of endocrine system.
- Developing necessary skills for understanding and independent problem solving in biochemistry of hormones by standard methodology
- to provide students with detail understanding of different cells of the immune system and their role in immune protection and application of immunological techniques.
- will provide knowledge about the role of immune system in pathogenesis of infectious diseases and Autoimmune disease

Unit I

Introduction to endocrine glands and their secretions. Organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role & disorders of Hypothalamus, Pituitary, Pineal, Thyroid and Parathyroid hormones.

Signaling molecules: types, nature and function. Signal transduction, second messenger concept (cAMP & Ca⁺²). General mechanism of hormone action. Hormone receptors (Adrenergic, Glucocorticoid & Insulin).

Unit II

Chemistry, physiological role and disorders of the hormones of Pancreas, Adrenal, Gonads and Placenta. Introduction to Gastrointestinal hormones. Neurotransmitters (Acetyl Choline, GABA, Serotonin).

Unit III

Organization of Immune system, cells & organs of Immune system. Classification of Immunoglobulins, structure of IgG. Epitopes/antigenic determinants. Concept of haptens. Adjuvants. Innate and Acquired immunity. Cell mediated and Humoral immunity. Monoclonal antibodies.

Unit IV

Antigen-antibody reactions-agglutination, Ouchterlony (Single & Double immunodiffusion). Blood group antigens. Outlines of hypersensitivity reactions. Fundamentals of graft rejection and MHC Proteins. Immunodiagnosics-RIA, ELISA. Vaccines and their classification. Traditional vaccines-live and attenuated, toxoids. Modern vaccines-recombinant and peptide vaccines.

Learning Outcomes:

- Understanding the key concepts of the functioning of endocrine system.
- Understanding the role of endocrine system in maintenance of homeostasis, growth and reproduction.

- Understanding of the overview of immune system including cells, organs and receptors.
- To learn structure and functions of different classes of immunoglobulins, the genetic basis of antibody diversity and the importance of humoral, cell-mediated and innate immune responses in combating pathogens.
- To understand mechanisms involved in different types of hypersensitivity and the importance of conventional vs. recombinant vaccines.
- To get acquainted with the importance of antigen-antibody interaction in disease diagnosis.
- To understand the principles of tolerance, autoimmunity and the role of immunity in protection against pathogens.

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons.
4. Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

CORE-2: Immunology (PRACTICALS)

SEMESTER – IV

Learning objectives:

- To familiarize with estimation of hormones of diagnostic value.
 - Acquiring skill sets in basics techniques of immunology such as isolation of lymphocytes from blood/spleen and to perform various immunoassays such as Ouchterlony double immunodiffusion (DID), ELISA, DOT ELISA for diagnosis of various diseases.
 - To learn techniques to purify immunoglobulins and to learn the principles of blood typing.
1. Identification of blood groups and Rh typing.
 2. Identification of Salmonella Antibodies. (WIDAL Test)

3. Identification of Rapid Plasma reagin.
4. Identification of Autoantigens (Rheumatoid Factor)
5. Identification of surface Ag of Hepatitis B.
6. Identification of HCG Ag by Immunochromatography.
7. Identification of HCG Ag by ELISA
8. Preparation of Agar wells for Ag-Ab interactions
9. Single radial Immunodiffusion
10. Double Immunodiffusion

Learning Outcomes:

- Conducting assays to estimate hormones.
- Skills to isolate lymphocytes performing immunoassays such as Ouchterlony double immunodiffusion (DID), ELISA, DOT ELISA for diagnosis of various diseases.
- Develops skills in techniques to purify immunoglobulins and to learn the principles of blood typing.

References:

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

B.Sc. BIOCHEMISTRY

SEMESTER- V

CORE-II NUTRITION & CLINICAL BIOCHEMISTRY

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with broad and balanced knowledge of the key concepts of nutrition like, balanced diet, Calorific values of food stuffs and RDA for children, adults, pregnant and lactating women.
- Developing necessary skills for understanding different sources of complete and incomplete proteins, Malnutrition diseases.
- Will provide knowledge on the chemical nature of vitamins, different vitamins into classes to which they belong, illustrate their chemical structure, the physico-chemical properties of vitamins, and relate the chemical structure and biochemical function of the water-soluble vitamins and their metabolites and antagonists to their regulatory role in metabolism, micro and macronutrients in diet
- to provide students with detail understanding of different plasma proteins in health and disease, physiology of organs like liver and kidney.
- will provide knowledge about the role liver and kidney in normal and diseased conditions and different tests to be done to confirm their normal and abnormal functions.
- Will provide knowledge on the tests for the diagnosis of heart diseases-HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

Unit I

Balanced diet. Calorific values of foods and their determination by Bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women. Sources of complete and incomplete proteins. Biological value of proteins. Role of essential fatty acids in human nutrition. Malnutrition, PEM –Kwashiorkor, Marasmus. Obesity and starvation.

Unit II

Vitamins-sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins. Introduction to nutraceutical and functional foods.

Minerals in Nutrition- Macro & Micro elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F.

Unit III

Plasma proteins in health and disease. Disorders of blood coagulation (Hemophilia). Types of anemias, Haemoglobinopathies -sickle cell anemia and Thalassemias.

Structure and functions of the liver. Liver diseases-jaundice, hepatitis, cirrhosis. Liver function tests-conjugated and total bilirubin in serum, albumin: globulin ratio, Hippuric acid and bromsulphthalein tests. Serum enzymes in liver diseases-SGPT, SGOT, GGT and alkaline phosphatase.

Unit IV

Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid-base and electrolyte balance in the body. Renal function tests – creatinine and urea clearance tests, phenol red test.

Biochemical tests for the diagnosis of heart diseases-HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

Learning Outcomes:

- Understanding the key concepts of nutrition like balanced diet, Calorific values of food stuffs, BMR, factors affecting BMR, SDA, RDA for children, adults, pregnant and lactating women.
- Understanding the role of the chemical nature of vitamins, different vitamins into classes to which they belong, illustrate their chemical structure, the physico-chemical properties of vitamins, and relate the chemical structure and biochemical function of the water-soluble vitamins and their metabolites and antagonists to their regulatory role in metabolism, micro and macronutrients in diet
- Understanding of different plasma proteins in health and disease, physiology of organs like liver and kidney

- Detail understanding about different plasma proteins in health and disease, physiology of organs like liver and kidney.
- Understanding the role of liver and kidney in normal and diseased conditions and different tests to be done to confirm their normal and abnormal functions.
- Understanding the tests for the diagnosis of heart diseases-HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

References :

- 1. Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.**
- 2. Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.**
- 3. Harper’s Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill**
- 4. Biochemistry-Lippincott’s Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott**
- 5. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.**
- 6. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.**

PRACTICALS

Core II Clinical Biochemistry

TOTAL HOURS: 20

CREDITS: 2

Learning Objectives:

- Understand skill and proficiency in estimation of serum constituents.
- Understand the importance of estimating serum constituents like creatinine, urea, cholesterol etc. using standard methods and clinical interpretations.
- Understand skills to perform total and differential counts of RBC and WBC.
- Understand importance of urine analysis for presence of abnormal constituents

1. Estimation of Hemoglobin by CMG method.

2. Total count – RBC and WBC. Differential count.

3. Qualitative Analysis of Urine for Albumin, sugars , ketone bodies & blood

4. Estimation of serum creatinine.

5. Estimation of Blood urea.

6. Estimation of serum cholesterol.

7. Determination of serum Alkaline phosphatase activity.

8. Determination of SGOT and SGPT activity.

Learning Outcomes:

- Develop skill and proficiency in estimation of serum constituents.
- Attains knowledge on importance of estimating serum constituents like creatinine, urea, cholesterol etc. using standard methods and clinical interpretations.
- Develop skills to perform total and differential counts of RBC and WBC.
- Attains knowledge on urine analysis for presence of abnormal constituents

References:

2. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

B.Sc. BIOCHEMISTRY
Skill Enhancement Course IV-C/1: TOOLS OF BIOCHEMISTRY (THEORY)
SEMESTER – VI

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with general scheme for purification of different bio-components
- Will provide knowledge on various chromatographic techniques: ion-exchange, gel filtration, Affinity, TLC, Paper chromatography
- Will provide knowledge on HPLC
- Developing necessary skills for understanding different methods utilized for isolation of subcellular fractions
- To provide students with detail understanding of applying centrifugation technique: Ultracentrifugation, density gradient centrifugation

- Will provide knowledge about the principles & applications of tracer techniques in biology, measurement of alpha, beta and gamma radiations.
- Will provide experimental knowledge with study of UV-Visible spectroscopy.
- To provide knowledge about ELISA and RIA

Unit-I:

Principles and applications of Chromatographic techniques: Paper Chromatography, Thin layer Chromatography(TLC), Gel filtration (Molecular sieve)and Ion-Exchange Chromatography, Affinity chromatography, Basic principles involved in HPLC, GC.

Unit-II:

Electrophoresis: Principles and applications of Paper, Polyacrylamide (Native and SDS-PAGE) and Agarose gel Electrophoresis, Immunoelectrophoresis.

Unit-III:

Colorimetry and Spectrophotometry: Electromagnetic radiation, Interaction of light with matter (Fluorescence, phosphorescence, chemiluminescence). Beer-Lambert's law, U.V.& Visible absorption spectra, Molar extinction coefficient. Biochemical applications of Colorimeter and Spectrophotometer.

Unit-IV:

Centrifugation techniques: Basic principles and applications of centrifuge.

Ultracentrifugation: Differential, Density gradient, cell fractionation methods.

Tracertechniques: Radioisotopes, Units of radioactivity, half-life, β and γ emitters and uses of radioisotopes in Biology: ELISA and RIA.

Learning Outcomes:

- Understanding general scheme for purification of different bio-components
- Understanding knowledge on various chromatographic techniques: ion-exchange, gel filtration, Affinity, TLC, Paper chromatography
- Understanding importance of HPLC
- Understanding different methods utilized for isolation of subcellular fractions
- Detail understanding of applying centrifugation technique: Ultracentrifugation, density gradient centrifugation.
- Understanding knowledge about the principles & applications of tracer techniques in biology, measurement of alpha, beta and gamma radiations.
- Understanding the experimental knowledge with study of UV-Visible spectroscopy
- Understanding knowledge about ELISA and RIA

**Skill Enhancement Course-IV- C/2: HUMAN PHYSIOLOGY(THEORY)
SEMESTER – VI**

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with knowledge on general physiological processes including mechanisms of homeostasis
- Developing necessary skills for critical evaluation of plasma constituents and physiological function of plasma proteins in normal and disease states.
- Will provide knowledge on performing basic physiological measurements and analyze physiological data quantitatively for cardiovascular and gastrointestinal physiology during normal and diseased states
- To provide students with detail understanding and deeper knowledge of physiology of muscles, biochemistry during muscle contraction and relaxation
- Will provide deeper knowledge of physiology and biochemistry of vision

Unit 1 Homeostasis and the organization of body fluid compartments

Intracellular, extracellular and interstitial fluid. Homeostasis, control system and their components. Plasma as an extracellular fluid, RBC, molecular mechanism of blood coagulation, role of vitamin K in coagulation, anticoagulant and fibrinolytic systems. Anemias, polycythemia, haemophilia and thrombosis.

Unit 2 Cardiovascular physiology

Pressure, flow and resistance. Anatomy of heart. Physiology of the cardiac muscle, automaticity of the cardiac muscle contraction, excitation contraction coupling, relationship between cardiac cycle, heart sound, control of cardiac function and output. The arterial system, venous system. Portal circulations. Arterial pressure and its regulation. Hypertension, congestive heart disease, atherosclerosis and myocardial infarction.

Unit 3 Respiration & Gastrointestinal physiology

Mechanism of respiration. Principles of gas exchange and transport. Regulation of respiration. Pulmonary oedema and regulation of pleural fluid. Hypoxia, hypercapnia, pulmonary distress, emphysema.

Propulsion and motility of food and digested material. Secretory functions of the gastrointestinal tract, Peptic ulcer, Sprue, celiac disease, IBD, regurgitation, diarrhea and constipation.

Unit 4 Musculoskeletal system & Biochemistry of Vision

Physiology of muscle contraction in striated and non-striated muscle. Biochemistry of muscle contraction. Physiology of Eye, Biochemistry of vision.

Learning Outcomes:

- Communicate understanding of physiological processes including mechanisms of homeostasis
- Critically evaluate plasma constituents and physiological function of plasma proteins in normal and disease states.
- Perform basic physiological measurements and analyze physiological data quantitatively for cardiovascular and gastrointestinal physiology during normal and diseased states
- Understanding deeper knowledge of physiology of muscles, biochemistry during muscle contraction and relaxation.
- Understanding deeper knowledge of physiology and biochemistry of vision

References:

- 1. Vander's Human Physiology (2008) 11th ed., Widmaier, E.P., Raff, H. and Strang, K.T., McGraw Hill International Publications (New York), ISBN: 978-0-07-128366-3.**
- 2. Harper's Biochemistry (2012) 29th ed., Murray, R.K., Granner, D.K., Mayes and P.A., Rodwell, V.W., Lange Medical Books/McGraw Hill. ISBN:978-0-07-176-576-3.**
- 3. Textbook of Medical Physiology (2011) 10th ed., Guyton, A.C. and Hall, J.E., Reed Elsevier India Pvt. Ltd. (New Delhi). ISBN: 978-1-4160-4574-8.**
- 4. Fundamental of Anatomy and Physiology (2009), 8th ed., Martini, F.H. and Nath, J.L., Pearson Publications (San Francisco), ISBN: 10:0-321-53910-9 / ISBN: 13: 978-0321-53910-6.**

SEMESTER – VI

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with knowledge on the structure and organization of genome in the cell
- Developing necessary skills for characterization of DNA using different techniques
- Will provide knowledge on compare and contrast the basic DNA replication and transcription helps in understanding the basics of transcription process and its' regulation
- To provide students with detail understanding and deeper knowledge of protein synthesis and protein transport
- Provide students with knowledge on the regulation of gene expression by various operon models.
- Will providedeeper knowledge on functions of restriction endonucleases
- Provide students with knowledge on importance of plasmids & viruses in genetic engineering
- To provide students with detail understanding and deeper knowledge on techniques of selection & screening of clones
- Helps in understanding methodology to construct DNA libraries and how to screen for clones that contain desired gene fragment
- Will provide knowledge of PCR and its' application
- Helps the students to illustrate applications of rDNA technology

Unit–I: DNA Replication and Transcription

Organization of genome in prokaryotes and eukaryotes. Experimental evidences to prove nucleic acids as genetic material. Nature and structure of the gene. DNA replication- models of replication (Meselson-Stahl's experiment). Okazaki fragments, Inhibitors of DNA replication.

Transcription – RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation-sigma factors and their recognition sites. Elongation-role of core enzyme. Termination-rho dependent and rho independent. RNA polymerase I, II and III of eukaryotes. Post transcriptional modifications.

Unit – II: Protein Synthesis

Introduction to protein synthesis-Genetic code, structure of t-RNA, deciphering of genetic code, Nirenberg's and Khorana's experiments, wobble hypothesis, degeneracy of genetic code.

Protein synthesis-activation of amino acids (aminoacyl t-RNA synthetases). Ribosome structure. Initiation, elongation and termination of protein synthesis. Post-translational modifications- Phosphorylation & Glycosylation. Inhibitors of protein synthesis.

Unit – III: Regulation of Gene Expression

Regulation of prokaryotic gene expression – induction and repression, Lac operon, catabolite repression. Tryptophan operon and attenuation.

Unit-IV: Recombinant DNA technology

Outlines of cloning strategies. DNA sequencing – Maxam Gilbert and Sanger's methods. Tools of r-DNA technology: Restriction Enzymes, ligase, Cloning Vectors- Plasmids.

Outlines of c-DNA and Genomic libraries and their applications.

Polymerase chain reaction- principle and applications. Outlines of Blotting techniques-Southern, Northern and Western.

Applications of gene cloning-production of insulin and human growth hormone, and edible vaccines.

Learning Outcomes:

- Communicate understanding of structure and organization of genome in the cell
- Critically evaluate skills for characterization of DNA using different techniques, compare and contrast the basic DNA replication and transcription in understanding the basics of transcription process and its' regulation
- Understanding deeper knowledge of protein synthesis and transport
- Understanding the regulation of gene expression by various operon models.
- Understanding the function of restriction endonucleases
- Analyze importance of plasmids and viruses as vectors in genetic engineering
- Apply the techniques of selection and screening of clones
- Construct DNA libraries and to screen for clones that contain a desired gene.
- Understanding the process of PCR and its' application
- Illustrate the applications of rDNA technology

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons.
4. Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

PRACTICAL CORE-II

MOLECULAR BIOLOGY

TOTAL HOURS: 20

CREDITS: 2

Learning Objectives:

- Understand skill and proficiency in isolation of DNA from various sources, plasmids from *E. coli*.
- Understand the importance of determination of purity of nucleic acids.
- Understand skills to perform estimation of DNA, RNA.
- Obtain skill and proficiency in isolation of nucleic acids by electrophoresis and its' visualization after separation using Ethidium bromide.
- Obtain skill and proficiency in restriction mapping λ DNA with restriction enzymes

- 1. Isolation of DNA from onion/liver/coconut endosperm.**
- 2. Isolation of plasmids.**
- 3. Determination of purity of nucleic acids by UV-spectrophotometric method.**
- 4. Estimation of DNA by Diphenylamine method.**
- 5. Estimation of RNA by Orcinol method.**
- 6. Electrophoresis of Nucleic acids and visualization by Ethidium bromide.**
- 7. Restriction mapping λ DNA with any two restriction enzymes.**

Learning Outcomes:

- Develop skill and proficiency in in isolation of DNA from various sources, plasmids from *E. coli*.
- Attains knowledge on importance of determination of purity of nucleic acids.
- Develop skills to perform estimation of DNA, RNA.
- Attains knowledge on isolation of nucleic acids by electrophoresis and its' visualization after separation using Ethidium bromide
- Develops skill and proficiency in restriction mapping λ DNA with restriction enzymes

References:

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

SKILL ENHANCEMENT COURSE FOR ALL DEGREE STUDENTS

Food Technology

TOTAL HOURS: 60

CREDITS: 4

Learning objectives of the course are:

- **To impart knowledge in the areas related to food science and technology.**
- **To acquaint students with nutritional aspects of different food groups**
- **To acquaint the students with the technologies and food processing of plant and animal foods; cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.**
- **To stress on the importance of food safety and quality management of international and national food laws and regulations as well as importance of food engineering and packaging in food industry**

Unit I

Nutritive value of foods:

Nutritive value of different types of foods-Cereals, Pulses, Dairy products, poultry, meat, fish and beverages. Calorific Value of Food stuffs.

Unit II

Food preservation:

Classical methods of Preservation, refrigerated storage or low temperature preservation, freezing preservation, preservation by chemical preservatives, preservation by canning, drying & dehydration, preservation by radiation and preservation by semi-moist food.

Unit III

Packaging of Foods:

Purpose of packaging, Aseptic Packaging, Aseptic packaging material, package forms, Packaging materials like Plastics, Aluminum foils. Polymeric packaging material and their Safe use in food contact application.

Unit IV

Food quality assurance, Food Contamination & Food safety:

The principles of quality assurance for food industry, Food safety issues and Food regulatory authorities. Safety evaluation of Food additives, Food contamination & infections due to spoilage of food. Food contamination by different bacterial, viral, fungal and protozoal organisms. Precautions to reduce food contamination.

Food hygiene, Hazards associated with foods, Hazard analysis critical control point (HACCP).

Course Learning Outcomes

- **Appreciate the relationship between food, nutrition and health.**
- **Understand the concept of balanced diets and menu planning.**
- **Describe different methods of cooking and ways to prevent nutrient losses.**
- **Plan and prepare meals and nutritious dishes for various age groups.**
- **Assess nutritional status of adults.**
- **Understand the important genera of microorganisms associated with food and their characteristics, their growth pattern and parameters.**
- **Comprehend the role of the microorganisms in spoilage of foods and methods of their control.**
- **Predict how processing conditions are likely to change the reactivity of food components**
- **To predict how changes in overall composition are likely to change the reactivity of individual food**
- **Understand cold preservation ,Freezer types and functioning**
- **Understand Dehydration, Dryer types and functioning**

- Understand Irradiation Plant and Microwave heating • Understand the Packaging requirements of food categories
- Understand thermal processing and fundamentals of thermal process calculations
- Knowledge about the beneficial role of microorganisms and different types of fermented foods.
- Identify the role of microorganisms in food borne diseases and control measures
- Understand the techniques to detect, quantify, and identify microorganisms in foods
- Able to analyze quality control acts, rules and regulations made by National and International agencies and characteristics of food for quality assurance.
- Able to measure consumer perception and acceptance of food products.

Suggested Readings:

1. Essentials of Food & Nutrition by M.S. Swaminathan (Vol.1 & Vol. 2)
2. Food Chemistry by L. H. Moyer.
3. Food Chemistry by Lehninger.
4. Handbook of Analysis of Fruits & Vegetables by Ranganna.S.
5. Technology and Food Preservation by Desrosier.
6. Food Science by Potter.
7. Preservation of Fruits and Vegetables by IRRI.
8. Guide to Quality Management System for the food industry by Ralph Early.
9. Food and Packing interactions by Joseph H. Hotchkiss.
10. Modern Food Microbiology by Jay J M- CBS Publishers.

DEPARTMENT OF BIOCHEMISTRY
B.Sc. BIOCHEMISTRY
SEMESTER-I
SUBJECT: BIOMOLECULES (THEORY)

SEMEST TOTAL HOURS: 60 **CREDITS: 4**

Course level Learning objectives: Upon completion of this paper, students will be able to develop skills in:

- Learn the elements present in biomolecules and the difference monomers and polymers.
- List the four major complex biomolecules found in living cells, three of which are found on food labels and the basis for grouping of biomolecules into those four groups.
- For each group of biomolecules learn the name of its generic monomer (simple unit) and polymer (complex structure) and their function.
- Carbohydrates: o Identify their chemical elements and the difference between simple sugars and complex carbohydrates. o Compare and contrast the structure and function of the following carbohydrates and where they are found: glucose, glycogen, starch, cellulose, chitin.
- Proteins: Identify their chemical elements and functional groups .
- Recognize the structure of an amino acid and the peptide bond that connects di-, tri, and polypeptides. Recognize the presence of 20 amino acids and that not all are essential amino acids.
- Summarize the function of proteins and recognize the importance of the three dimensional shape of a protein on its function and the role of non-covalent bonds in maintaining the shape of a protein.
- Explain protein denaturation and the effect of heat on protein structure and function.
- Lipids: Identify their chemical elements and learn their property of insolubility in water. o Identify the three groups of lipids.
- Compare and contrast saturated, mono-unsaturated, and poly-unsaturated fatty acids. Explain the importance of poly-unsaturated fatty acids and why omega-3 and omega-6 fatty acids are considered essential. List sources of polyunsaturated fatty acids.
- Nucleic Acids: Identify their chemical elements and components of a nucleotide. Describe the function of DNA Compare and contrast the 2 types of nucleic acids: DNA and RNA.

Unit I: Carbohydrates and Glycobiology

Monosaccharides - structure of aldoses and ketoses, ring structure of sugars, conformations of sugars, mutarotation, anomers, epimers and enantiomers, structure of biologically important sugar derivatives, oxidation of sugars. Formation of disaccharides, reducing and nonreducing disaccharides. Polysaccharides – homo- and heteropolysaccharides, structural and storage polysaccharides. Structure and role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharides). Carbohydrates as informational molecules.

Unit II: Lipids

Lipids – classification and general properties of lipids. Fatty acids, glycerol, ceramide. Storage lipids - triacyl glycerol and waxes. Structural lipids in membranes – glycerophospholipids, galactolipids and sulpholipids, sphingolipids and sterols. Structure, distribution and role of membrane lipids. Lipids as signals and cofactors. Eicosanoids-structure & functions.

Unit III: Amino acids

Structure and classification, physical, chemical and optical properties of amino acids. Naturally occurring peptides. Structural organisation of proteins. Protein denaturation and renaturation. Proteolytic enzymes.

Unit IV: Nucleic acids

Nucleotides - structure and properties. Nucleic acid structure – Watson-Crick model of DNA. Structure of major species of RNA - mRNA, tRNA and rRNA.

Nucleic acid chemistry- UV absorption, effect of acid and alkali on DNA.

Course Learning Outcomes:

- Understand biochemistry at the atomic level, reactions involved with biomolecules.
- Understand the difference between monosaccharides, disaccharides and polysaccharides. storage and structural polysaccharides.
- Learn the molecular structures of 20 amino acids, differentiating essential and non-essential amino acids, biologically important modified amino acids and their functions.
- Recognize the structural levels of organization of proteins, 3D structure of proteins, its functions, denaturation etc.
- Have a clear idea of biomembranes, behavior of amphiphatic lipids in water, formation of micelles, bilayers, vesicles, membrane composition and fluid mosaic model
- Recognize lipid and, lipoproteins. Describe how lipids, cholesterol, prostaglandins etc. are synthesized.
- chemical elements and components of a nucleotide. DNA double helix, denaturation, biological importance of RNA, types of RNA and their functions.
- Compare and contrast saturated, mono-unsaturated, and poly-unsaturated fatty acids. Explain the importance of poly-unsaturated fatty acids and why omega-3 and omega-6 fatty acids are considered essential. List sources of polyunsaturated fatty acids.
- Nucleic Acids: Identify their chemical elements and components of a nucleotide. Describe the function of DNA Compare and contrast the 2 types of nucleic acids: DNA and RNA.

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
4. Textbook of Biochemistry – West.E.S., Todd.W.R., Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell,V.W., McGraw- Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

BIOMOLECULES (PRACTICALS)

SEMESTER – I

CREDITS: 2

Course Learning Objectives: Upon completion of this practical, students will be able to develop skills in:

- Learn Good laboratory practices in a biochemistry laboratory.
- Learn safety and precautionary measures for working in a laboratory.
- To obtain skill and proficiency in Qualitative analysis of biomolecules like Carbohydrates, amino acids and proteins, lipids, nucleic acids.
- Learn to handling glass wares, minor equipment for conducting experiments.
- To obtain skill in separation techniques using paper chromatography and TLC

1. Safety measures in laboratories.

2. Qualitative analysis of Biomolecules:-

- (a) Carbohydrates**
- (b) Lipids**
- (c) Amino acids and proteins**
- (d) Nucleic acids**

3. Determination of pKa of acetic acid and glycine.

4. Separation techniques:

- (a) Separation of amino acids by paper chromatography.**
- (b) Separation of plant pigments by TLC.**

Course Learning Outcomes:

- Understanding Good laboratory practices in a chemistry/biochemistry laboratory.
- Learn safety and precautionary measures for working in a laboratory.
- Develop skill and proficiency in Qualitative analysis of biomolecules like Carbohydrates, amino acids and proteins, lipids, nucleic acids.
- Use of handling of glass wares, minor equipment for conducting experiments.
- Develop skill in separation techniques using paper chromatography and TLC

References:

2. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and VijayDeshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

**B.Sc. BIOCHEMISTRY
SEMESTER-II**

BIOENERGETICS & ENZYMOLOGY (THEORY)

SEMEST TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives: Upon completion of this paper, students will be able to develop skills in:

Bioenergetics:

- Learn the chemistry behind the energy of life.
- Be able to differentiate between potential and kinetic energy.
- Understand that an organism's metabolism transforms matter and energy, following the laws of thermodynamics.
- Define the first and second law of thermodynamics.
- Explain how energy coupling works.
- Understand the concept of Gibbs Free Energy.
- Know that ATP powers cellular work through exergonic and endergonic reactions.

Enzymology:

- define differences between enzymes and normal catalytic substances
- recognize the enzymes chemical structure
- explain cofactor and coenzymes
- express Important coenzymes and the groups they transfer
- recognize biological coenzymes
- explain activity of catalyticcenter
- define factors that effect enzyme activity
- explain heat, pH , concentration and the other factors on the effect of activity
- recognize Km
- define conformation changes of enzyme
- define enzyme specificity
- explain allosteric enzymes
- define activators and inhibitors
- recognize activators and inhibitors

Unit-I: Biological Energy Transformations:

Free energy, Exergonic and endergonic reactions, High energy phosphates, ATP cycle. Interconversion of Adenine nucleotides and phosphate cycle. Redox reactions, Standard Redox potential of some Biochemically important reactions.

Unit-II: Biological Oxidations:

Ultra-structure of mitochondria, Chloroplast, ATP Synthase. Electron transport chain and carriers involved. Oxidative Phosphorylation, Uncouplers, Substrate level phosphorylation, Cyclic and non-cyclic photophosphorylation. Mitchell's Chemiosmotic theory.

Unit-III: Enzymes:

Introduction to biocatalysis, differences between chemical and biological catalyst, Nomenclature and Classification of enzymes. Definition of Holoenzyme, Apo-Enzyme, Cofactor. Enzyme specificity. Active site, Principles of activation energy, transition state. Interaction between enzyme and substrate- Lock and Key Theory, Induced fit models.

Unit-IV: Enzyme Inhibition:

Factors affecting the Enzyme activity like -substrate concentration, P^H , temperature, Michaelis-Menten equation for uni-substrate reaction (derivation not necessary), significance of K_M and V_{Max} . Enzyme inhibition- irreversible and reversible, types of reversible inhibitions- competitive and non-competitive. Allosteric enzymes, Feedback inhibition. Isoenzymes, Ribozyme.

Course Learning Outcomes:

- Understand the fundamental energetics of biochemical processes, chemical logic of metabolic pathways. Knowing in detail about concepts to illustrate how enzymes and redox carriers and the oxidative phosphorylation machinery occur.
- Understand the utilization of proton gradient to drive the formation of high energy bonds and high energy compounds.
- To provide a deeper knowledge in fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes. Discussion on current applications and future potential of enzymes.
- understand of rate of reactions and order of reactions, and inhibitions and their kinetics. To gain knowledge on enzyme catalysis and isoenzymes and on multienzyme complexes.
- Understanding the concepts of standard redox potential and the enzymes in biological oxidations. A brief account of Mitochondria and chloroplast structure, ATPase (oxidative phosphorylation)
- Describe structure, functions and the mechanism of action of enzymes. Learning kinetics of enzyme catalysed reactions and enzyme inhibitions and regulatory process. Ability to perform immobilization of enzymes. Exposure of wide applications of enzymes and future potential.

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
4. Textbook of Biochemistry – West.E.S., Todd.W.R., Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell,V.W., McGraw- Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

ENZYMOLGY (PRACTICALS)

SEMESTER – II

CREDITS: 2

- Understand skill and proficiency in calibration of p^H meter.
- Understand the concepts of mole, molarity, normality etc.
- Understand skills to prepare buffer solutions.
- Learn enzyme inhibition and peroxidation reactions.
- Learn skills in assaying enzymes Amylase, Acid phosphatase, Alkaline phosphatase.
- Understand to immobilise enzymes like Amylase.
- Learn effects of different factors like Temperature and p^H on enzyme activity.

1. Calibration of p^H meter.

2. Buffer preparation and determination of p^H

- 3. Preparation of normal and molar solutions.**
- 4. Identification of Peroxidase activity.**
- 5. Assay of Amylase.**
- 6. Assay of Acid Phosphatase.**
- 7. Assay of Alkaline Phosphatase.**
- 8. Effect of Temperature and p^H on enzyme activity**
- 9. Immobilization of Amylase.**
- 10. Enzyme Inhibition (e.g. Catalase)**

Course Learning Outcomes:

- Develop skill and proficiency in calibration of p^H meter.
- Understanding of the concepts of mole, molarity, normality etc. and to apply them in preparations of solutions of desired strengths.
- Develop skills to prepare buffer solutions.
- Demonstration of inhibition and peroxidation reactions.
- Develop skills in assaying enzymes Amylase, Acid phosphatase, Alkaline phosphatase.
- Develop skills in immobilisation of enzymes like Amylase.
- Demonstrate effect of different factors like Temperature and p^H on enzyme activity.

References:

2. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and VijayDeshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

B.Sc. BIOCHEMISTRY
SEMESTER-III
CORE-II INTERMEDIARY METABOLISM (THEORY)
SEMESTER-III

SEMEST TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Understanding the importance of high energy compounds, electron transport chain, synthesis of ATP under aerobic and anaerobic conditions.
- To acquire knowledge related to the role of TCA cycle in central carbon metabolism, importance of anaplerotic reactions and redox balance.
- To understand the consequences of perturbations in the carbon metabolism in relation to various health disorders such as diabetes and cancer.
- To learn to utilize the knowledge that differences in the properties of metabolic enzymes of the host and pathogens can be exploited for the development of new drugs.
- To gain insights into metabolic engineering for the production of useful biomolecules

Unit-1:

Carbohydrate Metabolism:

Glycolysis pathway, energy yield, Glycogenesis, Glycogenolysis, TCA cycle& its regulation, ATP yield, Anaplerotic reactions of TCA cycle. Pentose-phosphate shunt, Gluconeogenesis. Disorders of carbohydrate metabolism: Glycogen storage diseases.

Unit-II:

Lipid Metabolism:

Lipid Metabolism: Lipolysis, β -oxidation, energy yield, role of Carnitine. Fatty Acid Synthase complex, Lipogenesis (Denovo synthesis of Fatty acid), elongation of Fatty acid (Mitochondrial elongation). biosynthesis of TAG, Phospholipids (Lecithin and Cephalin). Disorders of lipid metabolism: Atherosclerosis

Unit-III:

Amino Acid Metabolism:

General reactions of amino acids metabolism: transamination, deamination, decarboxylation. Urea cycle, regulation and biological significance. Metabolism of Glycine, Phenylalanine, Tyrosine, Serine, Methionine and Threonine. Inborn errors of amino acids: Phenyl alanine & Tyrosine metabolism.

Unit-IV:

Nucleic Acid metabolism:

Biosynthesis and regulation of Purines and Pyrimidines, Denovo and Salvage pathways. Catabolism of Purines and Pyrimidines. Biosynthesis of deoxy ribonucleotides, ribonucleotides and thymidylate synthesis and their significance. Disorders of nucleic acid metabolism (Gout, Lesch Nyhan syndrome)

Learning outcomes:

- **Define major pathways of intermediary metabolism of biomolecules and discuss their bioenergetics, physiological adaptation, metabolic reactions along with regulation, localization and cellular compartmentalization.**
- **Correlate the metabolic activity of tissues and organs with their function**
- **Inborn errors in metabolism and diseases associated with it.**

References:

1. **Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.**
2. **Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.**
3. **Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons.**
4. **Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.**
5. **Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.**
6. **Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill**
7. **Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott**
8. **Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.**
9. **Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt**

SEMESTER – III

CORE-2: TITRIMETRY (PRACTICALS)

Learning Objectives:

- **Acquire skill and proficiency in titration.**
 - **Understand the concept of quantification using titration reactions.**
 - **Acquire skills to prepare reagents (titrant or titrator)**
10. **Estimation of glucose by BQR method.**
 11. **Estimation of amino acid by formal titration.**

12. Estimation of Vitamin-C by 2,6-DCPIP method.
13. Determination of iodine number of edible oil.
14. Determination of saponification of fat/oil.
15. Determination of acid value of fats
16. Estimation of calcium.
17. Estimation of chlorides.
18. Determination of Ion-Exchange capacity of a resin.

Learning Outcomes:

- Develop skill and proficiency in titrations.
- Understanding the concepts of preparing reagents using standards.
- Develop skills in estimation of analytes.
- Develop skills in quantification of analytes and using a reference standard.

References:

3. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

SEMESTER-IV

CORE-2 HORMONE BIOCHEMISTRY & IMMUNOLOGY (THEORY)

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with broad and balanced knowledge of the key concepts of the functioning of endocrine system.
- Developing necessary skills for understanding and independent problem solving in biochemistry of hormones by standard methodology
- to provide students with detail understanding of different cells of the immune system and their role in immune protection and application of immunological techniques.
- will provide knowledge about the role of immune system in pathogenesis of infectious diseases and Autoimmune disease

Unit I

Introduction to endocrine glands and their secretions. Organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role & disorders of Hypothalamus, Pituitary, Pineal, Thyroid and Parathyroid hormones.

Signaling molecules: types, nature and function. Signal transduction, second messenger concept (cAMP & Ca⁺²). General mechanism of hormone action. Hormone receptors (Adrenergic, Glucocorticoid & Insulin).

Unit II

Chemistry, physiological role and disorders of the hormones of Pancreas, Adrenal, Gonads and Placenta. Introduction to Gastrointestinal hormones. Neurotransmitters (Acetyl Choline, GABA, Serotonin).

Unit III

Organization of Immune system, cells & organs of Immune system. Classification of Immunoglobulins, structure of IgG. Epitopes/antigenic determinants. Concept of haptens. Adjuvants. Innate and Acquired immunity. Cell mediated and Humoral immunity. Monoclonal antibodies.

Unit IV

Antigen-antibody reactions-agglutination, Ouchterlony (Single & Double immunodiffusion). Blood group antigens. Outlines of hypersensitivity reactions. Fundamentals of graft rejection and MHC Proteins. Immunodiagnosics-RIA, ELISA. Vaccines and their classification. Traditional vaccines-live and attenuated, toxoids. Modern vaccines-recombinant and peptide vaccines.

Learning Outcomes:

- **Understanding the key concepts of the functioning of endocrine system.**
- **Understanding the role of endocrine system in maintenance of homeostasis, growth and reproduction.**
- **Understanding of the overview of immune system including cells, organs and receptors.**
- **To learn structure and functions of different classes of immunoglobulins, the genetic basis of antibody diversity and the importance of humoral, cell-mediated and innate immune responses in combating pathogens.**
- **To understand mechanisms involved in different types of hypersensitivity and the importance of conventional vs. recombinant vaccines.**
- **To get acquainted with the importance of antigen-antibody interaction in disease diagnosis.**
- **To understand the principles of tolerance, autoimmunity and the role of immunity in protection against pathogens.**

References:

- 1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.**
- 2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.**
- 3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons.**
- 4. Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.**
- 5. Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John**

- Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill
 7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
 8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
 9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

CORE-2: Immunology (PRACTICALS)

SEMESTER – IV

Learning objectives:

- To familiarize with estimation of hormones of diagnostic value.
 - Acquiring skill sets in basics techniques of immunology such as isolation of lymphocytes from blood/spleen and to perform various immunoassays such as Ouchterlony double immunodiffusion (DID), ELISA, DOT ELISA for diagnosis of various diseases.
 - To learn techniques to purify immunoglobulins and to learn the principles of blood typing.
11. Identification of blood groups and Rh typing.
 12. Identification of Salmonella Antibodies. (WIDAL Test)
 13. Identification of Rapid Plasma reagin.
 14. Identification of Autoantigens (Rheumatoid Factor)
 15. Identification of surface Ag of Hepatitis B.
 16. Identification of HCG Ag by Immunochromatography.
 17. Identification of HCG Ag by ELISA
 18. Preparation of Agar wells for Ag-Ab interactions
 19. Single radial Immunodiffusion
 20. Double Immunodiffusion

Learning Outcomes:

- Conducting assays to estimate hormones.
- Skills to isolate lymphocytes performing immunoassays such as Ouchterlony double immunodiffusion (DID), ELISA, DOT ELISA for diagnosis of various diseases.
- Develops skills in techniques to purify immunoglobulins and to learn the principles of blood typing.

References:

2. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

B.Sc. BIOCHEMISTRY

SEMESTER- V

CORE-II NUTRITION & CLINICAL BIOCHEMISTRY

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with broad and balanced knowledge of the key concepts of nutrition like, balanced diet, Calorific values of food stuffs and RDA for children, adults, pregnant and lactating women.
- Developing necessary skills for understanding different sources of complete and incomplete proteins, Malnutrition diseases.
- Will provide knowledge on the chemical nature of vitamins, different vitamins into classes to which they belong, illustrate their chemical structure, the physico-chemical properties of vitamins, and relate the chemical structure and biochemical function of the water-soluble vitamins and their metabolites and antagonists to their regulatory role in metabolism, micro and macronutrients in diet
- to provide students with detail understanding of different plasma proteins in health and disease, physiology of organs like liver and kidney.
- will provide knowledge about the role liver and kidney in normal and diseased conditions and different tests to be done to confirm their normal and abnormal functions.
- Will provide knowledge on the tests for the diagnosis of heart diseases-HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

Unit I

Balanced diet. Calorific values of foods and their determination by Bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating women. Sources of complete and incomplete proteins. Biological value of proteins. Role of essential fatty acids in human nutrition. Malnutrition, PEM –Kwashiorkor, Marasmus. Obesity and starvation.

Unit II

Vitamins-sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins. Introduction to nutraceutical and functional foods.
Minerals in Nutrition- Macro & Micro elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F.

Unit III

Plasma proteins in health and disease. Disorders of blood coagulation (Hemophilia). Types of anemias, Haemoglobinopathies -sickle cell anemia and Thalassemias.

Structure and functions of the liver. Liver diseases-jaundice, hepatitis, cirrhosis. Liver function tests-conjugated and total bilirubin in serum, albumin: globulin ratio, Hippuric acid and bromsulphthalein tests. Serum enzymes in liver diseases-SGPT, SGOT, GGT and alkaline phosphatase.

Unit IV

Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid-base and electrolyte balance in the body. Renal function tests – creatinine and urea clearance tests, phenol red test.

Biochemical tests for the diagnosis of heart diseases-HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

Learning Outcomes:

- Understanding the key concepts of nutrition like balanced diet, Calorific values of food stuffs, BMR, factors affecting BMR, SDA, RDA for children, adults, pregnant and lactating women.
- Understanding the role of the chemical nature of vitamins, different vitamins into classes to which they belong, illustrate their chemical structure, the physico-chemical properties of vitamins, and relate the chemical structure and biochemical function of the water-soluble vitamins and their metabolites and antagonists to their regulatory role in metabolism, micro and macronutrients in diet
- Understanding of different plasma proteins in health and disease, physiology of organs like liver and kidney
- Detail understanding about different plasma proteins in health and disease, physiology of organs like liver and kidney.
- Understanding the role of liver and kidney in normal and diseased conditions and different tests to be done to confirm their normal and abnormal functions.
- Understanding the tests for the diagnosis of heart diseases-HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

References :

1. **Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.**
2. **Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.**
3. **Harper’s Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill**
4. **Biochemistry-Lippincott’s Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott**
5. **Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.**
6. **Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.**

PRACTICALS

Core II Clinical Biochemistry

TOTAL HOURS: 20

CREDITS: 2

Learning Objectives:

- Understand skill and proficiency in estimation of serum constituents.
- Understand the importance of estimating serum constituents like creatinine, urea, cholesterol etc. using standard methods and clinical interpretations.
- Understand skills to perform total and differential counts of RBC and WBC.
- Understand importance of urine analysis for presence of abnormal constituents

1. Estimation of Hemoglobin by CMG method.

2. Total count – RBC and WBC. Differential count.

3. Qualitative Analysis of Urine for Albumin, sugars , ketone bodies & blood

4. Estimation of serum creatinine.

5. Estimation of Blood urea.

6. Estimation of serum cholesterol.

7. Determination of serum Alkaline phosphatase activity.

8. Determination of SGOT and SGPT activity.

Learning Outcomes:

- Develop skill and proficiency in estimation of serum constituents.
- Attains knowledge on importance of estimating serum constituents like creatinine, urea, cholesterol etc. using standard methods and clinical interpretations.
- Develop skills to perform total and differential counts of RBC and WBC.
- Attains knowledge on urine analysis for presence of abnormal constituents

References:

4. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

B.Sc. BIOCHEMISTRY
Skill Enhancement Course IV-C/1: TOOLS OF BIOCHEMISTRY (THEORY)
SEMESTER – VI

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with general scheme for purification of different bio-components
- Will provide knowledge on various chromatographic techniques: ion-exchange, gel filtration, Affinity, TLC, Paper chromatography
- Will provide knowledge on HPLC
- Developing necessary skills for understanding different methods utilized for isolation of subcellular fractions
- To provide students with detail understanding of applying centrifugation technique: Ultracentrifugation, density gradient centrifugation
- Will provide knowledge about the principles & applications of tracer techniques in biology, measurement of alpha, beta and gamma radiations.
- Will provide experimental knowledge with study of UV-Visible spectroscopy.
- To provide knowledge about ELISA and RIA

Unit-I:

Principles and applications of Chromatographic techniques: Paper Chromatography, Thin layer Chromatography(TLC), Gel filtration (Molecular sieve)and Ion-Exchange Chromatography, Affinity chromatography, Basic principles involved in HPLC, GC.

Unit-II:

Electrophoresis: Principles and applications of Paper, Polyacrylamide (Native and SDS-PAGE) and Agarose gel Electrophoresis, Immunoelectrophoresis.

Unit-III:

Colorimetry and Spectrophotometry: Electromagnetic radiation, Interaction of light with matter (Fluorescence, phosphorescence, chemiluminescence). Beer-Lambert's law, U.V.& Visible absorption spectra, Molar extinction coefficient. Biochemical applications of Colorimeter and Spectrophotometer.

Unit-IV:

Centrifugation techniques: Basic principles and applications of centrifuge.

Ultracentrifugation: Differential, Density gradient, cell fractionation methods.

Tracertechniques: Radioisotopes, Units of radioactivity, half-life, β and γ emitters and uses of radioisotopes in Biology: ELISA and RIA.

Learning Outcomes:

- Understanding general scheme for purification of different bio-components
- Understanding knowledge on various chromatographic techniques: ion-exchange, gel filtration, Affinity, TLC, Paper chromatography
- Understanding importance of HPLC
- Understanding different methods utilized for isolation of subcellular fractions
- Detail understanding of applying centrifugation technique: Ultracentrifugation, density gradient centrifugation.
- Understanding knowledge about the principles & applications of tracer techniques in biology, measurement of alpha, beta and gamma radiations.
- Understanding the experimental knowledge with study of UV-Visible spectroscopy
- Understanding knowledge about ELISA and RIA

Skill Enhancement Course-IV- C/2: HUMAN PHYSIOLOGY(THEORY) SEMESTER – VI

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with knowledge on general physiological processes including mechanisms of homeostasis

- Developing necessary skills for critical evaluation of plasma constituents and physiological function of plasma proteins in normal and disease states.
- Will provide knowledge on performing basic physiological measurements and analyze physiological data quantitatively for cardiovascular and gastrointestinal physiology during normal and diseased states
- To provide students with detail understanding and deeper knowledge of physiology of muscles, biochemistry during muscle contraction and relaxation
- Will providedeeper knowledge of physiology and biochemistry of vision

Unit 1 Homeostasis and the organization of body fluid compartments

Intracellular, extracellular and interstitial fluid. Homeostasis, control system and their components. Plasma as an extracellular fluid, RBC, molecular mechanism of blood coagulation, role of vitamin K in coagulation, anticoagulant and fibrinolytic systems. Anemias, polycythemia, haemophilia and thrombosis.

Unit 2 Cardiovascular physiology

Pressure, flow and resistance. Anatomy of heart. Physiology of the cardiac muscle,automacity of the cardiac muscle contraction, excitation contraction coupling, relationship between cardiac cycle, heart sound, control of cardiacfunction and output. The arterial system, venous system. Portal circulations. Arterialpressure and its regulation. Hypertension, congestive heart disease, atherosclerosis andmyocardial infarction.

Unit 3 Respiration & Gastrointestinal physiology

Mechanism of respiration. Principles of gas exchange and transport. Regulationof respiration. Pulmonary oedema and regulation of pleural fluid. Hypoxia, hypercapnia, pulmonary distress, emphysema.

Propulsion and motility of food and digested material. Secretory functions of the gastrointestinal tract, Peptic ulcer, Sprue, celiac disease, IBD, regurgitation, diarrhea and constipation.

Unit 4 Musculoskeletal system & Biochemistry of Vision

Physiology of muscle contraction in striated and non-striated muscle. Biochemistry of muscle contraction. Physiology of Eye, Biochemistry of vision.

Learning Outcomes:

- Communicate understanding of physiological processes including mechanisms of homeostasis
- Critically evaluate plasma constituents and physiological function of plasma proteins in normal and disease states.
- Perform basic physiological measurements and analyze physiological data quantitatively for cardiovascular and gastrointestinal physiology during normal and diseased states
- Understanding deeper knowledge of physiology of muscles, biochemistry during muscle contraction and relaxation.
- Understanding deeper knowledge of physiology and biochemistry of vision

References:

1. Vander's Human Physiology (2008) 11th ed., Widmaier, E.P., Raff, H. and Strang, K.T., McGraw Hill International Publications (New York), ISBN: 978-0-07-128366-3.

2. Harper's Biochemistry (2012) 29th ed., Murray, R.K., Granner, D.K., Mayes and P.A., Rodwell, V.W., Lange Medical Books/McGraw Hill. ISBN:978-0-07-176-576-3.

3. Textbook of Medical Physiology (2011) 10th ed., Guyton, A.C. and Hall, J.E., Reed Elseviers India Pvt. Ltd. (New Delhi). ISBN: 978-1-4160-4574-8.

4. Fundamental of Anatomy and Physiology (2009), 8th ed., Martini, F.H. and Nath, J.L., Pearson Publications (San Francisco), ISBN: 10:0-321-53910-9 / ISBN: 13: 978-0321-53910-6.

**CORE-II: MOLECULAR BIOLOGY & REGULATION
OF GENE EXPRESSION (THEORY)
SEMESTER – VI**

TOTAL HOURS: 60

CREDITS: 4

Course Learning objectives:

- Provide students with knowledge on the structure and organization of genome in the cell
- Developing necessary skills for characterization of DNA using different techniques
- Will provide knowledge on compare and contrast the basic DNA replication and transcription helps in understanding the basics of transcription process and its' regulation
- To provide students with detail understanding and deeper knowledge of protein synthesis and protein transport
- Provide students with knowledge on the regulation of gene expression by various operon models.

- Will provide deeper knowledge on functions of restriction endonucleases
- Provide students with knowledge on importance of plasmids & viruses in genetic engineering
- To provide students with detail understanding and deeper knowledge on techniques of selection & screening of clones
- Helps in understanding methodology to construct DNA libraries and how to screen for clones that contain desired gene fragment
- Will provide knowledge of PCR and its' application
- Helps the students to illustrate applications of rDNA technology

Unit-I: DNA Replication and Transcription

Organization of genome in prokaryotes and eukaryotes. Experimental evidences to prove nucleic acids as genetic material. Nature and structure of the gene. DNA replication- models of replication (Meselson-Stahl's experiment). Okazaki fragments, Inhibitors of DNA replication.

Transcription – RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation-sigma factors and their recognition sites. Elongation-role of core enzyme. Termination-rho dependent and rho independent. RNA polymerase I, II and III of eukaryotes. Post transcriptional modifications.

Unit – II: Protein Synthesis

Introduction to protein synthesis-Genetic code, structure of t-RNA, deciphering of genetic code, Nirenberg's and Khorana's experiments, wobble hypothesis, degeneracy of genetic code.

Protein synthesis-activation of amino acids (aminoacyl t-RNA synthetases). Ribosome structure. Initiation, elongation and termination of protein synthesis. Post-translational modifications- Phosphorylation & Glycosylation. Inhibitors of protein synthesis.

Unit – III: Regulation of Gene Expression

Regulation of prokaryotic gene expression – induction and repression, Lac operon, catabolite repression. Tryptophan operon and attenuation.

Unit-IV: Recombinant DNA technology

Outlines of cloning strategies. DNA sequencing – Maxam Gilbert and Sanger's methods. Tools of r-DNA technology: Restriction Enzymes, ligase, Cloning Vectors- Plasmids.

Outlines of c-DNA and Genomic libraries and their applications.

Polymerase chain reaction- principle and applications. Outlines of Blotting techniques-Southern, Northern and Western.

Applications of gene cloning-production of insulin and human growth hormone, and edible vaccines.

Learning Outcomes:

- Communicate understanding of structure and organization of genome in the cell
- Critically evaluate skills for characterization of DNA using different techniques, compare and contrast the basic DNA replication and transcription in understanding the basics of transcription process and its' regulation
- Understanding deeper knowledge of protein synthesis and transport
- Understanding the regulation of gene expression by various operon models.
- Understanding the function of restriction endonucleases

- Analyze importance of plasmids and viruses as vectors in genetic engineering
- Apply the techniques of selection and screening of clones
- Construct DNA libraries and to screen for clones that contain a desired gene.
- Understanding the process of PCR and its' application
- Illustrate the applications of rDNA technology

References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons.
4. Textbook of Biochemistry – West.E.S., Todd.W. R, Mason.H.S.. and Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E., Stumpf., Bruening, G and Doi.R.H., John Wiley & Sons.
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell, V.W., McGraw- Hill
7. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.

PRACTICAL CORE-II

MOLECULAR BIOLOGY

TOTAL HOURS: 20

CREDITS: 2

Learning Objectives:

- Understand skill and proficiency in isolation of DNA from various sources, plasmids from *E. coli*.
- Understand the importance of determination of purity of nucleic acids.
- Understand skills to perform estimation of DNA, RNA.
- Obtain skill and proficiency in isolation of nucleic acids by electrophoresis and its' visualization after separation using Ethidium bromide.
- Obtain skill and proficiency in restriction mapping λ DNA with restriction enzymes

1.Isolation of DNA from onion/liver/coconut endosperm.

2.Isolation of plasmids.

8. Determination of purity of nucleic acids by UV-spectrophotometric method.

9. Estimation of DNA by Diphenylamine method.

10. Estimation of RNA by Orcinol method.

11. Electrophoresis of Nucleic acids and visualization by Ethidium bromide.

12. Restriction mapping λ DNA with any two restriction enzymes.

Learning Outcomes:

- Develop skill and proficiency in isolation of DNA from various sources, plasmids from *E. coli*.
- Attains knowledge on importance of determination of purity of nucleic acids.
- Develop skills to perform estimation of DNA, RNA.
- Attains knowledge on isolation of nucleic acids by electrophoresis and its' visualization after separation using Ethidium bromide
- Develops skill and proficiency in restriction mapping λ DNA with restriction enzymes

References:

1. Experimental Biochemistry-A student companion-Beedu Sashidhar Rao and Vijay Deshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

SKILL ENHANCEMENT COURSE FOR ALL DEGREE STUDENTS

Food Technology

TOTAL HOURS: 60

CREDITS: 4

Learning objectives of the course are:

- **To impart knowledge in the areas related to food science and technology.**

- To acquaint students with nutritional aspects of different food groups
- To acquaint the students with the technologies and food processing of plant and animal foods; cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.
- To stress on the importance of food safety and quality management of international and national food laws and regulations as well as importance of food engineering and packaging in food industry

Unit I

Nutritive value of foods:

Nutritive value of different types of foods-Cereals, Pulses, Dairy products, poultry, meat, fish and beverages. Calorific Value of Food stuffs.

Unit II

Food preservation:

Classical methods of Preservation, refrigerated storage or low temperature preservation, freezing preservation, preservation by chemical preservatives, preservation by canning, drying & dehydration, preservation by radiation and preservation by semi-moist food.

Unit III

Packaging of Foods:

Purpose of packaging, Aseptic Packaging, Aseptic packaging material, package forms, Packaging materials like Plastics, Aluminum foils. Polymeric packaging material and their Safe use in food contact application.

Unit IV

Food quality assurance, Food Contamination & Food safety:

The principles of quality assurance for food industry, Food safety issues and Food regulatory authorities. Safety evaluation of Food additives, Food contamination & infections due to spoilage of food. Food contamination by different bacterial, viral, fungal and protozoal organisms. Precautions to reduce food contamination.

Food hygiene, Hazards associated with foods, Hazard analysis critical control point (HACCP).

Course Learning Outcomes

- Appreciate the relationship between food, nutrition and health.
- Understand the concept of balanced diets and menu planning.
- Describe different methods of cooking and ways to prevent nutrient losses.
- Plan and prepare meals and nutritious dishes for various age groups.
- Assess nutritional status of adults.
- Understand the important genera of microorganisms associated with food and their characteristics, their growth pattern and parameters.

- Comprehend the role of the microorganisms in spoilage of foods and methods of their control.
- Predict how processing conditions are likely to change the reactivity of food components
- To predict how changes in overall composition are likely to change the reactivity of individual food
- Understand cold preservation ,Freezer types and functioning
- Understand Dehydration, Dryer types and functioning
- Understand Irradiation Plant and Microwave heating • Understand the Packaging requirements of food categories
- Understand thermal processing and fundamentals of thermal process calculations
- Knowledge about the beneficial role of microorganisms and different types of fermented foods.
- Identify the role of microorganisms in food borne diseases and control measures
- Understand the techniques to detect, quantify, and identify microorganisms in foods
- Able to analyze quality control acts, rules and regulations made by National and International agencies and characteristics of food for quality assurance.
- Able to measure consumer perception and acceptance of food products.

Suggested Readings:

11. Essentials of Food & Nutrition by M.S. Swaminathan (Vol.1 & Vol. 2)
12. Food Chemistry by L. H. Moyer.
13. Food Chemistry by Lehninger.
14. Handbook of Analysis of Fruits & Vegetables by Ranganna.S.
15. Technology and Food Preservation by Desrosier.
16. Food Science by Potter.
17. Preservation of Fruits and Vegetables by IRRI.
18. Guide to Quality Management System for the food industry by Ralph Early.
19. Food and Packing interactions by Joseph H. Hotchkiss.
20. Modern Food Microbiology by Jay J M- CBS Publishers.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
CHAITANYA DEEMED TO BE UNIVERSITY, HYDERABAD, TELANGANA,
CBCS PATTERN IN SEMESTER SYSTEM (W.E from 2023-2024)

SEMESTER PATTERN

Year	Sem	Code	CourseTitle	Course Type	HPW	Credits
FIRST	I	BS104	Introduction to Nutrition&Dietetics	DSC-1A	4T+2P=6	4+1=5
	II	BS204	Food Chemistry and Nutrition	DSC -1B	4T+2P=6	4+1=5
SECOND	III	BS305	Nutritional Biochemistry and human physiology	DSC-1C	4T+2P=6	4+1=5
	IV	BS405	Food Microbiology, sanitation and hygiene	DSC-1D	4T+2P=6	4+1=5
THIRD	V	BS504	A-ClinicalDietetics	DSE-1E	4T+2P=6	4+1=5
		BS505	B-Diet Therapy	DSE-2E		
	VI	BS604	A-PublicHealthNutrition	DSE-1F	4T+2P=6	4+1=5
		BS605	B-CommunityNutrition	DSE-2F		
		BS603	ProjectWork/Optional		4	4

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
CHAITANYA DEEMED TO BE UNIVERSITY, HYDERABAD, TELANGANA
Under Graduate Courses (Under CBCS 2023-2024 onwards)
B.Sc. I YEAR- SEMESTER – I

PAPER-I: INTRODUCTION TO NUTRITION & DIETETICS (THEORY)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

UNIT I: INTRODUCTION TO FOOD GROUPS, CEREALS & MILLETS & PURE CARBOHYDRATES

- 1.1 Definition-
Food, nutrition, nutrients; food groups based on functions, origin and nutritive value;
Food guide pyramid, balanced diet
- 1.2 Cereals and Millets-
Composition, nutritive value and nutrient losses during processing; breakfast cereals
- 1.3 Sugars- Types of sugars and stages of sugar cookery
- 1.4 Jaggery- Manufacture and stages of jaggery cookery

UNIT II: PULSES & LEGUMES, NUTS & OIL SEEDS AND FATS & OILS

- 2.1 Pulses & Legumes-
Composition, nutritive value, nutrient losses during processing, importance of germination and malting; anti nutritional factors
- 2.2 Nuts & Oil seeds – Nutritive value, toxins and role in cookery
- 2.3 Fats & Oils – Composition, nutritive value, properties- physical and chemical, functions of oils and fat in foods
- 2.4 Rancidity of Oils- Types and prevention

UNIT III: VEGETABLES, FRUITS & FOOD PRESERVATION

- 3.1 Vegetables- Classification, composition and nutritive value, changes during cooking, loss of nutrients during cooking, storage, factors affecting storage
- 3.2 Fruits- Classification, composition, nutritive value, storage and ripening
- 3.3 Enzymatic browning and its prevention
- 3.4 Food preservation – principles, methods- dehydration, low temperature, high temperature and preservatives.

UNIT IV: ANIMAL FOODS AND FOOD ADULTERATION

- 4.1 Milk- Composition, nutritive value, fermented and non-fermented milk products
- 4.2 Egg- Composition, nutritive value and quality; poultry-
Classification, composition and nutritive value
- 4.3 Meat- Nutritive Value and changes during cooking; fish-
classification, composition and nutritive value
- 4.4 Food Adulteration- intentional and incidental

Books Recommended:

Text Books

- ❖ SrilakshmiB-FoodScience,5thEdition,NewAgeInternationalPublishers,NewDelhi 110002, 2011. –

ReferenceBooks

- ❖ ShakuntalaManayN-FoodFactsandPrinciples,NewAgeInternationalPublishers,NewDelhi– 110002, 2005.
- ❖ NormanPotterN-FoodScience,CBSPublishersandDistributors,NewDelhi.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
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Under Graduate Courses (Under CBCS 2023-2024)
B.Sc. I Year SEMESTER-I

PAPER-I: INTRODUCTION TO NUTRITION & DIETETICS (PRACTICAL)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

I. S
standardization, Preparation and Nutritive value calculation of the recipes based on the following food group and combination

1. Cereal, millet and malting of grains
2. Pulse, germination of grains
3. Cereal-pulse combination
4. Stages of sugar cookery, preparation with jiggery

II. Methods of Preservation of

5. Fruits-Squashes and jams
6. Vegetables by Pickling

III. Detection of Adulterants

8. Water, urea and starch in milk
9. Hydrogenated fat in ghee and butter

Books Recommended:

- ❖ Srilakshmi B-Food Science, 5th Edition, New Age International Publishers, New Delhi – 110002, 2011.
- ❖ Longvah T. Ananthan R. Bhaskarachary K. and Venkaiah K. Indian Food Composition Table, National Institute of Nutrition, Tarnaka, 2017.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
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Under Graduate Courses (Under CBCS 2023-2024 onwards)
B.Sc. I YEAR- SEMESTER – I

PAPER-II: FOOD CHEMISTRY & NUTRITION (THEORY)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
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Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)
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UNIT-I- Food Nutrition

1. Introduction to nutrition– definition of nutrition, Food as a source of nutrients. Functions of foods
2. Interrelationship between nutrition and health, visible symptoms of good health.
3. Food guide- basic five food groups and usage of food guide.
4. Use of food in body- digestion, absorption, transport, utilization of nutrients in the body.

UNIT-II- Components of Foods

Carbohydrates- pectic substances and seed gums, Sweeteners, Effect of Sugar, Acid, Alkali, Fat and Surface-Active Agents on Starch, Types of Candies, Chemistry of Milk, Sugar, Non-Enzymatic Browning, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis.

Lipids– Lipid oxidation -Rancidity, hydrolytic and oxidative Hydrogenation – mechanism and catalysts, Decomposition of Triglycerides, Shortening Power of Fats, Changes in Fats and Oils during Heating, Factors affecting fat absorption in foods

Proteins– modification of food protein through processing and storage Protein structure, Components of Wheat Proteins, Structure, Gluten Formation Effect of Soaking, Fermentation and Germination on Pulse Proteins. Properties of Egg Protein, Chemistry of Milk Protein, Changes in Milk, Egg and Meat Proteins during Heating, Action of Heat, Acid, Alkalis on vegetables.

UNIT-III- Water and its food activity

Moisture in Foods, Hydrogen Bonding, Bound Water, Water and its interaction with food components and food stability, Water Activity in Foods.

Energy– Unit of energy,

food as a source of energy, energy value of food, the body's need for energy, energy requirement for different age groups. B.M.R. activities.

Enzymes. Nomenclature, specificity, uses of enzymes in foods, enzyme added to food during processing

UNIT-IV- Plant pigments and flavors

Different Types of Plant Pigments – Water- and Fat-Soluble Pigments, Properties and Active Principles of Spices and Condiments, Colors and colorants, Food additives, Flavors, Acid -base chemistry of foods and common additives, Toxic substances.

Pigments indigenous to food, structure, chemical and physical properties. Effect of processing and storage.

Flavors– Vegetables, fruit and

spice flavors, fermented food, Meat and seafood.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
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Under Graduate Courses (Under CBCS 2023-2024)
B.Sc. I Year SEMESTER-I

PAPER-II: FOOD CHEMISTRY & NUTRITION (PRACTICAL)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

1. Experiments on properties of monosaccharides-Glucose, Fructose and Galactose
2. Experiments on properties of Disaccharides-maltose, lactose and sucrose.
3. Experiments on properties of Polysaccharides-starch
4. Estimation of glucose in a given sample.
5. Experiments on properties of amino-acids.
6. Experiments on properties of proteins
7. Experiments on properties of fats.
8. Saponification number of lipids.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
CHAITANYA DEEMED TO BE UNIVERSITY, HYDERABAD, TELANGANA
Under Graduate Courses (Under CBCS 2023-2024 onwards)
B.Sc. I YEAR- SEMESTER – II

PAPER-I: NUTRITIONAL BIOCHEMISTRY & HUMAN PHYSIOLOGY (THEORY)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

UNIT-I: MACRONUTRIENTS

1. Carbohydrates-

Composition,classification,sources,functions,deficiencyandexcess,glycolysis,citricacid cycle,glycogenesis,glycogenolysisandgluconeogenesis

2. Lipids - Composition, classification, sources and functions; deficiency and excess of fats;essentialfattyacids, beta-oxidation and synthesis of fattyacids.
3. Proteins- Composition,classification,sources,functions,deficiency andexcess,basicstepsin protein synthesis
4. Aminoacids-Classification-chemicalandnutritional;deamination,transaminationandureacycle

UNITII:MICRONUTRIENTS,WATER,ELECTROLYTESANDENZYMES

1. Vitamins - Classification, sources, functions and deficiency symptoms of fat soluble andwater-soluble vitamins
2. Minerals - Classification, sources, functions and deficiency symptoms of macro andmicrominerals
3. Water -Functions, distribution, intake andelimination, waterbalanceElectrolytes-Concentrations in intracellular and extra cellular fluids andosmotic pressure; acid basebalance
4. Enzymes-Definition,classification(IUBMB),properties,mechanismofenzymeaction

UNITIII:CELL,CIRCULATORYSYSTEM,NERVOUSSYSTEMANDENDOCRINESYSTEM

1. Cell-Structure&functions
2. Circulatory system- Parts & functions of heart, heart rate, cardiac cycle, cardiacoutput;blood pressure,Blood-Composition,coagulation andbloodgroups
3. Nervoussystem-Classificationandfunctions
4. Hormones-Endocrineglandstheirsecretionandfunctions

UNIT-IV:RESPIRATORY,DIGESTIVEANDEXCRETORY SYSTEM

1. Respiratorysystem-Parts andfunctions,mechanism ofrespiration;oxygenandCarbon-dioxide transport
2. Digestivesystem-PartsandfunctionsofGItract,digestiveglands,digestion,absorptionandtransport
3. Excretorysystem-Urinarysystem-partsandfunctions,structureofnephron,formationofurine
4. Skin:functions and itsrolein regulationof bodytemperature

BooksRecommended

- ChatterjeeC.C.,HumanPhysiology,Vol.I&II,MedicalAlliedAgency,Calcutta(1987).
- AVSSRamaRao-ATextBookofBioChemistry,9thedition,UBSPublishersdistributionPvt.Ltd, 2002.
- SwaminathanN-A Handbook of Foodand Nutrition,5theditionvolume1,Bangaloreprintingand publishing Co.Ltd, 1986.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
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B.Sc. I Year SEMESTER-II

PAPER-I: NUTRITIONAL BIOCHEMISTRY & HUMAN PHYSIOLOGY(PRACTICAL)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

1. Qualit

ativetestsofcarbohydrates

2. Qualitative tests of amino acids and proteins
3. Quantitative analysis of calcium by titrimetric
4. Quantitative analysis of vitamin C 2,6-dichloroindophenol dye method
5. Determination of acidity parameters: acid value, peroxide value
6. Identification of blood group

Books Recommended

- Raghuramulu, Madhavannair, Kalyansundram, A manual of laboratory techniques, NIN, Hyderabad (2003).
- Sawhney SK, Randhir Singh, Introductory practical biochemistry, Nasora Publishers, New Delhi (2000).

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
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B.Sc. I YEAR- SEMESTER – II

PAPER-II: FOOD MICROBIOLOGY SANITATION AND HYGIENE (Theory)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

UNIT– I-Introduction to Microbiology

1. Introduction to microbiology and its relevance to everyday life-General morphology of micro-organisms–General characteristics of bacteria, fungi, virus, protozoa, algae.
2. Control of micro-organisms, growth curve – Effect of environmental factors on growth of microorganisms-pH, water activity – oxygen availability, temperature & others.
3. **The relationship of micro-organism to sanitation. Role of microbiology- Environment effects of microbial growth.**

UNIT–II-Effects & benefits of Microorganisms

1. Effectsofmicro-organismsonfooddegradationandfoodborneillness–Bacteria,Virus,Molds,Yeasts andparasites(foodpoisoning).
2. Otherfoodhazards–chemicals,antibiotics,hormones,metalscontamination–poisonousfoods.Otheragentsofcontamination:Human,domesticanimals,vermins,birds.
3. Beneficialeffectofmicro-organisms.

UNIT–III-Spoilage and contamination of foods

1. Microbiology of different foods – Spoilage and contamination- Sources, types, effectsonthefollowing:
 - a) Cereals &Cerealsproducts.
 - a) Vegetables&Fruits.
 - b) Meat&Meatproducts.
 - c) Eggs&Poultry.
 - d) Milk&Milkproducts

UNIT–IV-Personal Hygiene

1. Importance ofpersonalhygieneoffoodhandlers– clothes,illness.Educationoffoodhandler inhandling andservingfood
2. Safetyinfoodprocurement,'storage,handlingandpreparation– controlofspoilagesafetyofleftoverfoods.
3. Cleaningandsanitization.Productsandmethods– useofdetergentsandchemicalsPlanningandimplementationoftrainingprogrammesfor health personnel.
4. Relevanceofmicrobiologicalstandardsfor foodsafety.

Reference Books :

1. Adams, M.R and Mass, M.D. (2008). Food Microbiology. newAge International Pvt.LTd.Publishers.
2. Banwart,G.T.(1987).BasicFoodMicrobiology.CBSPublications:NewDelhi.
3. Block, J.G. (1999). Microbiology Principles and Explorations. 4th Edition.John wileyandsonsInc.

B.Sc. NUTRITION DIETETICS & FOOD SCIENCE
CHAITANYA DEEMED TO BE UNIVERSITY, HYDERABAD, TELANGANA
 Under Graduate Courses (Under CBCS 2023-2024)

B.Sc. I Year SEMESTER-I

PAPER-II:FOOD MICROBIOLOGY SANITATION AND HYGIENE (Practical)

Theory:	4Hrs/week	Credits: 4	Marks: 100 (Internal-30, External 80)
Practical:	3Hrs/week	Credits: 1	Marks: 50 (Internal -15, External 35)

1. Microscope and its parts. Examination under low power/high power and oil immersion objectives.
2. Gram staining, Isolation and Identification.
3. Zheil-Nelsch staining.
4. Examination of yeasts, mold and non-pathogenic bacteria.
5. Study of sterilization equipment.
6. On the job training for 1 month during summer break.

Course structure, Scheme of Instructions and Examinations, Syllabus for Pre-Ph.D. effective from the academic year 2023 - 2024 onwards.

CODE	COURSE TITLE	HPW	CREDITS	Total Marks
	Research and Publication Ethics	2	2	50
	Research Methodology	4	4	100

	Trends and Tools in Biochemistry Research	4	4	100
	Analysis of Published research papers / Scientific Literature	2	2	50

CHAITANYA (DEEMED TO BE UNIVERSITY)

Pre-Ph.D. (Biochemistry)

Paper-I

Research and Publication Ethics

Hours per week: 02

Credits: 02

UNIT-I:

- a) Philosophy and Ethics: Introduction to Philosophy – definition – nature and scope – concept – branches – Ethics: definition – moral philosophy – nature of moral judgements and reactions.
- b) Scientific Conduct: Ethics with respect to science and research – Intellectual honesty and research integrity – scientific misconducts: Falsification – Fabrication and Plagiarism – Redundant publications: Duplicate and overlapping publications – salami slicing – Selective reporting and misrepresentation of data.
- c) Publication Ethics: Definition – introduction and importance – Best practices/standards setting initiatives and guidelines: COPE – WAME etc. - Conflicts of interest – Publication misconduct: Definition – concept – problems that lead to unethical behavior and vice versa – types – Violation of publication ethics – authorship and contributorship – Identification of publication misconduct – complaints and appeals – Predatory publishers and journals.

UNIT – II:

- a) Open Access Publishing: Open access publications and initiatives – SHERPA / RoMEO online resource to check publisher copyright & self-archiving policies – Software tool to identify predatory publications developed by SPPU – Journal finder / journal suggestion tools viz., JANE, Elsevier journal finder, Springer journal suggester, etc.
- b) Publication Misconduct:
 - 1) Group Discussions: Subject specific ethical issues - Falsification – Fabrication and Plagiarism (FFP), authorship – Conflicts of interest- Complaints and appeals : examples and fraud from India and abroad.
 - 2) Software tools: Use of plagiarism software like Turnitin, Urkund and other open source software tools.
- c) Databases and Research Metrics:
 - 1) Databases: Indexing databases – Citation databases: Web of Science, Scopus, etc.
 - 2) Research Metrics: Impact factor of journal as per journal citation report, SNIP, SJR, IPP, and Cite Score – Metrics: h – index, g index, i10 index, altmetrics.

References:

1. Bird, A. (2006). Philosophy of Science. Routledge.
2. MacIntyre, Alasdair (1967) A Short History of Ethics, London.
3. P.Chaddah, (2018) Ethics in Competitive Research: Do not get scooped: do not get plagiarized, ISBN: 978-9387480865.
4. National Academy of Science, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A Guide to responsible Conduct in Research: Third Edition. National Academy Press.
5. Resnik, D.B. (2011). What is ethics in research & why is it important, National Institute of Environmental Health Sciences, 1-10. Retrieved from <https://www.niehs.nih.gov/research/resoureses/bioethics/whatis/index.cfm>.
6. Bcall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>.
7. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN: 978-81-939482-1-7, https://www.insaindia.res.in/pdf/Ethics_Book.pdf.

CHAITANYA (DEEMED TO BE UNIVERSITY)
Pre-Ph.D. (Biochemistry)
Paper-II
Research Methodology

Hours per week: 04

Credits: 04

UNIT-I: Research Problem and Design

1. Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, Criteria of Good Research.
2. Defining the Research Problem: Concept and need, Identification of Research problem, defining and delimiting Research problem.
3. Research Questions and Hypothesis: Variables and their linkages, characteristics of good Hypothesis. Research question and formulation of hypotheses- directional and non-directional hypotheses, Basis for hypotheses.
4. Research design: Meaning, Need, Features of Good Design, Concepts, Types. Basic principles of Experimental Design, various methods of Research. The survey, Philosophical, Historical, Experimental, Causal Comparative, Genetic, and Case Studies.

UNIT-II: Literature Searching and Report Writing:

1. Tools for Data Collection: Collections of Primary Data, Collection

of Data through questionnaire and Schedules, other Observation Interview Methods, Collection of Secondary Data, Selection of appropriate method for data collection, Case Study, Focus Group Discussion.

2. Techniques of developing research tools, viz. Questionnaire and rating scales etc. Reliability and validity of Research tools.
3. Writing Research Report: Format and style, Review of related literature its implications at various stages of research. (Formulation of research problem, hypothesis, interpretation and discussion of results).
4. Major findings, Conclusions and suggestions. Citation of references and bibliography.

UNIT-III: Statistical analysis & Bioinformatics

- 1. Data collection : Sources of Data: Primary Data, Secondary Data; Sampling Merits and Demerits of Experiments, Procedure and Control Observations, Sampling Errors - Type-I, Error - Type-II Error. Statistical analysis and fitting of data.**
- 2. Probability Theories - Conditional Probability, Poisson Distribution, Binomial Distribution and Properties of Normal Distributions, Estimates of Means and Proportions; Chi-Square Test, Association of Attributes, t-Test . Standard deviation - Coefficient of variations. Correlation and Regression Analysis. Introduction to statistical packages, plotting of graphs.**
3. Development of bioinformatics, Operating systems in bioinformatics. Databases: Gene banks, Sequence and structure databases; types of databases, web interfaces; Search tools: Data mining, BLAST and FASTA. Sequence analysis of biological data. Major bioinformatics resources (NCBI, EBI, ExPASy). Phylogenetic analysis:
4. Concept of phylogenetic trees, phylogenetic trees and multiple alignment methods, suitable software-EMBOSS. Approaches methods and function of gene prediction,

UNIT-IV: Analytical Techniques

- 1. Spectroscopy: Principles of spectroscopy: Laws governing light absorption (Beer-Lambert's Law). Instrumentation and biological applications of UV and visible spectrophotometer. Flame photometry, atomic-absorption spectrophotometry, Basic principles of IR and NMR spectroscopy. Radioisotope techniques; types of isotopes. Nature and type of radioactivity, Decay units, detection and measurement of radioactivity (GM and Scintillation). Biological uses of radioisotopes.**
- 2. Separation techniques: Principles, methods and biological applications various chromatography techniques. Basic principles and applications of different electrophoresis methods. Principles and applications of various**

- centrifugation techniques.
3. **Microscopy: principles and working of light and phase-contrast, fluorescent, scanning and transmission electron-microscopy.**
 4. **Flowcytometry and their applications.**

Reference Books:

- a) Best and Kahn, Research Methodology, PHI Limited.
- b) Kothari, C.R. Research Methodology (Methods and Techniques), New Age Publisher.
- c) Kerlinger, Foundation of Research.
- d) Fundamentals of modern statistical methods by R. A. Fisher.
- e) Power Analysis for Experimental research A Practical Guide for the Biological, Medical and social Sciences by R. Barker Bausell, Yi-Fang Li Cambridge University Press.
- f) Design of Experience: Statistical Principles of Research Design and Analysis, by Robert O. Kuehl Brooks/Cole.

CHAITANYA (DEEMED TO BE UNIVERSITY)

Pre-Ph.D. (Biochemistry)

Paper-III

Trends & Tools in Biochemistry Research

Hours per week: 04

Credits: 04

Unit I:

Enzyme Engineering & Recombinant DNA technology: Cell culture techniques. Hybrid proteins. Site-directed mutagenesis approaches to improve industrial enzymes. Isolation and purification of nucleic acids; amplification of DNA using PCR, recombinant PCR, nested PCR, use of restriction and modification in enzymes in cloning, plasmid vectors, λ phage, DNA sequencing, next generation sequencing, Principle and applications of blotting techniques.

Unit-II

Bioinformatics: Development of bioinformatics, Operating systems in bioinformatics. Databases: Gene banks, Sequence, and structure databases; types of databases, web interfaces; Search tools: Data mining, BLAST, and FASTA. Sequence analysis of biological data. Major bioinformatics resources (NCBI, EBI, EXPASY). Phylogenetic

analysis: Concept of phylogenetic trees, phylogenetic trees, and multiple alignment methods, suitable software EMBOSS. Approaches methods and function of gene prediction

Unit III:

Chromatography & Electrophoretic Techniques: Chromatographic methods for macromolecule separation - Gel permeation, Ion exchange, Affinity chromatography; HPLC and FPLC. Theory and application of Polyacrylamide and Agarose gel electrophoresis; Capillary electrophoresis; 2D Electrophoresis; Disc gel electrophoresis; Pulsed-field gel electrophoresis Basic principles of centrifugation techniques.

Unit IV:

Advanced Techniques: MALDI-TOF; Mass spectrometry; Enzyme and cell immobilization techniques; Peptide Synthesis and Sequencing.

Books recommended:

- 1. Voet D., Voet J.G, Biochemistry 4 th Edition., John Wiley and Sons, 2011.**
- 2. Nelson, D. C. And Cox, M.M., Lehninger Principles of Biochemistry, 5th Edition, W. H. Freeman, 2010.**
- 3. Berg J.M., Tymoczko J.L. and Stryer L., Biochemistry. 7th edition, W.H. Freeman and Co. New York, 2011.**
- 4. Molecular biology by Robert F. Weaver McGraw-Hill 4 edition (2007)**
- 5. Advanced molecular biology by R. M. Twyman, (1998)**
- 6. Genes VII by B. Lewin Oxford University Press, Cell Press, London (2000)**
- 7. Arora .P, Mani and Vijayaraj Bioinformatics for the beginners.**
- 8. Rastogi. Bioinformatics Basic skills and applications**

Analysis of Published research papers / scientific literature

Hours per week: 02

Credits: 02

A research scholar should submit an analysis of published research papers / scientific literature in the form of a dissertation.

Departmental Research Committee Dept of Biochemistry

S/No	Name	Designation
1.	Prof S. Suma	Chairman
2.	Prof. M. SunderRam	Dean, Sciences Department of Mathematics
3.	Prof B.S. Anuradha	Member Dean, Academics, Department of Microbiology
4.	Dr. V. Srilekha	Member Head/Chairman BOS Biotechnology
5.	Prof. B. Sreelatha	Member Head/Chairman BOS Microbiology
6.	Prof. G. Shyam Prasad	Member Department of Microbiology

Facilities:

The Department of Biochemistry has spacious labs with good ventilation and has all the requirements and equipment to perform experiments for wide applications in Lifesciences, it can be the isolation of microorganisms to recent progresses like genomics and proteomics.

LIST OF EQUIPMENT

1.	High-speed cooling centrifuge	-----	1
2.	Thermostatic water bath	-----	1
3.	Water bath for enzyme assays	-----	1
4.	Chromatography columns	-----	3
5.	Cyclomixer	-----	1
6.	Homogeniser	-----	1
7.	Electrophoresis Apparatus	-----	1
8.	Glass Distillation Unit	-----	1
9.	Digital Balance	-----	2
10.	Colorimeters	-----	6
11.	Centrifuge Machine	-----	2
12.	Vortex Shaker	-----	2
13.	Micropipettes	-----	8
14.	UV-Visible Spectrophotometer	-----	2
15.	Digital p ^H Meter	-----	1
16.	Refrigerator	-----	1
17.	Heating Mantle	-----	1
18.	Laboratory Mixie	-----	2
19.	UPS	-----	1
20.	Over Head Projector	-----	1
21.	Slide Projector	-----	1
22.	Computer with Multimedia Software	-----	1
23.	Epson Printer	-----	1

LIST OF TEACHING STAFF

	NAME OF THE FACULTY	QUALIFICATION	DESIGNATION	EXPERIENCE
1	PROF. S. SUMA	M.Sc., PH.D	PROFESSOR & HEAD OF THE DEPARTMENT	26 YEARS
2	PROF. G. SHYAM PRASAD	M.Sc., PH.D	PROFESSOR	23 YEARS
3	DR. K.V.N.RAJESHWARI	M.Sc. PH.D	ASSISTANT PROFESSOR	19 YEARS
4	DR. A. JAHNAVI	M.Sc. PH.D	ASSOCIATE PROFESSOR	5 YEARS
5	B.SOUJANYA	M.Sc.	ASSISTANT PROFESSOR	1 YEAR
6	SOHEL RANA SHAIK	M.Sc.	ASSISTANT PROFESSOR	3 MONTHS

Faculty Profiles:

Prof. S. Suma

Professor

Dept. of Biochemistry,

Chaitanya (Deemed to be University)

Himayatnagar-500075, Hyderabad

Telangana State (TS), INDIA.

Phone:+91 [9849243305](tel:9849243305)

E-mail: sumareddy197420@gmail.com

Qualification: Ph.D (2015) – Department of Biochemistry, Kakatiya University, Warangal entitled” Isolation, Purification and biochemical characterization of microbial phytase (*Klebsiella oxytoca*)”.

Teaching Experience:

- Professor: Department of Biochemistry, CDU, Hanamkonda from 2019 to till date
- Assistant Professor: Department of Biochemistry, Chaitanya Degree & P.G. college, Hanamkonda from 1998 to 2019.
- Innovations/Contributions in Teaching:
- Design of Curriculum : For M. Sc Biochemistry as Chairperson and Member of BOS respectively.
- Teaching methods : OHP, Power points (Audio-Visual)
- Laboratory experiments: Practical sessions for Qualitative and Quantitative analysis of Biomolecules, enzymology practicals, molecular biology practical.

Analytical techniques (paper, TLC, Gel filtration, Ion exchange)

Administrative Experience:

- Head, Dept of Biochemistry, CDU, Hanamkonda
- Member, BOS, B.Sc., Agriculture (Hons); CDU, Hanamkonda
- Member of Academic Council, CDU, Hanamkonda
- Director of Admissions, CDU, Hanamkonda
- Member-IQAC, CDU, Hanamkonda
- Paper setter, UG and PG Biochemistry, Kakatiya University
- Paper Valuer Biochemistry, Kakatiya University and Mahatma Gandhi University
- Panel of Examiners- SRBGNR Govt Degree College(autonomous) – Khammam and City College(autonomous), Hyderabad.
- Life member for Advaita Innovative Research Association.
- Life member for PravaralInnovatives, Hyderabad.
- Paper reviewer for Research Journal of Pharmacy and Technology and Associate editor Journal of BioScientia, CDU, Hanamkonda

Research Projects:

- Successfully finished Minor Research Project entitled, “Synthesis and Studies on Anti-Oxidant Activity of Novel-substituted-pyridyl-1H-Tetrazoles, financially assisted by UGC-SERO, Hyderabad (No. F MRP-6087/15 (SERO/UGC)).

Research students:

Ph.D Awarded: 01

1. Ms. K.V.N. Rajeshwari entitled, “ Studies on Polygalacturonase Enzyme from *Aspergillus niger* strain RA401”

Ph.D. pursuing:

1. Mr. B. Srikanth entitled “
2. Ms. Susmitha Kodam entitled “
3. Mr. Mohd. Khalid Pasha entitled”
4. Mr. V. Naveen entitled”
5. Mr. N. Venkatesh entitled “
6. Ms. Fakeha Sadaf entitled “

7. Mr. A. Sridhar entitled "

Research Publications:

1. *World Journal of Microbiology & Biotechnology* 20: 531 – 534, 2004, © Kluwer Academic Publishers, Printed in the Netherlands – "Isolation of phytate-hydrolysing microbial strains from traditional waste water of rice fermentation and liquid cattle feeds". P. Mukesh¹, S. Suma², M.A. Singaracharya³ and V. Lakshmipathi⁴.
2. A novel simple robust enzyme based high throughput screening method for antibacterial peptide discovery. *Journal of Peptide Science* 20(5): 341 – 8. Muthukumaresan T, Roy A, Suma.S.
3. Suma. S, Pasupuleti. M, Vadlakonda L (2014). Comparison of phosphate estimating methods in the presence of P hytic acid for the determination of phytase activity. *Preparative Biochemistry & Biotechnology* 44 (3): 231 – 41,
4. Synthesis and Computational studies of Pyridylmethyl-(1H)- Tetrazoles, Volume-6, Issue -2, February-2017. ISSN No.2277. Suma.S, Prasanna.B
5. Proceedings at National level Conference. "Measures for Quality Enhancement & Sustenance in Higher Education." Page 16-22 S.Suma, B.S.Anuradha
6. Published a Research article titled "Dark Incubation Induced Alterations in the Primary Reactions of Photosynthesis in Maize Primary Leaves" in the journal RJPBCS (Research Journal of Pharmaceutical, Biological and Chemical Sciences.
7. K.V. N. Rajeshwari, S. Suma* (2023) Enzymatic profiling, isolation, and identification of *Aspergillus niger*. *Eur. Chem. Bull.* 2023,12(Special Issue 1), 781-788.
8. K.V. N. Rajeshwari, S. Suma* (2023) Partial purification and Characterization of Exo-Polygalacturonase produced by *Aspergillus niger* strain RA401 using Solid state Fermentation. *Biogecko- A New Zealand Herpetology Journal*. Vol 12 Issue 02 2023, 2256-2269. *Web of Science Journal*.
9. K.V. N. Rajeshwari, S. Suma* (2023) UV Mutagenesis for the Enhanced Production of Polygalacturonase by *Aspergillus niger* strain RA401. *ZKG International*. Volume VIII Issue II OCTOBER 2023. *WOS journal*.
10. Srikanth Burra, K Venkata Naga Rajeshwari, S Suma* (2023) GENOME-WIDE IDENTIFICATION, CHARACTERIZATION, AND PHYLOGENETIC ANALYSIS OF CALCIUM-DEPENDENT PROTEIN KINASE IN *ZEAMAYS*. *Chelonian Research Foundation*. Vol. 18 No. 2 (2023). 1424-1434. *Scopus Indexed journal*.

11. B. R. SaiKishore, Prof. Jagadeesh Kumar. E*, Suma. S* (2023) Studies Of Composite Based NPK Fertilizer Its Application For Sustainable Agriculture. *Journal of Advanced Zoology*. Volume 44 Issue 5 Year 2023 Page 01-06. *Scopus Indexed journal*.

Books:

1. Published a book entitled “ Microbial Phytase- A Green Solution to Environmental Phosphate Problem” publishers are Scholars Press with ISBN Number 978-620-2-31059-8.

Patent: Dr. S. Suma & Dr. Siddoju Kavitha on "Novel Approach for Investigation and Synthesis of Non-Linear Optical Crystal" (Indian Patent No: 202141040430A, Sep 10, 2021)

Dr. G. Shyam Prasad

M.Sc., Ph.D., PDF (OU).

Professor Dept. of Microbiology,

Chaitanya (Deemed to be
University)

Himayatnagar-500075, Hyderabad

Telangana State (TS), INDIA.

Phone: +918686563395 ; +91970503765

E-mail: shyamprasad1919@yahoo.com

TEACHING RESEARCH AND INDUSTRY EXPERIENCE: 23 YEARS

- ✓ Professor: Currently working as Professor, Department of Microbiology, Chaitanya Deemed to be University Moinabad, Hyderabad, Telangana State, India from August 22nd to till date.
- ✓ Associate Professor: worked as Associate Professor, Department of Microbiology, Chaitanya Deemed to be University, Kishanpura, Hanamkonda, Warangal, Telangana State, India from May 10th. 2021 to July 2022 .
- ✓ Assistant Professor: Worked as Assistant Professor of Microbiology, Vaagdevi Degree and PG College, Hanamkonda, Warangal-506009 Telangana State (TS), INDIA (Post Graduate level). From June 2017 – may 2021).
- ✓ Assistant Professor: Sahasra Institute of Pharmaceutical Sciences, Hasanparthy, Warangal 01/09/2009 to 10/02/2010.
- ✓ Assistant Professor: kakatiya Institute of Pharmaceutical Sciences, Hasanparthy, Warangal 01/09/2008 to 31/08/2009.
- ✓ Lecturer: Department of Microbiology, Padmavathi College, Warangal, A.P, India. 2001-2006 (6 years).

POST DOCTORAL RESEARCH (6 years)

UGC-Dr. D. S. Kothari Post doctoral fellowship (2013-2016) 3 years

- Worked as Dr. D. S. Kothari Post doctoral fellow, Department of Biochemistry, *Osmania University*, Hyderabad-500007, Telangana State (TS), INDIA.
- Project Title : *Application of Nanotechnology in drug discovery and drug development studies employing microbial culture – a green synthetic approach.*

CSIR- Research Associate (2010-2013) 3 years

- Worked as CSIR-Research Associate, Department of Microbiology, *Kakatiya University*, Warangal-506009, Telangana State (TS), INDIA.
- Project Title :*Application of Thermophilic fungi in the production of novel drugs*

EDUCATIONAL QUALIFICATIONS

Ph.D (2004-2007) (4years)

- Received Ph.D. in Microbiology, from Dept. of Microbiology, *Kakatiya University*, Warangal-506009, Telangana State (TS), INDIA.
- Thesis title :*Biotransformation of organic compounds for their biological activity.*

M.Sc (1999-2001) (2 years)

- Awarded Masters in Microbiology from Dept. of Microbiology, *Swami Ramanand Teerth Maratwada University*, Nanded, Maharashtra state (MS), INDIA.
- Thesis title: *Extraction and characterization of proteases from *Bacillus licheniformis*.*

B.Sc (1995-1998)

- Earned Bachelor of Science (B.Sc.) from Chaitanya Degree and PG College, *Kakatiya University*, Warangal – 506 009 (TS), INDIA.

TECHNICAL QUALIFICATIONS:

Computer knowledge

- Diploma in Computer Applications (DCA) (1998-1999), from Computer Maintenance Corporation (CMC), New Delhi, INDIA.

Additional qualifications:

- **Experienced in Bioinformatics software's like Autodock, Autodock vina, PYMOL, Discovery Studio etc.**

INDUSTRIAL EXPERIENCE (2 years)

- **Alkem Laboratories LTD. (01.11.2007 to 22.08.2008)**
Worked as officer-Microbiologist in Parenteral Section at Alkem Laboratories LTD, Dabhel, DAMAN-396210.
- **Mangalam Drugs and Organics Ltd. (15.11.2006 to 31.10.2007)**
Worked as officer-Microbiologist in Quality Control Lab at Mangalam Drugs and Organics Ltd. which is a Bulk drug company located at GIDC, Vapi, Gujarat State.

RESEARCH EXPERIENCE

Experienced in

- Purification of secondary metabolite viz. antibiotic, toxins and enzyme from mesophilic and thermophilic microorganisms.
- Drug metabolism and drug interaction studies employing microbial cultures
- Metal nano particle synthesis and nanomedicine formulations.
- Probiotics,
- Mycotoxins and their management.
- Microbial pigments, their isolation, purification and their biological activity studies.
- Anticancer, antimicrobial, anti-diabetic, anti-biofilm and other biological activity studies of drugs and their isolated metabolites.
- Experienced in chromatography techniques viz. TLC, column, HPLC, Gas chromatography and other techniques like ELISA etc.
- Experienced in *In silico studies*.

FOREIGN COLLABORATIONS

- The University of Michigan (USA)
Collaborated with Sonia M.Tiqua-Arashiro (smtiquia@umich.edu) Professor of Microbiology, The University of Michigan (USA) and contributed a book chapter
- Mekelle University, Ethiopia
Selected as Assistant Professor of Microbiology, Health Sciences, Mekelle University, Ethiopia (2013).

BACTERIAL AND FUNGAL CULTURE SEQUENCE DEPOSITED IN NCBI DATA BASE:

1. [Cereibactersphaeroides strain GSPCDUBSR 16S ribosomal RNA gene, partial sequence.](#) accession number- PP565033.1
2. [Sphingobacterium sp. strain GSPCDUPV 16S ribosomal RNA gene, partial sequence.](#)accession number- PP565039.1
3. *Serratia surfactantfaciens* strain GSPCDUCK 16S ribosomal RNA gene, partial sequence. accession number- PP565027.1
4. The large subunit ribosomal RNA gene, partial sequence of thermophilic fungal culture *Rhizomucorpusillus* strain BSRSPOU isolated from zoo waste was deposited in NCBI data base with Gene Bank accession number KY174325.1
5. The 28S ribosomal RNA gene, partial sequence of thermophilic fungal culture *Rhizomucorpusillus* strain GSMBKU-09 isolated from zoo waste was deposited in NCBI data base with Gene Bank accession number JX088738.1
6. The 28S ribosomal RNA gene, partial sequence of thermophilic fungal culture *Thermomyceslanuginosus*strain GSLMBKU-10 isolated from Banana Peel waste was deposited in NCBI data base with Gene bank accession number HE984155.1

FELLOWSHIPS, ACADEMIC ACHEIVEMENTS:

- Selected for India's Prestigious *Dr. D.S. Kothari Post Doctoral Research Fellow ship*, (2013-2016) sponsored by University Grants Commission (UGC), New Delhi, India.
- Selected for India's Prestigious *CSIR-Research Associate*, (2010-2013) sponsored by Council of Scientific and Industrial Research, New Delhi (CSIR), New Delhi, India.
- Awarded *Best oral presentation* at "International conference on Biochemistry, Nutrition and Pharmacy in human welfare: Recent trends and future challenges" (2015) Osmania University, Hyderabad, Telangana State.
- Awarded *Best oral presentation* at *National Seminar on Challenges Opportunities and emerging trends in Microbial Technology*, (2012) Kakatiya University- Warangal, Telangana State.

PUBLICATIONS BOOKS AND BOOK CHAPTERS

- No. of Publications : 31
- Books : 01
- Book chapters : 04
- Patents filed : 01

Total Number of students perceiving PhD

Microbiology-06

Biochemistry – 02

1. B. Swathi

Topic: *Gumkondagogu metal nanocomposite material as an antifungal agent: evaluation of its potential as nanomedicine against clinical isolates of Candida species.*

2. G. Chandrakala

Topic: *Microbial Pigment Prodigiosin as a potential source for textile and biomedical Applications.*

3. Jeshwant Paul

Topic: *Mycotoxins and their management using Probiotics*

4. V. Pradeep

Topic: *A study on polystyrene Biodegradation using Super worms (Larvae of Zophobas atratus)*

5. B. Surender Reddy

Topic: *Microbial synthesis of coenzyme Q10*

6. Satish Kumar:

Topic: *Microbial Pigment Melanin as a potential source for Cosmetic Industry*

7. Amrapali:

Topic: *Incidence and Prevalence of viral diseases in population of Mehabubabad district, haematological and biochemical changes in infected patients.*

8. Jayson:

Topic: *Nosocomial Infections and their prevention*

INTERNATIONAL PUBLICATIONS (13)

1. KVN Rajeshwari, Shravan Kumar Gunda, K. Susmitha, G. Shyam Prasad*, S. Suma (2023) Post harvest management of fruits and vegetable spoilage by *Aspergillus niger* employing some selected natural compounds: An Insilico study. *Journal of Pharmaceutical Negative results*.14:1127-1136. *Scopus Indexed Journal*
2. Vennela Reddy Lankala¹, Durgesh Kumar⁴, KVN Rajeshwari, Venkateshwara Rao Joginipally, G. Shyam Prasad*(2023) Homology modeling and molecular docking of LpxC protein of different Gram negative bacteria using some natural products. *Neuro Quantology*, 21:476-498. *Scopus Indexed Journal*.
3. B. Sreelatha, G. Shyam Prasad*, V. Koteswar Rao, S. Girisham (2018). Microbial Synthesis of mammalian metabolites of spironolactone by thermophilic fungus *Thermomyceslanuginosus*. *Steroids*. ; 136:1-7. Impact Factor: 2.7.
4. G. Shyam Prasad, P. Govardhan, G. Deepika, V. Vakdevi, R. B. Sashidhar (2018) Anti-inflammatory activity of fenofibratae and its phase-1 metabolite fenofibric acid: an *in silico*, *in vitro* and *in vivo* study. *Inflammo pharmacology* 26:973-981. Impact Factor: 5.8.
5. G. Shyam Prasad, K. Srisailam and R. B. Sashidhar (2016) Metabolic inhibition of meloxicam by specific CYP2C9 inhibitors in *Cunninghamellablakesleeana* NCIM 687: *in silico* and *in vitro* studies. *Springer Plus* 65:166. Impact Factor 0.982.
6. G. Shyam Prasad, P. Govardhan, S. Girisham, S. M. Reddy. (2014) Fungal mediated generation of metabolites of fenofibrate and enhanced pharmacological activity of main metabolite fenofibric acid. *Drug metabolism Letters* 8: 88-95. Impact Factor 1.2.
7. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2011) Potential of thermophilic fungus *Rhizomucorpusillus* NRRL 28626 in biotransformation of anti-helminthic drug albendazole. *Applied Biochemistry and Biotechnology*. 165:1120-1128. Impact Factor 3.0.
8. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2009) Studies on microbial transformation of meloxicam by fungi *Journal of Microbiology and Biotechnology*, 19 (9): 922-931. Impact Factor 2.8.
9. G. S. Prasad, S. Girisham, S. M. Reddy and K. Srisailam. (2008) Biotransformation of albendazole by fungi. *World Journal of Microbiology and Biotechnology*, 24(8):1565–1571. Impact Factor 4.1.
10. G. S. Prasad, S. Girisham, S. M. Reddy and K. Srisailam (2008) Biotransformation of albendazole by *Cunninghamellablakesleeana*: Effect of carbon and nitrogen source. *World Journal of Microbiology and Biotechnology*, 24(10):2055–2059. Impact Factor 4.1.

11. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2009) Biotransformation of Albendazole by *Cunninghamellablatesleena*: Influence of Incubation Time, Media, Vitamins and Solvents. *Iranian journal of Biotechnology*, 7(4):205-215. *Impact Factor* 1.671
12. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2009) Oxidation of meloxicam by *Streptomyces griseus*. *Iranian journal of Biotechnolgy*. (2009)7(3): 142-147. *Impact Factor* 1.671.
13. G. Shyam Prasad, K.N.Rao, S.Girisham, and S.M.Reddy (2009) Bioconversion of meloxicam by bacteria *African Journal of Biotechnology*, 8(15):3610-3614. *Impact Factor* 0.702.

NATIONAL PUBLICATIONS 18

1. KVN Rajeshwari, B.Srilatha, Srilekha Reddy, G.Shyam Prasad* (2023) Non Steroidal Anti Inflammatory Drugs (NSAIDS) as potential inhibitors of tankyrase-2 for colon cancer prevention: an *in silico* study.18:216-221, *Research Journal of Biotechnology. Scopus Indexed Journal*.
2. Madhavi Latha, Amarnath Velidandi, G.Shyam Prasad* (2023) Human Centromere Associated Protein (CENP-A, B, S, N, E) binding potentials of Nitrile compounds: an *in silico* study. *Research Journal of Biotechnology* 18:18-27. *Scopus Indexed Journal*.
3. KVN Rajeshwari, G.Shyam Prasad* (2023) Albendazole and its biotransformed metabolites as inhibitors of Glutathione peroxidase (GPx1): A potential target for cancer treatment: An *in silico* study. *Bioscientia*. 1:64-69.
4. Kumaraswamy Aavunuri, G.Shyam Prasad, T.Christopher Reuben(2023) Bixin-a diapocarotenoid as inhibitors of Glutathione peroxidase (GPx1): A potential target for cancer treatment: An *in silico* study. *Biological forum: An International Journal*. 15:660-664. *UGC Care Listed Journal*.
5. G. Shyam Prasad*, G. Shravan Kumar and K.Srisailam (2018) Novel metabolites of losartan as human peroxisome proliferator activated receptor gamma (ppar γ) and human angiotensin receptor (at1r) binders: an *in silico* study. *International Journal of Pharmacy and Biological Sciences*. 8:pp.2230-7605. *UGC Care Listed Journal*
6. G. Shyam Prasad* and Shravan Kumar Gunda (2018) Hepatitis c virus rna-dependent rna polymerase ns5b inhibition potentials of anti-helminthic drug albendazole and its biotransformed metabolites: an *in silico* study. *International Journal of Pharmacy and Biological Sciences*. 8:pp.341-348. *UGC Care Listed Journal*
7. Ajmera ShanthiPriyal* Girisham, Shyam Prasad and Chandra Sekhar Rao (2017). Biotransformation of diclofenac by thermophilic coprophilous fungus *Scytalidiumthermophilum* isolated from sheep dung. *International Journal of Current Advanced Research*. 4594-4597.
8. G. Shyam Prasad*, S. Girisham, S. M. Reddy. (2011). Biotransformation of meloxicam by *Cunninghamellablatesleena*: Effect of carbon and nitrogen source. *Indian journal of microbiology*, 51(1) 82-87. *Impact Factor* 3.0.
9. M. R. Krishna, G. Shyam Prasad (2011) Dengue and other unknown viral outbreaks in Warangal District, Andhra Pradesh, South India. *Current Science* 101(10) *Impact factor* 0.897.

10. G. Shyam Prasad, S. Girisham, and S. M. Reddy. Microbial transformation of albendazole (2010) *Indian Journal of Experimental Biology*, 48:415-420. *Impact Factor 0.934*.
11. G. Shyam Prasad (2010). Anti bacterial and antifungal activity of methanolic extract of *Argemone mexicana* leaves. *International journal of phytopharmacology* 1(2):64-67.
12. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2009) Studies on Microbial Transformation of Albendazole by Soil Fungi. *Indian Journal of Biotechnology*. 8(4):425-429. *Impact Factor 0.385*.
13. G. Shyam Prasad, S. Girisham, S. M. Reddy (2009) Significance of vitamins, substrate concentration and agitation on biotransformation of anti-inflammatory meloxicam by *Cunninghamella blakesleeana*. *Biotechnology: an Indian Journal* 3(4):201-206.
14. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2009) Biotransformation of meloxicam by *Aspergillus fumigatus* and *Fusarium moniliforme* isolated from soil. *National Academy Science Letters* 32:157-161. *Impact Factor 1.1*.
15. Narasimha Rao, K., G. Shyam Prasad, S. Girisham and S. M. Reddy. (2007) Factors influencing Zearalenone production by *Fusarium moniliforme*. *Indian Phytopathology*, 60:123-125.
16. Narasimha Rao, K., G. Shyam Prasad, S. Girisham and S. M. Reddy. (2006) Food Preservatives in the Management of Fusarial Mycotoxins. *Bioinfolet*. 3(2):107- 110. *UGC Care Listed Journal*
17. K. Narasimha Rao, G. Shyam Prasad, S. Girisham and S. M. Reddy. (2006) Influence of culture filtrate of different species of *Fusarium* on maize. *Bioinfolet*. 3(4):255-261. *UGC Care Listed Journal*
18. K. Narasimha Rao, G. Shyam Prasad, S. Girisham and S. M. Reddy (2006) Efficacy of volatile compounds in the management of Fusarial toxins. *Journal of Basic and Applied Mycology*. 5 (I&II): 18-20.

BOOK CHAPTERS-04

1. G. Shyam Prasad (2016) Pharmaceutical application of thermophilic fungi *In: Fungi in Extreme Environments: Ecological role and Biotechnological Significance* Eds. Sonia M. Tiquia-Arashiro-Martin Grube. *Springer Publications*, pp.269-289.
2. G. Shyam Prasad, B. Sashidhar Rao (2015) Fungal Biotransformation of Drugs: Potential Applications in Pharma Industry *In: Microbial Biotechnology: Technological challenges and Developmental Trends* Eds. Bhima Bhukya and Anjana Devi, *Apple Academic Press, Canada* PP. 387-407.
3. G. Shyam Prasad, S. Girisham, and S. M. Reddy (2012) Biotransformations by thermophilic fungi- a green chemistry technology for drug synthesis: a mini review *In: Microbial Diversity Exploration & Bioprospecting* edited by S. Ram Reddy, M. A. Singara Charya, S. Girisham, Published by *Scientific Publishers*, India, ISBN: 978-81-7233-782-7, pp.415-429.
4. G. Shyam Prasad, S. Girisham, and S. M. Reddy. (2009) Microbial Transformations: An emerging field in biotechnology *In: Advances in applied biotechnology* edited by Parihar, Parihar Published by *Agrobios*, Jodhpur, India, pp. 345-380.

BOOKS-01

1. G. Shyam Prasad, K. Srisailam (eds.) Pharmaceutical Microbiology A Laboratory Manual Pharma Med Press, (2019) Hyderabad, India.

PATENT FILED

- *Title:* “Z-1-(P-DIMETHYLAMINOETHOXYPHENYL)-1, 2-DIPHENYL-1-BUTENE METABOLITE” Application No.201641045175 A.

JOURNAL EDITORIAL ADVISORY BOARD MEMBER:

- Editorial advisory board member of “*International Journal of Pharmacy and Biological Science*”
- Reviewer board member of *Annals of Pharmacology*

Dr. K. V. N. Rajeshwari

M.Sc., Ph.D.

Asst. Professor, Dept. of Biochemistry,

Chaitanya (Deemed to be University)

Himayatnagar-500075, Hyderabad

Telangana State (TS), INDIA.

Phone:+919849109370

E-mail:kvnrajeswari@gmail.com

1. Qualifications: M.Sc., Ph.D. (January 2024) Studies on Polygalacturonase Enzyme from *Aspergillus niger* strain RA401

Shodhganga Link <http://hdl.handle.net/10603/546273>

2. Work experience (in chronological order)

S No	Position Held	Name of the institution	From	To
1	Head of the Department (Biochemistry)	Chaitanya Degree College (Autonomous)	2013	2020
2	Member of Academic Council	Chaitanya Degree College (Autonomous)	2013	2020
3	Chairman, BOS	Chaitanya Degree College	2013	2020

	(Biochemistry)	(Autonomous)		
4	Member of BOS (Biochemistry P.G., U.G., UG- Nutrition, Dietetics & Food Science, PG- Food Technology & Quality Control, Nutrition & Clinical Dietetics)	Chaitanya Degree & Postgraduate College (Autonomous), Chaitanya (Deemed to be University), Himayatnagar, Hyderabad.	2013 2020	2020 Till Date
5	Assistant Professor	Department of Biochemistry Chaitanya (Deemed to be University) Warangal, Telangana	2005	Till- date

3. Professional recognition /award/Prize/certificate/fellowship received

S.No.	Name of the Award	Awarding Agency	Year
1	F MRP-6074/15, UGC-SERO	UGC-SERO	2017
2	GenBank Accession Number MN153032	NCBI	2019

4. Teaching Experience:

UG - 19 Years

PG – 19 Years

Subjects of Teaching:

UG- Biomolecules (General Biochemistry), Enzymes, Bioinformatics, Nutrition and Clinical Biochemistry, Food Technology, Food Science & Nutrition, Food Science & Dietetics, Food Safety Standards.

PG- Biomolecules, Biophysical & Biochemical Techniques, Bioinformatics, Genomics, Proteomics,

5. Publications (Recent Publications):

1. KVN Rajeshwari, Shravan Kumar Gunda, K. Susmitha, Shyam Prasad*, S. Suma (2023) Post harvest management of fruits and vegetable spoilage by *Aspergillus niger* employing some selected natural compounds: An Insilico study. *Journal of Pharmaceutical Negative results*.14:1127-1136. *Scopus Indexed Journal*.
2. Vennela Reddy Lankalal, Durgesh Kumar4, KVN Rajeshwari, Venkateshwara Rao Joginipally, G. Shyam Prasad*(2023) Homology modeling and molecular docking of LpxC protein of different Gram negative bacteria using some natural products. *Neuro Quantology*, 21:476-498. *Scopus Indexed Journal*.
3. KVN Rajeshwari, B.Srilatha, Srilekha Reddy, G. Shyam Prasad* (2023) Non Steroidal Anti Inflammatory Drugs (NSAIDS) as potential inhibitors of tankyrase-2 for colon cancer prevention: an *in silico* study.18:216-221, *Research Journal of Biotechnology*. *Scopus Indexed Journal*.
4. K.V. N. Rajeshwari, S. Suma* (2023) Enzymatic profiling, isolation, and identification of *Aspergillus niger*. *Eur. Chem. Bull.* 2023,12(Special Issue 1), 781-788.
5. K.V. N. Rajeshwari, S. Suma* (2023) Partial purification and Characterization of Exo-Polygalacturonase produced by *Aspergillusniger*strain RA401 using Solid state Fermentation. *Biogecko- A New Zealand Herpetology Journal*. Vol 12 Issue 02 2023, 2256-2269. *Web of Science Journal*.
6. K.V. N. Rajeshwari, S. Suma* (2023) UV Mutagenesis for the Enhanced Production of Polygalacturonase by *Aspergillus niger* strain RA401. *ZKG International*. Volume VIII Issue II OCTOBER 2023. *WOS journal*.
7. Srikanth Burra, K Venkata Naga Rajeshwari, S Suma* (2023) GENOME-WIDE IDENTIFICATION, CHARACTERIZATION, AND PHYLOGENETIC ANALYSIS OF

CALCIUM-DEPENDENT PROTEIN KINASE IN *ZEA MAYS*. *Chelonian Research Foundation*. Vol. 18 No. 2 (2023). 1424-1434. *Scopus Indexed journal*.

8. Baliye Rakesh, Puskuri Divya, Rajeshwari KVN, Venkanna Muripiti, Amarnath Velidandi* (2023) Preparation, In Silico Studies, In Vitro Antibacterial and Antioxidant Activity of 4, 6-Disubstituted DihydropyrimidineThiones. *Russian Journal of Bioorganic Chemistry*. Volume 49. Pages 76-80 (2023) *Springer publication*.
9. V. Srilekha*, Gudikandula Krishna, B.Sreelatha, Ega Jagadeesh Kumar, K.V.N. Rajeshwari (2023) Prodigiosin: a fascinating and the most versatile bioactive pigment with diverse applications. *Systems Microbiology and Biomanufacturing*. Vol. 4 Page 66-76 (2024). *Springer Publication*.

6. Details of Patents:

S.No.	Patent Title	Application Number	Agency /Country	Status
1	An Efficient and Rapid Regeneration of Callus from Roots and Root hair of Indian Maize	202341033823 A	Indian Patent	Published

Dr.JAHNAVIALWALA
Associate Professor, Dept. of Biochemistry,
Chaitanya (Deemed to be University)
Himayatnagar-500075, Hyderabad
Telangana State (TS), INDIA.

EmailId:jahnavichandu.enjapuri@gmail.com

Mobilenumber:8712700975.

EDUCATIONALQUALIFICATIONS:

- Ph.D.inBiochemistryfromOsmaniaUniversityinJuly2019.
- MSc.Biochemistrywith72%fromChaitanyaPGCollege,KakatiyaUniversity.
- BSc.(Bi.Mi.C)with75%fromHolyCrossDegreeCollegeWomen,BHEL,
R.C.Puram,Hyderabad.
- Intermediate(B.P.C)with71%fromBoardofintermediateinKakatiyaJuniorCollege,SRNa

gar, Hyderabad.

- SSCwith80%fromSt.Arnold'sHighschool,BHEL, R.C.Puram,Hyderabad.

INTERESTEDAREAS:

- Biochemistry
- Microbiology
- MolecularBiology
- Bioinformatics

INSTRUMENTATIONHANDLED:

- Chromatography(paper,TLC,IonExchange,Column,GC)
- UVSpectrophotometerUltra-Centrifugation(Beckman,Hitachi)
- Colorimeter
- VacuumseparatorsorRotavapors

WORK EXPERIENCE:

- Working as Assistant Professor at Department of Biochemistry in Chaitanya Deemed to be University, Hyderabad from 4th August 2023 to till date.
- Worked as Senior Officer in HBI-PRODUCTION at INDIAN IMMUNOLOGICAL LTD., from April 2018 till November 2021 in the downstream processing in Hepatitis B Vaccine manufacturing.

Freelancing Experience:

- Worked as Scientific Writer, content writer and spotting grammatical errors during my Ph.D. and continuing after my Ph.D. simultaneously as freelancer.
- Editorial board member for the Journal –
Journal of Pharmaceutical and Biological Sciences (Ref ID: JPABS/EB/052)
from 28-12-2016.

Research Scholars: 02

- ✓ Mr. B. Vikram -(Regular research scholar from September 2023).
- ✓ Sadath Fatima -(Regular research scholar from September 2023).

PROJECT WORK:

- Dissertation with “*Synthesis of biologically active prochiral alcohols by using biocatalysts*” from IICT (Indian Institute of Chemical Technology) HYDERABAD of which it is dealing with the research for upgrading the *Drug and Cosmetic industries* and also upgraded my technical knowledge in biochemical techniques.

PARTICIPATION IN NATIONAL WORKSHOPS, SEMINARS AND CONFERENCES:

- Participated in “*National seminars on recent trends in Microbiology*” organised by Department of Microbiology, Chaitanya PG College, Kakatiya University on 5-6th October 2007.
- Attended workshop on “*Molecular techniques*” organized by Department of Microbiology, Chaitanya PG College, Kakatiya University.

- Participated in one day workshop in “Ethical issues of Animal House and Animal experimentation” held on 4-09-2012, at Department of Zoology, University college of Science, Hyderabad.
- Participated and given paper presentation entitled “*Stigmaphyllon littorale* leaves mediated silver nanoparticles biosynthesis and characterization” in the International Conference, Global Meet of Biologists-2012, at Indian Institute of Chemical Technology from 26th-28th December-2012.
- Participated in National conference “Declining Interest in Science Education and Research Among Students: Reasons and Remedies” at ICT on 29th-30th March 2013.
- Attended fieldworks in *Yashoda hospitals Secunderabad, Government mental hospital Erragadda, Unani hospitals Erragadda.*
- *Participated and given paper presentation entitled “Influence of distinctive sources on Hydrogen Production from Photosynthetic bacteria isolated from marine water of Goa” , in Indo-US Conference on Advanced Lignocellulosic Biofuels (Indo-USCALB-2014).*
- *Presented the Oral presentation in “International Conference on Biochemistry, Nutrition & Pharmacy in Human Welfare: Recent Trends and Future Challenges” as titled “BIOFUEL PRODUCTION FROM RHODOPSEUDOMONAS FAECALIS MPPR001 PHOTOSYNTHETIC BACTERIA USING GAS CHROMATOGRAPHY” On September 3rd-5th, 2015 at Department of Biochemistry, Osmania University.*

Research Experience:

SPECIALISATION: Microbial Biochemistry.

THESIS TITLE: “Biofuel Production from Marine Phototrophic bacteria” Supervisor: Dr. M.P. Pratap Rudra, Department of Biochemistry, Osmania University.

LIST OF PUBLICATIONS (UGC Approved Journals):

1. Green Synthesis of plant-mediated silver nanoparticles using *Withania somnifera* leaf extract and evaluation of their anti-microbial activity-

VeerababuNagati, RamaKoyyati,Raj kiranBanala Jahnavi Alwala, Manisha R Donda, Pratap Rudra ManthurPadigya*Department ofBiochemistry,Osmania University,Hyderabad,IJARVolume 1,Issue9,307- 313.

2. Green Synthesis and characterization of silver nanoparticles from *Cajanus cajan* leaf extract and its antibacterial activity Veera babu Nagati, Rama Koyyati, Manisha R Donda, Jahnavi Alwala, Karunakar Rao Kundle, Pratap Rudra ManthurPadigya* Department ofBiochemistry,OsmaniaUniversity,HyderabadInternationalJournalofNanomaterialsandBiostructures UniversalResearch Publications– 2012,Vol2,Issue3,pageno39-43.
3. Biofabrication of silver nanoparticles using *Cuminum cyminum* through microwave irradiation Karunakar Rao Kudle, Manisha R Donda, Jahnavi Alwala, Rama Koyyati, VeerababuNagati, RamchanderMerugu, Y. Prashanthi, M. P. Pratap Rudra*. - 2012,2(4)65-69.
4. Biosynthesis of Silver Nanoparticles using *Catharanthus roseus* Leaf extract and antimicrobial activity, VeerababuNagati, RamaKoyyati, ManishaRDonda, Jahnavi Alwala, Pratap RudraManthurPadigya*, 2013, Sep 11 2013.
5. Synthesis of silver nanoparticles using extracts of *Securinegaluecopyrus* and evaluation of its antimicrobial activity. Manisha D. R1, Jahnavi Alwala1, Karunakar Rao Kudle1, Anila Miryala, B. Sreedhar and M.P. Pratap Rudra*, INTJ CURR SCI, 7: E1-8.
6. Synthesis of silver nanoparticles from *Phyllanthus reticulatus*: An investigation on the effect of broth (leaves & root) concentration in reduction mechanism and particle size., Karunakar Rao Kudle1, Manisha D. R1, Jahnavi Alwala1, Madhukar Rao Kundle, B. Sreedhar, M. P. Pratap Rudra* World Journal of Pharmacy and Pharmaceutical Sciences, Volume 2, Issue 5, 2839-2849.

7. Biosynthesis of Silver Nanoparticles using Flower Extracts of *Catharanthus roseus* and evaluation of its antimicrobial activity, Manisha D. R1, Jahnvi Alwala1, Karunakar Rao Kudle1, M.P. Pratap Rudra*2014, *World Journal of Pharmacy and Pharmaceutical Sciences*, Volume 3, Issue 5, 877-885.
8. Interpretative *in vitro* Phyto chemical analysis, Synthesis of silver nanoparticles and Thin Layer Chromatography screening of Aqueous and Ethanolic extracts of *Morinda citrifolia* L. (Noni) Fruit and their comparative study. Jahnvi Alwala1, Manisha R Donda, M. P. Pratap Rudra*, in *World Journal of Pharmacy* 2014.
9. Photoproduction of hydrogen by Vishakha aptnam photosynthetic bacteria and their effect on cultural conditions Jahnvi Alwala1, M.P. Pratap Rudra *1, Ramchander Merugu, in *International Journal of Research (IJR)* Vol1, Issue 8, September 2014.
10. Impact of various cultural conditions on photoproduction of hydrogen from Kanyakumari Photosynthetic bacteria Jahnvi Alwala 1, M.P. Pratap Rudra *1, Ramchander Merugu, in *International Journal of Multidisciplinary Research and Development* Volume 1, Issue 7, Part I 2014.
11. Biosynthesis of Silver Nanoparticles using *Impatiens balsamina* leaf extracts and its characterization and cytotoxic studies using human cell lines Raju Nalvothula, Jahnvi Alwala, Veerababu Nagati and M.P. Pratap Rudra*, in *International Journal of Chemtech Research* Vol7, No.5 pp 2460-2468.
12. Prevalence of distinctive sources on Hydrogen Production from Goa Photosynthetic Bacteria. Jahnvi Alwala ¹, M.P. Pratap Rudra*¹, Ramchander Merugu². *JECET*; March 2015-May 2015; Sec. A; Vol.4. No.2, 519-525.
13. Cytotoxicity of Biologically Synthesized Silver Nanoparticles from Citrus Lemon against some Cell Lines Raju Nalvothula¹, Ramchander Merugu², Jahnvi Alwala¹, M.P.

PratapRudra1* InternationalJournalof Pharm Tech Research(Vol.8, No.4, pp 691-695, 2015).

- Isolated phototrophic bacterial pure strains from marine water samples were deposited inNCBIas*Rhodopsuedomonasfaecalis*SMRJVI(Vishakapatnammarinewater),*Rhodopsuedomonasfaecalis*MPPR001(Kanyakumarimarinewater)and*Rhodopsuedomonas palustris*MPPR 001(Goa marinewater).

B. SOWJANYA,

M.Sc.

Assistant Professor

Department of Biochemistry

Chaitanya (Deemed to be University)

Himayatnagar, Hyderabad.

Mobile: 8008982235

Email: soujanyabilakanti@gmail.com

Education

	Institute	Year of Passing	Percentage%
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MScBiochemistry	MahatmaGandhiUniversit y	2020-2022	83%
BSc Microbiology GeneticsChemistry	AuroraDegreeCollege	2017-2020	90%
Intermediate(Bipc)	SriChaitanyaJuniorColleg e	2015-2017	78.6%
SSC	St.Ann'sGirlsHighSchool	2014-2015	85%

Industrial Experience

- Worked as Quality control trainee in Sri Krishna Pharmaceuticals Limited, Uppal

Skills

- BasicMicrobiologicaltechniqueslikestainingtechniques,sterilizationtechniques,platingtechniques, and biochemical tests.

Projects

- Assessmentofphysicochemicalquality ofgroundwaterinsomevillagesofNalgonda DistrictTelangana India, Mahatma Gandhi University, Nalgonda
- Removaloffluorideusingbiologicalmethod(bindingofseedpowdertofluoridecontent).

Training

- Completedatrainingprogramin"MedicalCoding"atBrptech,Hyderabad.

Achievements:

- Participated in an "International Conference On Advances In Genetic Diagnosis In The Era OMICS"- June 2022.
- Participated and presented a paper entitled "Critical Study on Human-Animal Conflict" at the "National E-conference on Advances in Science, Technology, Commerce, and Management organized by Aurora Degree College, Hyderabad-July, 2020.
- Participated in a workshop on "Eminence of Biosciences in Carving Research Oriented Future" Organized by Department of Microbiology Aurora Degree College, Hyderabad -March 2019.

SOHEL RANA SHEAKH

Address: Tungi, Nowda, Murshidabad, WB

Mobile: 9382616073

Email id: krara2133@gmail.com

My objective of life is to illuminate myself through the learning process of every day as a professional and I also wish to contribute my level best for the betterment of today's generation.

Professional Experience

1. Currently Working as Assistant Professor in the Department of Food Technology & Nutrition at Chaitanya Deemed to be University, Hyderabad.

❖ Course Teaching:

- i. M.Sc. Food Technology & Quality Control
- ii. M.Sc. Clinical Nutrition & Dietetics
- iii. B.Sc. Nutrition, Dietetics & Food Science

2. Engaged as lecturer at Brahmananda Keshab Chandra College under West Bengal State University.

3. Worked as Assistant teacher – Biology at Al-Ameen Mission Academy, Beldanga, Murshidabad, WB.

Academic qualifications:

University/Board	Degree	Remarks	Year of Passing
Central University of Punjab	M.sc Food Science & Technology (2 nd Rank)	7.80 CGPA	2023
West Bengal College Service Commission	SET (Home Science)	Qualified	2023
University Grand Commission	UGC-NET (Home Science)	Qualified for Assistant Professor	2023
University of Calcutta	B.sc Industrial Fish & Fisheries	7.614 CGPA	2021
W.B.C.H.S.E.	Higher Secondary	84.6%	2018
W.B.B.S.E.	Madhyamik	75.28%	2016

Specialization:

- Dairy Technology, Nutrition, Food Processing & Preservation, Fish Processing, Microbes associated with Food, Fruits & Vegetables

Others education:

- P.G Diploma in Computer Application from Jasoda Institute of Technology and Management Science (Jitms) (Govt. of Odisha) with grade A+ (83%) of Session- 2021 to 2022.

Membership:

- Active life time member of the Food Science, Technology and Nutrition (FSTN) Exploration Foundation.

Training Attended:

- Online Training in "Fisheries Post-Harvest Technology" from National Institute of Fisheries Post Harvest Technology and Training (04.03.21 to 06.03.21).
- Five days training programme on "Freshwater Fish and Prawns Farming" organized by Ramkrishna Ashram

Krishi Vigyan Kendra, Nimpith, South 24 – Parganas, West Bengal.

- Online training Programme on “Micro Encapsulation of Nutraceuticals” organized by ICAR-CIPHET, Ludhiana, Punjab.
- Online training on “Impact of Food Industries on Carbon Foot Printing” organized by the Departments of Food Processing & Quality Control and Sustainable Energy Management, Stella Maris College, Chennai, Tamil Nadu.
- Online training on “Studies on Nutrition, Human Health and Immunity” organized by Nutrigram.
- Online training on “Evolution of Food: From Fortification to Medical Foods through Encapsulations” organized by department of Food Science and Technology, MAKAUT, WB.
- Online training on “Importance of Food Safety Audit” organized by Food Industry Capacity and Skill Initiative (FICSI).
- Online training on “Mango Production is not Enough! Wakeup call on Post-harvest Handling, Processing Technology and Value Chain Management” organized by Department of Agriculture and Environmental Sciences, NIFTEM.
- Online training on “Recent Trends in Sensory Evaluation–Integration of Science and Technology” Organized by Nutrition Society of India, Mumbai Chapter.
- Online international training on “Innovative in Fermented Dairy Products” organized by National Agricultural Higher Education Project (NAHEP)- Innovation Grant Faculty of Dairy Technology, West Bengal University of Animal and Fishery Sciences.
- Online Workshop on “Tools and Techniques of Marine Fisheries and Observational Oceanography” organized by the Department of Marine Sciences, Berhampur University from 13th July 2023 to 15th July 2023.

Internship

- One month training programme on “Production as Well As Quality Assurance of Milk and Milk Products (Dahi, lassi, Ice-creams, Pasteurized, homogenized, toned, double toned, flavored milk, tetra pack milk, UHT milk and Paneer)” Manufactured at KeventerAgro Limited, Nilganj Bazar, Barasat, WB.

Dissertation:

- “Study on preparation and analysis of different properties of edible film from yam” from Department of Applied Agriculture, Central University of Punjab.

Publication:

- "Culture of *Macrobrachium rosenbergii* using modern techniques” in a magazine namely MEENKATHA publish by State Fisheries Staff Association, West Bengal

Achievements:

- Qualified Central University Common Entrance Test 2021 (CUCET) with All India Rank 04.
- Qualified Pondicherry University Entrance Test 2021 (PUET) with All India Rank 07.
- Appreciation certificate received from the Departmental Head of the Department of Applied Agriculture of Central University of Punjab for participation in PROCESSING OF PROCESSED PRODUCTS that were served to the NAAC peer team members during their visit in Central University of Punjab.

Research Interest:

- Study on preparation and analysis of various by-products from edible aquatic resources.

I do here by declare that the above statements are true and correct to the best of my knowledge and belief. in event of any information found false/ incorrect my candidature may be cancelled without any notice.

The BOS Members for the Department of Biochemistry

S. No.	Name of the Member	Member as
1	Prof. S. Suma, Head, Dept. Of Biochemistry, Chaitanya Deemed to be University, Hanamkonda.	Chairperson, BOS
2	Prof. Mukesh Pasupuleti, Principal Scientist, Division of Microbiology, Infectious diseases, CSIR-CDRI, Lucknow.	Subject Expert
3	Dr. Y. Suresh,	Subject Expert

	Associate Professor, Dept. of Animal Biology, Central University, Hyderabad.	
4	Prof. B.S. Anuradha, Dean, Academics, Dept. of Microbiology, Chaitanya (Deemed to be University), Hanamkonda.	Member
5	Prof. G. Shyam Prasad Dept. Of Biochemistry, Chaitanya (Deemed to be University), Hanamkonda.	Member
6	Dr. K.V.N. Rajeshwari, Asst. Prof., Department of Biochemistry, Chaitanya (Deemed to be University), Hanamkonda.	Member
7	Sri. B. Srikanth, Asst. Prof., Dept. Of Biochemistry, Chaitanya (Deemed to be University), Hanamkonda.	Member



Industrial visit to Veeramani biscuits, Hyderabad

**Research Scholar
Qualifies for Ph.D. in
Biochemistry at
Chaitanya University**



DECCAN NEWS SERVICE

■ HYDERABAD

K. Venkata Naga Rajeshwari, a Research Scholar at Chaitanya (Deemed to be University), Hyderabad, successfully presented her thesis titled "Studies on Polygalacturonase Enzyme from *Aspergillus niger* strain RA401" for the Ph.D. Degree in Biochemistry Under the supervision of Prof. S. Suma. She has been declared qualified for the Degree of Doctor of Philosophy (Ph.D.) at Chaitanya University.

Publications of Prof. S. Suma:

12. *World Journal of Microbiology & Biotechnology* 20: 531 – 534, 2004, © Kluwer Academic Publishers, Printed in the Netherlands – “Isolation of phytate-hydrolyzing microbial strains from traditional wastewater of rice fermentation and liquid cattle feeds”. P. Mukesh¹, S. Suma², M.A. Singaracharya³ and V. Lakshmipathi⁴.
13. A novel simple robust enzyme-based high throughput screening method for antibacterial peptide discovery. *Journal of Peptide Science* 20(5): 341 – 8. Muthukumaresan T, Roy A, Suma.S.
14. Suma. S, Pasupuleti. M, Vadlakonda L (2014). Comparison of phosphate estimating methods in the presence of P hytic acid for the determination of phytase activity. *Preparative Biochemistry & Biotechnology* 44 (3): 231 – 41,
15. Synthesis and Computational studies of Pyridylmethyl-(1H)- Tetrazoles, Volume-6, Issue - 2, February-2017. ISSN No.2277. Suma.S, Prasanna.B
16. Proceedings at National level Conference. “Measures for Quality Enhancement & Sustenance in Higher Education.” Page 16-22 S.Suma, B.S.Anuradha
17. Published a Research article titled “Dark Incubation Induced Alterations in the Primary Reactions of Photosynthesis in Maize Primary Leaves” in the journal RJPBCS (Research Journal of Pharmaceutical, Biological and Chemical Sciences).
18. K.V. N. Rajeshwari, S. Suma* (2023) Enzymatic profiling, isolation, and identification of *Aspergillus niger*. *Eur. Chem. Bull.* 2023,12(Special Issue 1), 781-788.
19. K.V. N. Rajeshwari, S. Suma* (2023) Partial purification and Characterization of Exo-Polygalacturonase produced by *Aspergillus niger* strain RA401 using Solid state Fermentation. *Biogecko- A New Zealand Herpetology Journal*. Vol 12 Issue 02 2023, 2256-2269. *Web of Science Journal*.
20. K.V. N. Rajeshwari, S. Suma* (2023) UV Mutagenesis for the Enhanced Production of Polygalacturonase by *Aspergillus niger* strain RA401. *ZKG International*. Volume VIII Issue II OCTOBER 2023. *WOS journal*.

21. Srikanth Burra, K Venkata Naga Rajeshwari, S Suma* (2023) GENOME-WIDE IDENTIFICATION, CHARACTERIZATION, AND PHYLOGENETIC ANALYSIS OF CALCIUM-DEPENDENT PROTEIN KINASE IN *ZEA MAYS*. *Chelonian Research Foundation*. Vol. 18 No. 2 (2023). 1424-1434. *Scopus Indexed journal*.
22. B. R. SaiKishore, Prof. Jagadeesh Kumar. E*, Suma. S* (2023) Studies Of Composite Based NPK Fertilizer Its Application For Sustainable Agriculture. *Journal of Advanced Zoology*. Volume 44 Issue 5 Year 2023 Page 01-06. *Scopus Indexed journal*.

Books:

2. Published a book entitled “ Microbial Phytase- A Green Solution to Environmental Phosphate Problem” publishers are Scholars Press with ISBN Number 978-620-2-31059-8.

Patent: Dr. S. Suma & Dr. Siddoju Kavitha on "Novel Approach for Investigation and Synthesis of Non-Linear Optical Crystal" (Indian Patent No: 202141040430A, Sep 10, 2021)

Publications of Prof. G. Shyam Prasad:

14. KVN Rajeshwari, Shravan Kumar Gunda, K. Susmitha, G. Shyam Prasad*, S. Suma (2023) Post harvest management of fruits and vegetable spoilage by *Aspergillus niger* employing some selected natural compounds: An Insilico study. *Journal of Pharmaceutical Negative results*. 14:1127-1136. *Scopus Indexed Journal*
15. Vennela Reddy Lankalal, Durgesh Kumar⁴, KVN Rajeshwari, Venkateshwara Rao Joginipally, G. Shyam Prasad* (2023) Homology modeling and molecular docking of LpxC protein of different Gram negative bacteria using some natural products. *Neuro Quantology*, 21:476-498. *Scopus Indexed Journal*.
16. B. Sreelatha, G. Shyam Prasad*, V. Koteswar Rao, S. Girisham (2018). Microbial Synthesis of mammalian metabolites of spironolactone by thermophilic fungus *Thermomyces lanuginosus*. *Steroids*. ; 136:1-7. Impact Factor: 2.7.
17. G. Shyam Prasad, P. Govardhan, G. Deepika, V. Vakdevi, R. B. Sashidhar (2018) Anti-inflammatory activity of fenofibratae and its phase-1 metabolite fenofibric acid: an *in silico*, *in vitro* and *in vivo* study. *Inflammo pharmacology* 26:973-981. Impact Factor: 5.8.

18. G. Shyam Prasad, K. Srisailam and R. B. Sashidhar (2016) Metabolic inhibition of meloxicam by specific CYP2C9 inhibitors in *Cunninghamella blakesleeana* NCIM 687: in silico and in vitro studies. *Springer Plus* 65:166. Impact Factor 0.982.
19. G. Shyam Prasad, P. Govardhan, S. Girisham, S. M. Reddy. (2014) Fungal mediated generation of metabolites of fenofibrate and enhanced pharmacological activity of main metabolite fenofibric acid. *Drug metabolism Letters* 8: 88-95. Impact Factor 1.2.
20. G. Shyam Prasad, S. Girisham, S. M. Reddy. (2011) Potential of thermophilic fungus *Rhizomucor pusillus* NRRL 28626 in biotransformation of anti-helminthic drug albendazole. *Applied Biochemistry and Biotechnology*. 165:1120-1128. Impact Factor 3.0.
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NATIONAL PUBLICATIONS 18

19. KVN Rajeshwari, B.Srilatha, Srilekha Reddy, G.Shyam Prasad* (2023) Non Steroidal Anti Inflammatory Drugs (NSAIDS) as potential inhibitors of tankyrase-2 for colon cancer

- prevention: an *in silico* study.18:216-221, *Research Journal of Biotechnology. Scopus Indexed Journal*.
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 21. KVN Rajeshwari, G.Shyam Prasad* (2023) Albendazole and its biotransformed metabolites as inhibitors of Glutathione peroxidase (GPx1): A potential target for cancer treatment: An *in silico* study. *Bioscientia*. 1:64-69.
 22. Kumaraswamy Aavunuri, G.Shyam Prasad, T.Christopher Reuben(2023) Bixin-a diapocarotenoid as inhibitors of Glutathione peroxidase (GPx1): A potential target for cancer treatment: An *in silico* study. *Biological forum: An International Journal*. 15:660-664. *UGC Care Listed Journal*.
 23. G. Shyam Prasad*, G. Shravan Kumar and K.Srisailam (2018) Novel metabolites of losartan as human peroxisome proliferator activated receptor gamma (ppar γ) and human angiotensin receptor (at1r) binders: an *in silico* study. *International Journal of Pharmacy and Biological Sciences*. 8:pp.2230-7605. *UGC Care Listed Journal*
 24. G. Shyam Prasad* and Shravan Kumar Gunda (2018) Hepatitis c virus rna-dependent rna polymerase ns5b inhibition potentials of anti-helminthic drug albendazole and its biotransformed metabolites: an *in silico* study. *International Journal of Pharmacy and Biological Sciences*. 8:pp.341-348. *UGC Care Listed Journal*
 25. Ajmera ShanthiPriya1* Girisham, Shyam Prasad and Chandra Sekhar Rao (2017). Biotransformation of diclofenac by thermophilic coprophilous fungus *Scytalidium thermophilum* isolated from sheep dung. *International Journal of Current Advanced Research*. 4594-4597.
 26. G. Shyam Prasad*, S. Girisham, S. M. Reddy. (2011). Biotransformation of meloxicam by *Cunninghamella blakesleeana*: Effect of carbon and nitrogen source. *Indian journal of microbiology*, 51(1) 82-87. *Impact Factor*3.0.
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29. G. Shyam Prasad (2010). Anti bacterial and antifungal activity of methanolic extract of *Argemone mexicana* leaves. *International journal of phytopharmacology* 1(2):64-67.
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BOOK CHAPTERS-04

5. G. Shyam Prasad (2016) Pharmaceutical application of thermophilic fungi *In: Fungi in Extreme Environments: Ecological role and Biotechnological Significance* Eds. Sonia M. Tiquia-Arashiro-Martin Grube. *Springer Publications*, pp.269-289.
6. G. Shyam Prasad, B. Sashidhar Rao (2015) Fungal Biotransformation of Drugs: Potential Applications in Pharma Industry *In: Microbial Biotechnology: Technological challenges and Developmental Trends* Eds. Bhima Bhukya and Anjana Devi, *Apple Academic Press, Canada* PP. 387-407.

7. G. Shyam Prasad, S. Girisham, and S. M. Reddy (2012) Biotransformations by thermophilic fungi- a green chemistry technology for drug synthesis: a mini review *In: Microbial Diversity Exploration & Bioprospecting* edited by S. Ram Reddy, M. A. Singara Charya, S.Girisham, Published by *Scientific Publishers*, India, ISBN: 978-81-7233-782-7, pp.415-429.
8. G. Shyam Prasad, S. Girisham, and S. M. Reddy. (2009) Microbial Transformations: An emerging field in biotechnology *In: Advances in applied biotechnology* edited by Parihar, Parihar Published by *Agrobios, Jodhpur*, India, pp. 345-380.

BOOKS-01

2. G. Shyam Prasad, K. Srisailam (eds.) *Pharmaceutical Microbiology A Laboratory Manual* Pharma Med Press, (2019) Hyderabad, India.

PATENT FILED

- *Title: “Z-1-(P-DIMETHYLAMINOETHOXYPHENYL)-1, 2-DIPHENYL-1-BUTENE METABOLITE”* Application No.201641045175 A.

Publications by Dr. K.V.N. Rajeshwari

10. KVN Rajeshwari, Shravan Kumar Gunda, K. Susmitha, Shyam Prasad*, S. Suma (2023) Post harvest management of fruits and vegetable spoilage by *Aspergillus niger* employing some selected natural compounds: An Insilico study. *Journal of Pharmaceutical Negative results*.14:1127-1136. *Scopus Indexed Journal*.
11. Vennela Reddy Lankala¹, Durgesh Kumar⁴, KVN Rajeshwari, Venkateshwara Rao Joginipally, G. Shyam Prasad*(2023) Homology modeling and molecular docking of LpxC protein of different Gram negative bacteria using some natural products. *Neuro Quantology*, 21:476-498. *Scopus Indexed Journal*.
12. KVN Rajeshwari, B.Srilatha, Srilekha Reddy, G. Shyam Prasad* (2023) Non Steroidal Anti Inflammatory Drugs (NSAIDS) as potential inhibitors of tankyrase-2 for colon cancer

- prevention: an *in silico* study.18:216-221, *Research Journal of Biotechnology. Scopus Indexed Journal*.
13. K.V. N. Rajeshwari, S. Suma* (2023) Enzymatic profiling, isolation, and identification of *Aspergillus niger*. *Eur. Chem. Bull.* 2023,12(Special Issue 1), 781-788.
 14. K.V. N. Rajeshwari, S. Suma* (2023) Partial purification and Characterization of Exo-Polygalacturonase produced by *Aspergillus niger* strain RA401 using Solid state Fermentation. *Biogecko- A New Zealand Herpetology Journal*. Vol 12 Issue 02 2023, 2256-2269. *Web of Science Journal*.
 15. K.V. N. Rajeshwari, S. Suma* (2023) UV Mutagenesis for the Enhanced Production of Polygalacturonase by *Aspergillus niger* strain RA401. *ZKG International*. Volume VIII Issue II OCTOBER 2023. *WOS journal*.
 16. Srikanth Burra, K Venkata Naga Rajeshwari, S Suma* (2023) GENOME-WIDE IDENTIFICATION, CHARACTERIZATION, AND PHYLOGENETIC ANALYSIS OF CALCIUM-DEPENDENT PROTEIN KINASE IN *ZEA MAYS*. *Chelonian Research Foundation*. Vol. 18 No. 2 (2023). 1424-1434. *Scopus Indexed journal*.
 17. Balije Rakesh, Puskuri Divya, Rajeshwari KVN, Venkanna Muripiti, Amarnath Velidandi* (2023) Preparation, In Silico Studies, In Vitro Antibacterial and Antioxidant Activity of 4, 6-Disubstituted Dihydropyrimidine Thiones. *Russian Journal of Bioorganic Chemistry*. Volume 49. Pages 76-80 (2023) *Springer publication*.
 18. V. Srilekha*, Gudikandula Krishna, B.Sreelatha, Ega Jagadeesh Kumar, K.V.N. Rajeshwari (2023) Prodigiosin: a fascinating and the most versatile bioactive pigment with diverse applications. *Systems Microbiology and Biomanufacturing*. Vol. 4 Page 66-76 (2024). *Springer Publication*.

Patents: Published an Indian patent entitled “An Efficient and Rapid Regeneration of Callus from Roots and Root Hair of Indian Maize with application number 202341033823 A”

Publications by Dr. Jahnavi Alwala

14. Green Synthesis of plant-mediated silver nanoparticles using *Withania somnifera* leaf extract and evaluation of their anti-microbial activity-Veerababu Nagati, Rama Koyyati, Raj kiran Banala Jahnavi Alwala, Manisha R Donda, Pratap Rudra Manthur Padigya*Department of Biochemistry, Osmania

University, Hyderabad, IJAR Volume 1, Issue 9, 307- 313.

15. Green Synthesis and characterization of silver nanoparticles from *Cajanus cajan* leaf extract and its antibacterial activity Veera babu Nagati, Rama Koyyati, Manisha R Donda, Jahnavi Alwala, Karunakar Rao Kudle, Pratap Rudra Manthur Padigya*
Department
of Biochemistry, Osmania University, Hyderabad International Journal of Nanomaterials and Biostructures Universal Research Publications– 2012, Vol2, Issue3, page no 39-43.
16. Biofabrication of silver nanoparticles using *Cuminum cyminum* through microwave irradiation Karunakar Rao Kudle, Manisha R Donda, Jahnavi Alwala, Rama Koyyati, Veerababu Nagati, Ramchander Merugu, Y. Prashanthi, M. P. Pratap Rudra*. - 2012, 2(4) 65-69.
17. Biosynthesis of Silver Nanoparticles using *Catharanthus roseus* Leaf extract and antimicrobial activity, Veerababu Nagati, Rama Koyyati, Manisha R Donda, Jahnavi Alwala, Pratap Rudra Manthur Padigya*, 2013, Sep 11 2013.
18. Synthesis of silver nanoparticles using extracts of *Securinega leucopyrus* and evaluation of its antimicrobial activity. Manisha D. R1, Jahnavi Alwala1, Karunakar Rao Kudle1, Anila Miryala, B. Sreedhar and M.P. Pratap Rudra*, INTJ CURR SCI, 7: E1-8.
19. Synthesis of silver nanoparticles from *Phyllanthus reticulatus*: An investigation on the effect of broth (leaves & root) concentration in reduction mechanism and particle size., Karunakar Rao Kudle1, Manisha D. R1, Jahnavi Alwala1, Madhukar Rao Kudle, B. Sreedhar, M. P. Pratap Rudra* World Journal of Pharmacy and Pharmaceutical Sciences, Volume 2, Issue 5, 2839-2849.
20. Biosynthesis of Silver Nanoparticles using Flower Extracts of *Catharanthus roseus* and evaluation of its antimicrobial activity, Manisha D. R1, Jahnavi Alwala1,

Scholars awarded Ph.D. under the supervision of Prof. S. Suma

2. Ms. K.V.N. Rajeshwari entitled, "Studies on Polygalacturonase Enzyme from *Aspergillus niger* strain RA401"

Scholars pursuing under the supervision of Prof. S. Suma:

8. Mr. B. Srikanth

Topic:

9. Ms. Susmitha Kodam

Topic:

10. Mr. Mohd. Khalid Pasha

Topic:

11. Mr. V. Naveen

Topic:

12. Mr. N. Venkatesh

Topic:

13. Ms. Fakeha Sadaf

Topic:

14. Mr. A. Sridhar

Topic:

Scholars pursuing under the supervision of Prof. G. Shyam Prasad:

1. B. Swathi

Topic: *Gumkondagogu metal nanocomposite material as an antifungal agent: evaluation of its potential as nanomedicine against clinical isolates of Candida species.*

2. G. Chandrakala

Topic: *Microbial Pigment Prodigiosin as a potential source for textile and biomedical Applications.*

3. Jeshwant Paul

Topic: *Mycotoxins and their management using Probiotics*

4. V. Pradeep

Topic: *A study on polystyrene Biodegradation using Super worms (Larvae of Zophobas atratus)*

5. B. Surender Reddy

Topic: *Microbial synthesis of coenzyme Q10*

6. Satish Kumar:

Topic: *Microbial Pigment Melanin as a potential source for Cosmetic Industry*

7. Amrapali:

Topic: *Incidence and Prevalence of viral diseases in population of Mehabubabad district, haematological and biochemical changes in infected patients.*

8. Jayson:

Scholars pursuing under the supervision of Dr. Jahnvi Alwala

- ✓ Mr. B. Vikram -(Regular research scholar from September 2023).
- ✓ Sadath Fatima -(Regular research scholar from September 2023).

Prof. S. Suma Attended

S.No.	Name of the Seminar/ Conference/ Symposia Workshop, etc.	Name of the Sponsoring Agency	Place and Date
1.	Emerging trends in Biotechnological applications in plants-Indian Perspective	DST, Govt. of India & Chaitanya Colleges & Alumni Association of Chaitanya Colleges	Chaitanya Colleges, Warangal and 27 th & 28 th March, 2010
2.	Recent trends in Microbial Biotechnology	Department of Microbiology, Kakatiya University	Department of Microbiology, Kakatiya University, Warangal and 26 th and 27 th March, 2011
3.	Challenges, Opportunities and Emerging Trends in Microbial Technology	Department of Microbiology, Kakatiya University	Department of Microbiology, Kakatiya University, Warangal on 26 th & 27 th March, 2012
4.	International Conference on Biotechnology in Human Welfare	Department of Biotechnology, Kakatiya University	Department of Biotechnology, Kakatiya University, Warangal, 7 th -9 th February, 2013
5.	National Seminar on Ethics in Microbiology	Department of Microbiology, Kakatiya University	25 th July, 2015
6.	“9 th Indo Global Summit on Cancer therapy” (Presented poster)	Omics International	2 nd – 4 th October, 2015
7.	Global Biotechnology Summit	Department of Science & Technology, New Delhi	5 th & 6 th February, 2016
8.	National Conference on Coastal and Marine Biodiversity of India (Session Chair Person)	Department of Marine Biology, Vikrama Simhapuri University, Nellore	16 th – 17 th September, 2016
9.	National Conference on Developing a culture of Quality Implementing & Sustaining Approaches to quality in Higher Education	IQAC, St. Francis College For Women, Hyderabad	3 rd -4 th March, 2017
10.	1 week FDP on Quality Assurance in Higher Educational Institutions and Industries	TSCHE, ISTE and IETE sponsored. At KITS, Warangal	19 th -23 rd July, 2017
11.	MOOCS on Blended Learning Practice	Commonwealth of Learning and Athabasca University, Canada	April 2020
12.	STEM Teacher training workshop on Research Based Pedagogical Tools (Level 1) by DBT	Govt. of India in collaboration with British council and supported by IISER, Pune	28 th September to 1 st October 2018
13.	Insight into Life on Cellular Level: Single cell Genomics	AIIMS, Bibinagar, Hyderabad	March 24 and 25, 2023

and Digital droplet PCR		
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Dr. K.V.N. Rajeshwari Attended

Name of the Seminar/ Conference/ Symposia Workshop, etc.	Name of the Sponsoring Agency	Place and Date
1. Recent trends in Biotechnology	Department of Microbiology, Kakatiya University	Department of Microbiology, Kakatiya University, Warangal and 26 th and 27 th March, 2011
2. Challenges, Opportunities And Emerging Trends In Microbial Technology	Department of Microbiology, Kakatiya University.	Department of Microbiology, Kakatiya University, Warangal on 26 th & 27 th March, 2012.
3. Emerging Biotechnologies	Department of Biotechnology, Kakatiya University.	28 th -30 th Jan-2016
4. National conference on Coastal and Marine Biodiversity of India-Propects, Threats and Conservation Strategies (CMBI-2016)	Department of Marine Biology, Vikrama Simhapuri University, Nellore	16 th - 17 th September, 2016
5. National conference on "Research advances in biotechnology"	Sreenidhi Institute of Technology and Science, Yamnampet, Hyderabad. sponsored by TEQIP-II (World Bank Assistance)	20-21 st October 2016,
6. MOOCS on Blended Learning Practice	Commonwealth of Learning and Athabasca University, Canada	1 st March to 28 March 2020

7. Two-week Refresher Course in "Life Sciences"	TLC, Ramanujan College University of Delhi	01-15 September 2021
8. STEM Teacher training workshop on Research Based Pedagogical Tools (Level 1) by DBT	Govt. of India in collaboration with British council and supported by IISER, Pune	28 th September to 1 st October 2018
9. Insight into Life on Cellular Level: Single-cell Genomics and Digital droplet PCR	AIIMS, Bibinagar, Hyderabad	March 24 and 25, 2023

Dr. A. Jahnavi Attended

Name of the Seminar/ Conference/ Symposia Workshop, etc.	Name of the Sponsoring Agency	Place and Date
<i>Recent trends in Microbiology</i>	Department of Microbiology, Chaitanya P.G. College, Hanamkonda	Department of Microbiology on 5-6th October 2007.

2. Molecular techniques	Department of Microbiology, Kakatiya University.	Department of Microbiology, Kakatiya University, Warangal on 26 th & 27 th March, 2012.
3. Ethical issues of Animal House and Animal experimentation	Department of Zoology, University college of Science, Hyderabad.	4-09-2012
4 Global Meet of Biologists-2012	Indian Institute of Chemical Technology	26 th -28 th December-2012
5. Declining Interest in Science Education and Research Among Students: Reasons and Remedies	Indian Institute of Chemical Technology	29 th -30 th March 2013.
<i>Indo-US Conference on Advanced Lignocellulosic Biofuels (Indo-USCALB-2014).</i>		

<p>7. <i>International Conference on Biochemistry, Nutrition & Pharmacy in Human Welfare: Recent Trends and Future Challenges</i></p>	<p>Osmania University, Hyderabad</p>	<p>September 3rd- 5th, 2015</p>
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