RAJAH SERFOJI GOVT. COLLEGE (AUTONOMOUS)
Reaccredited at 'A'Grade by NAAC
(Affiliated to Bharathidasan University, Tiruchirappalli)
Thanjavur – 613 005, TAMIL NADU, INDIA.

BOARD OF STUDIES IN BIOCHEMISTRY

MINUTES OF THE MEETING HELD ON 05th January 2021

The meeting of the Board of Studies in Commerce, for the Academic Year 2020-21, was held on 5th January 2021 at 2:00 pm at Department of Biochemistry , Rajah Serfoji Government College, Thanjavur-5.

The following members attended the meeting:

1	**Dr. K. JEYAPRAKASH**	Chairperson	Head Department of Biochemistry
2	**Dr. M. JEYARAJ**	Subject Expert & University Nominee	Asst Professor and Head, Govt Arts College Kumbakonam -01.
3	**Dr.V.RAMAMURTHY**	Subject Expert Academic Council Nominee	Head, Department of Biochemistry , Maruthupandiyar College, Vallam post, Thanjavur -613403
4	**Dr.S.VELAVAN**	Industrialist	Harman Research Institute, Thanjavur
5	**Mr.B.R.BALAJI**	Alumni	Teaching assistant for NEET Exam.
6.	**Dr.A.SUBRAMANIAN**	Faculty Member	Assistant Professor, Dept of Biochemistry
8	**Dr.V.MURALIKRISHNAN**	Faculty Member	Assistant Professor, Dept of Biochemistry
9.	**Dr.L.MALARVANNAN**	Faculty Member	Assistant Professor, Dept of Biochemistry

Dr.K.JEYAPRAKASH, Chairperson, BoS and Head, Department of Biochemistry, Rajah Serfoji Government College, and Board members passed the following resolutions.

1) Discussions for the new additions in the existing curriculum for B.Sc and M.Sc Biochemistry were made in the context of local needs and recent developments.

RESOLUTION [No.: BOS/BIOCHEM/2020-21/1] Unanimously resolved to approvethe changes made which will be implemented from the present academic year itself.

2) Discussions for the revision of the course outline of B.Sc and M.Sc Biochemistry Programmes incorporating the Extra Credit Courses for Advanced Learners.The extra credit courses are implemented from the Academic year 2020-21, as resolved as Resolution No. 3 at the college council meeting held on 12.02.2020. Due ratification for the same shall be obtained from the forthcoming Academic Council in this regard. These courses are introduced to improve the knowledge base of the students in their own Discipline. These are self study courses and are optional. For UG, two Courses with extra credit and for PG, two courses with extra credit are included. There should be no standing arrears for opting Extra Credit Courses and similarly, Students are not permitted to write the course as arrear, if he / she fails in the courses with extra credit.In the 5th& 6th semesters of the UG Programmes and 3rd& 4th Semesters of the PG Programmes, these extra credit courses are to be offered. One of the Discipline Specific Major electives of the particular semester (5th& 6th semesters of the UG and 3rd& 4th Semesters of the PG), which are not opted by the candidate for the regular Study may be taken by them as extra credit course.Each Extra Credit Course will carry 4 credits each.

RESOLUTION [No.: BOS/BIOCHEM /2020-21/2] Unanimously resolved to give ratification for the introduction of the Extra Credit Courses for Advanced Learners which will be implemented from the present academic year itself. As it is a Part-IV self study course there will not be any internal assessment and external marks alone will be awarded. External assessment may be based on the MCQ type from the next academic year onwards. Though the already approved Major Elective Course is taken as an Extra Credit Course choice, it is suggested to float two specific Extra Credit Courses from the next Academic Year onwards.

3) Discussions were made on the proposed Program Specific Outcomes (PSO) and Course Outcomes (PO).

RESOLUTION [No.: BOS/BIOCHEM/2020-21/3] Unanimously resolved to give approval for the Program Specific Outcomes and Course Outcomes prepared and presented and the Chairperson is

requested to place the PSO and PO Matrix along with its Cognitive level specification in the forthcoming Board of Studies.

4) Discussions were made exhaustively on the feedback reports of the Students regarding the Curriculum and the need for more Practical papers/ internship is understood.

RESOLUTION [No.: BOS/BIOCHEM /2020-21/4] Unanimously resolved to introduce more Number of Practical papers in the curriculum which will be implemented from the Academic Year 2021-22 onwards and the proposals for the same need to be placed in the forthcoming Board of Studies.

5) Deliberations were made profoundly on the Credit Accumulation and Transfer through Swayam platform. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge base by enrolling themselves in the Massive Open Online Courses (MOOC) in any subject of their choice provided by various portals such as SWAYAM, NPTEL etc. initiated by MHRD. This can be availed by all the students of all the semesters and there is no minimum eligibility to take up this course by UG/PG students during their period of study (3 Years/2 Years).

RESOLUTION [No.: BOS/BIOCHEM/2020-21/7] unanimously resolved to suggest the extra credit accumulation option through Swayam platform and to ensure the entry for the same in the Consolidated Marksheet.

6) Detailed discussions were held on the Programmes proposed for RUSA's financial assistance. Exploring the possibilities of employability ensuring Certificate Programmes in the field of commerce two Certificate Programmes namely 1. Certificate Course on Solid waste management 2.Medical Laboratory Technology ,3.Public health and Hygiene, if accepteds.

RESOLUTION [No.: BOS/BIOCHEM /2020-21/8 unanimously resolved to give approval to start

1. Certificate Course on Solid waste management.
2. Medical Laboratory Technology.
3. Public health and Hygiene.

Further resolved to suggest the Acadamic Council to do the needful to start and continue these courses even if the RUSA finance is not available or ceases.

7) Discussions were made to suggest the Eligibility for the panel of examiners for April 2021.

RESOLUTION [No.: BOS/BIOCHEM /2020-21/9] Unanimously resolved to suggest the examiners for April 2021 examinations in such a way that there should be a minimum of **FIVE** years of service for UG Valuation and **EIGHT** years of Service for PG Valuation and should be enrolled in Bharathidasan university Examiner panel. Priority for examiner selection may be considered from the University, Govt Colleges , Autonomous Colleges.

The meeting ended with vote of thanks, particularly to the External Members of the Board, recollecting their valuable inputs in their tenureP

CHAIRMAN:

1. **Dr. K.JEYAPRAKASH**
   Head,Department of Biochemistry

5.1.2021

Dr. K. JEYAPRAKASH
M.Sc.,M.Phil.,Ph.D.,PGDCA
Head, Dept. of Biochemistry
Rajah Serfoji Govt. College
Thanjavur - 613 005

MEMBERS OF THE BOARD:

2.**Dr. M.JEYARAJ**
Subject Expert & University Nominee,
Asst Professor and Head, Govt Arts College
Kumbakonam -01.

3. **Dr.V.RAMAMURTHY**
Subject Expert
Head, Department of Biochemistry ,
Maruthupandiyar College, Vallam post,
Thanjavur -613403.

4. **Dr.S.VELAVAN**
Industrialist
Harman Research Institute, Thanjavur.

5. **Mr.B.R.BALAJI**
Alumni, Teaching Assistant for NEET Exam
C-Academy, Thanjavur.

MEMBERS

6. Dr.A.SUBRAMANIAN
Assistant Professor, Dept. of Biochemistry

5/1/2020

7.Dr.V.MURALIKRISHNAN
Assistant Professor, Dept. of Biochemistry

5/1/21.

8.Dr.L.MALARVANNAN
Assistant Professor, Dept. of Biochemistry

05/01/2021

RAJAH SERFOJI GOVT COLLEGE,(AUTONOMOUS)

THANJAVUR –613 005
(Reaccredited with "A"Grade by NAAC)

AFFLIATED TO BHARATHIDASAN UNIVERSITY ,

TRICHIRAPPALLI –24

DEPARTMENT OF BIOCHEMISTRY

B.Sc BIOCHEMISTRY SYLLABUS

(For the students admitted from 2021 onwards)

COURSE – B.Sc BIOCHEMISTRY

PROGRAMME OUTCOMES (POs)

On completion of the Programme, the learner will be able:

1. To understand the central features of the extra ordinary diverse fields of life sciences
2. To impart critical thinking and problem solving ability
3. To acquire and to apply knowledge for development of diagnostic methods
4. To inculcate aptitude towards research
5. To sensitise towards gender health and environmental related issues
6. Apply and advance the knowledge and skills acquired, to become a creative professional in their chosen field.
7. Engage in self-directed continuous learning, aimed at global competency, which will promote professional and personal growth
8. Work towards achieving economic and social responsibilities through application of relevant knowledge

PO-1 The students will be able to demonstrate an understanding of fundamental biochemical principles such as the structure and functions of biomolecules and metabolic pathways.

PO-2 The students will be able to demonstrate the structure and functions of various organs of human body.

PO-3 The students will be able to demonstrate practical skills in handling biological specimens, analysis and their safe disposal.

PROGRAMME SPECIFIC OUTCOMES

PSO-1 After completion of the program the students are well poised to pursue careers in academic and industry in the areas of pharmaceutical and biotechnology.

PSO-2 Health care professionals for services in the fields of clinical biochemistry, laboratory management, hospital and community services.

PO-1 The students will be able to demonstrate an understanding of fundamental biochemical principles such as the structure and functions of biomolecules and metabolic pathways.

PO-2 The students will be able to demonstrate the structure and functions of various organs of human body.

PO-3 The students will be able to demonstrate practical skills in handling biological specimens, analysis and their safe disposal.

On completion of B.Sc Biochemistry, the student will be able to:

PSO 1.Communicate the fundamental concepts of specific molecules, enzymes, cells, organ systems and metabolism of compounds

PSO 2.Apply the knowledge and expertise in industries, diagnostic laboratories and various research fields

PSO 3.Impart practical skills and scientific knowledge in domains of molecular biology, enzymology, genetics, clinical biology and immunology

PSO 4.Develop problem solving ability by utilizing the conceptual knowledge, analytical techniques, computational and statistical approaches.

PSO 5. Facilitate to pursue post graduationin related fields in life sciences and contribute their knowledge to the betterment of the society in various research and health care sectors.

Credits	5	Hrs/week	6	Sub Code	S1BC1	Semester	I	Medium of Instruction	English

Semester : I- CORE COURSE-1

(For the students admitted from 2018 onwards)

BIOMOLECULES

COURSE OBJECTIVE

To inculcate the knowledge on different types of carbohydrates and their structure.

To instill the knowledge on the structure and types of amino acids, proteins and their organization.

To impart the fundamental knowledge about lipids , their types.and DNA, RNA .

UNIT I: Carbohydratses: Classification, preparation, properties and structure. Interconversion of sugars. Properties, structure and biological functions of mono, di, oligo and polysaccharides.Homopolysaccharides – Starch, glycogen, cellulose. Heteropolysaccharides – Hyaluronic acid and chondrointin sulphate,

UNIT II -Amino acids: Structure, classification and chemical reactions. peptide bond. Proteins. Biological importance, Forces stabilizing the structure of proteins. classification, general properties, primary structure, Secondary , tertiary and quarternary structures. Denaturation.

UNIT III- Nucleic acids - Purine and Pyrimidines – structure and properties. Nucleosides. Nucleotides. DNA and RNA. Composition, structure, their biological importance, Comparison between DNA and RNA, Denaturation and Renaturation of nucleic acid .

UNIT IV- Lipids: Biological significance, classification. Structure , properties and functions- Fatty acids, triglycerides, waxes , terpenes, cholesterol and its derivatives. Compound lipids- Phosphoglycerides, sphingolipids and glycolipids. Reichert meissel Value, iodine number, saponification value , acid number.

UNIT V- Vitamins- Source, biological role, daily requirement and deficiency manifestation - fat soluble vitamins A,D,E & K. Water soluble vitamins- Ascorbic acid, thiamine, riboflavin, pyridoxine, niacin, folic acid and vitamin B12.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	understand the role of sugars in energy production and living systems	Un
CO 2	Apply the link between the structure and functions of proteins in biological context	Ap
CO3	Analyse the role of lipids and apply the techniques to identify their purity	An
CO4	Remember the structure of lipids with their reactivity in biological membrane systems and life processes.	Re

CO5	Evaluate the structural studies to the biological processes like replication, transcription and translation	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books:

1. Biochemistry by N.Arumugam, Saras Publications, 3rd edition (2010)
2. Biochemistry by U.Sathyanarayana, Allied Books Publishers, 4th edition, 2007

Reference Books :

1. B iochemistry by Lubert Stryer, Free man Publishers Ltd, 5th edition (2002).
2. Biochemistry by Voet & Voet, Wiley Publications, 2nd Edition (2003)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	3	Sub Code	S2BCP1	Semester	I & II	Medium of Instruction	English

Semester - I & II-CORE COURSE -3

(For the students admitted from 2018 onwards)

Major Practicals- I

COURSE OBJECTIVE

To identify various types of suguars

To analyse qualitatively the various types of amino acids

Qualitative analysis:

A. Qualitative analysis of carbohydrates (glucose, fructose, maltose, sucrose, lactose), Identification of mono ,disaccharides and starch in mixtures.

B. Colour reactions of amino acids like tryptophan, tyrosine, arginine, proline and histidine.

C. Qualitative analysis of Lipids.

Quantitative analysis.

A. Estimation of reducing sugar by Benedicts quantative method.

B. Estimation of amino acid by Ninhydrin method.

C. Estimation of ascorbic acid by titrimetric method using 2,6 - dichlorophenol indophenol.

D. Estimation of acid number of Edible oil.

E. Determination of saponification number of edible oil.

COURSE OUTCOMES

Apply the techniques for qualitative analysis
Acquiring skills on identification of biomolecules.

Questions paper pattern

Internal – 40marks , External – 60marks

Major experiment – 30 marks, Minor experiments – 20 marks, Record – 10 marks

Signature of HOD

Credits	5	Hrs/week	6	Sub Code	S2BC2	Semester	II	Medium of Instruction	English

Semester : II-CORE COURSE -2

(For the students admitted from 2018 onwards)

BIOCHEMICAL TECHNIQUES

COURSE OBJECTIVES

To Impart Knowledge about safety aspects of handling laboratory instruments.

To expose the students to various chromatographic techniques and fundamentals of radioactivity.

To appreciate electrophoretic and electrochemical principles in separation of compounds.

Unit I- Laws of thermodynamics- First, second, third and zero law. Law of mass action. Electrochemical techniques - Measurement of pH, Standard hydrogen electrode-, Henderson- Hessel balch equation. Types of buffer, role of Buffers in biological system. Colloids and their role in the living body, application of colloids.

Unit II- Chromatography: Principle, methods and applications of paper chromatography, Thin layer Chromatography, affinity chromatography, Gas-liquid chromatography, Gel filtration chromatography and Ion exchange chromatography. High performance liquid chromatography, (HPLC).

Unit III- Electrophoresis: Principle, instrumentation and applications - paper electrophoresis, Agarose gel electrophoresis, PAGE, Isoelectric focusing.

Principles of centrifugation. Preparative, Analytical ultra centrifuge- Instrumentation and applications. Basic principle and techniques of subcellular fractionation by differential centrifugation.

Unit IV- Spectroscopy: Colorimetry, Beer-Lambert's law. Principle, Components and applications of spectrophotometer. Principle, instrumentation and applications of flame photometer, atomic absorption, NMR, ESR and mass spectroscopy.

Unit V

Radioisotopes- Radioactive decay, units of radioactivity. Measurement of radioactivity- Geiger muller counter. Scintillation counter and Autoradiography. Applications of radioisotopes in Biology.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	understand the reactions of thermodynamics	Un
CO 2	Apply the various types of chromatographic techniques	Ap

CO3	Analyse protein and DNA by electrophoresis	An
CO4	Remember basics of calorimetry	Re
CO5	Evaluate the uses of radioisotopes	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books& Reference Books

1. Analytical Biochemistry by P.Asokan, Chinna Publications, 2nd edition, (2005)
2. Biophysical chemistry – Principles and Techniques by Upathayaye and Nath, Himalaya Publishers, 3rd edition, (2002)
3. Principles and techniques of practical Biochemistry by Wilson and Walker University Press, Cambridge, 5th editon (2000)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	5	Hrs/week	6	Sub Code	S3BC3	Semester	III	Medium of Instruction	English

Semester : III-CORE COURSE -4

(For the students admitted from 2018 onwards)

HUMAN PHYSIOLOGY

COURSE OBJECTIVES

To understand the digestive and circulatory systems.

To To Impart Knowledge about Blood composition and function and blood clotting mechanism.

To study about the muscular and nervous system.

Unit I– Digestive system - Anatomy of the digestive system, Salivary, gastric , biliary secretion - Composition and functions. Intestinal hormones, movements in gastro intestinal tract, secretion, digestion and absorption in the small intestine. Digestion and absorption of carbohydrates , lipids and proteins .

Unit – II- Body fluids : Extra cellular fluid plasma, interstitial fluid , intra cellular fluid. Lymph & blood composition, functions, ionic composition , electrolytes, body buffers. Blood cells- RBC , WBC, hemoglobin , hemopoiesis, blood coagulation and blood groups.

Unit- III- Circulation : Structure of heart and blood vessels, cardiac cycles, cardiac factors, controlling blood pressure, Blood pressure and its measurement, electro cardiogram. Treatment for Blood pressure. Respiration: Anatomy and physiology of respiration, exchange of gases between lungs and blood and between blood and tissues.

Unit- IV- Excretory systems: Structure of nephron, composition and formation of urine. Muscle-Types of muscle structure, mechanism of muscle contraction. Nervous system- Structure of brain, neuron, nerve impulse, synapse, Cerebrospinal fluid- composition and biological functions, blood brain barrier.

Unit- V- Reproductive systems: General anatomy of male and female reproductive organs, Endocrine system: Functions and deficiency diseases of the pituitary , thyroid, adrenal, parathyroid and pancreatic hormones.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand and analyze blood cells and blood groups Blood clotting mechanism	Un
CO 2	Apply and Outline the muscular and nervous sytem, Mechanism of muscle contraction and structure of brain and spinal cord	Ap
CO3	Utilise the knowledge about the structure kidney and nephron ,to understand the mechanism of Urine formation and learn the concept of Dialysis,	An

CO4	Acquire knowledge about the components of Digestive system,Hcl formation and Digestion process	Re
CO5	Compile the classification of Hormones and its biological role	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books:

1. Human Physiology by Chatterjee, Medical Allied Publications, 3rd edition, 2004
2. Animal Physiology by N.Arumugam, Saras Publications, 2nd edition, 2008

Reference Books:

1. Human Physiology by Guyton, Saunders Publishing Ltd, 9th edition (2004).
2. Physiology and Biochemistry by R.A .Agarwal, S.Chand Company Publishers, 3rd edition (1986)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	3	Sub Code	S4BCP2	Semester	III	Medium of Instruction	English

SEMESTER – III- MAJOR PRACTICALS- II
(For students admitted from 2018 onwards)

COURSE OBJECTIVES :

To prepare the buffers and its measurements.

To estimate DNA and RNA

To separate amino acids by chromatography

Syllabus

1. Preparation of buffers and measurement of pH.
2. Extraction of nucleic acids.
3. Estimation of RNA by orcinol method.
4. Estimation of DNA by Diphenylamine method.
5. Estimation of chlorophyll.
6. Estimation of lactose
7. Estimation of lecithin from egg yolk
8. Estimation of fructose.

Demonstration experiments:

9. Circular paper chromatography for separation of amino acids.
10. Ascending and decending chromatography for separation of amino acids.
11. Separation of plant pigments by column chromatography.
12. Thin layer chromatography of amino acids.
13. PAGE – electrophoresis.
14. Preparations of normal and molar solutions.

COURSE OUTCOMES

Apply the methods for preparation of buffers

Evaluate the estimation of biomolecules

Attain technical knowledge on separation techniques

Questions paper pattern

Internal – 40marks , External – 60marks

Major experiment – 30 marks, Minor experiments – 20 marks, Record – 10 marks

Signature of HOD

Credits	2	Hrs/week	2	Sub Code	S3SB1C	Semester	III	Medium of Instruction	English

SEMESTER – III- SKILL BASED
(For the students admitted from 2018 onwards)

APICULTURE

COURSE OBJECTIVES

To learn history and importance of honey bee

To undertand bee family and its role.

To apply apiary management skills

UNIT I

History and scope of Bee keeping. Present status of Apiculture in India. Honeybee –Systematic position – Species of Honey bees – Morphology and Life history. Stinging apparatus and bee poisoning.

UNIT II

Bee colony – Castes – natural colonies and their yield. Bee foraging: Pollen and nectar yielding plants. Honey bee – behaviour – swarming – Pheromones.

UNIT III

Apiary Management – Artificial bee hives – types – construction of space frames – Selection of sites – Handling – Maintenance – Instruments employed in Apiary

UNIT IV

Honey – Composition – Honey extraction, seasonal maintenance- uses. Bee wax and its usesNational and International markets for Honey and Wax. Natural enemies and diseases of honey bees and their control measures

UNIT V

Apiculture as Self - employment venture –financial assistance and funding agencies Economics of Apiculture and Management

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the life cycle of honey bee	Un
CO 2	Apply and learn honey bee foraging	Ap
CO3	Remember the importance of honey bee	Re
CO4	Analyse honey composition and it nutritional value	An
CO5	Evaluate the financial assistance for apiculture	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books:

1. Abrol, D. P. 1997. Bees and Beekeeping in India. Kalyani Publishers, Ludhiana.
2. . Sharma, P. and Singh L. 1987 – Hand book of bee keeping, Controller Printing and Stationery

Reference Books:

1. Cherian, R. & K.R. Ramanathan, 1992 – Bee keeping in India
2. Shukla, G.S. and Upadhyay, V.B. 1997. Economic Zoology. Rastogi Publications

Question paper pattern **Max Marks: 50** **Exam duration : 3 hours**

Part A 5x4 = 20 Answer any five questions (out of seven)

Part B 3x10 = 30 Answer any three questions (out of five)

Signature of HO

Credits	5	Hrs/week	6	Sub Code	S4BC4	Semester	IV	Medium of Instruction	English

SEMESTER –IV-CORE COURSE 5

(For the students admitted from 2018 onwards)

CELL AND MOLECULAR BIOLOGY

COURSE OBJECTIVES:

To learn the nature of cell and its molecular biology in DNA and RNA level.

To understand the cell structure with its organelles

To demonstrate the experiment to know DNA as a genetic material

UNIT – I -An Overview of cells – Origin and evolution of cells. Cell theory, Classification of cells – Prokaryotic cells and Eukaryotic cells. Comparison of prokaryotic and eukaryotic cells. Cell Membrane – Fluid mosaic model of membrane structure and its composition. Cell cycle.

UNIT – II- Cell organelles: Endoplasmic reticulum, Ribosomes, Mitochondria, Chloroplast, lysosomes, Golgi apparatus- structure and their functions.

UNIT III- Identification of DNA as genetic materials, Griffith, Harshey –chase experiment. DNA replication- types, semi conservative mechanism, requirement for DNA replication, topoisomerases. Inhibitors of DNA replication.

UNIT IV- Genetic code and their salient features, Transcription in prokaryotes - initiation , elongation and termination, inhibitors of transcription. Post transcriptional modification. Mutation – types and causative agents.

UNIT –V- Protein synthesis in prokaryotic and eukaryotes- activation, initiation, elongation and termination of protein synthesis. Inhibitors of protein synthesis, Post translational modification.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the cell theory and cell structure	Un
CO 2	Learn cell structure with its organelles	Ap
CO3	Apply the experiments for DNA as a genetic material	Ap

CO4	Remember genetic code , and various types of mutation	Re
CO5	Exemplify the protein synthesis mechanism	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books:

1. Cell Biology by S.C.Rastogi , New Age International Publishers, 3rd edition (2007)
2. Molecular Biology by Freifelder, Narosa Publishing House, 4th edition, (1999)
3. Biochemistry and Molecular Biology by William .H.Elliot, Oxford University Press, 3rd edition (2007)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	2	Hrs/week	2	Sub Code	S4SB2B	Semester	IV	Medium of Instruction	English

SEMESTER IV-SKILL BASED
(Applicable to the students admitted from 2018 onwards)

BIOFERTILIZER

COURSE OBJECTIVES

To introduce the types of biofertilizer with its advantage and disadvantages

To understand biological cycles like nitrogen, and phosphorus cycle

To impart basic understanding of mass cultivation techniques
.

Unit I
Types and benefits of biofertilizers. Nitrogen biofertilizers, Phosphate biofertilizer, compost biofertilizers, organic farming – introduction, methods , advantages and disadvantages .

Unit - II
Importance of Nitrogen and Phosphorus cycles. Benefits of Biofertilizers -strain selection - seed pelleting - Inoculant and inoculant carriers - Nitrogen fixing Bacteria (Azotobacter, Beijerinckia, Clostridium, Cyanobacter).

Unit III
Mass cultivation of Cyanobacteria (Anabaena, Cylindrospermum) - Mass cultivation of Azolla, Azolla - Anabaena complex - Algal inoculants - methods of production (Trough method, Pit method, Field scale,) application.

Unit IV
Rhizobium - Taxonomy, physiology, Host-Rhizobium interaction, mass cultivation, carrier and base inoculants. Vermiculture - Earth worms and micro organisms - Microbial enzymes.

Unit V
Types of mycorrhizal associations, VAM mycorrhizal association: taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield, collection of VAM, isolation, stock plants and inoculums, production of VAM.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the type sof biofertilizers with its importance	Un
CO 2	Remember nitrogen and phosphorus cycle	Re
CO3	Apply mass cultivation techniques	Ap
CO4	Attain the kowledge about the vermiculture	An

CO5	Demonstrate the VAM association	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books

1. S. G. Borkar, 2015. Microbes as Bio-fertilizers and their Production Technology,Woodhead Publishing India in Agriculture, India.

2. R Shankara Reddy, 2012. Biofertilizer Technology, Adhyayan Publishers, India

Reference Books

1. Moshrafuddin Ahmed and Basumatary,S.K.2006. Applied Microbiology, M.J.P. Publishers, Chennai.
2. Dubey, R.C.2003. A text book of Biotechnology. S.mChand & company, New Delhi.

Question paper pattern **Max Marks: 50** **Exam duration : 3 hours**

Part A 5x4 = 20 Answer any five questions (out of seven)

Part B 3x10 = 30 Answer any three questions (out of five)

Signature of HOD

Credits	5	Hrs/week	5	Sub Code	S5BC5	Semester	V	Medium of Instruction	English

SEMESTER : V- CORE COURSE 7

(For the students admitted from 2018 onwards)

ENZYMES

COURSE OBJECTIVES

To learn the classification , properties and isolation of enzymes
To understand the structure and functions of enzymes
To demonstrate the kinetics of enzymes
To apply the uses of enzymes in clinical and industry field

Unit I- Enzymes – Definition, Nomenclature and classification of enzymes, properties, enzymes as biological catalysts, specificity of enzymes. Active site – Salient features, Structure and functions of coenzymes- FAD, TPP, NAD, Biotin, Pyridoxal phosphate. Units of enzyme activity . Turnover number

Unit II- Isolation and purification of enzymes : Classical methods of isolation and purification-affinity chromatography, ion exchange chromatography, gel filtration chromatography. Purification of Bulk enzymes and therapeutic enzymes.

Unit III- Enzyme kinetics – Factors affecting enzyme activity. Derivation of Michaelis Menten equation, Line weaver burk plot, Enzyme Inhibition – Competitive , non competitive , and uncompetitive enzyme inhibition.

Unit IV- Mechanism of enzyme action – Lock and Key model, induced fit hypothesis, Mechanism of enzyme action – covalent catalysis (Chymotrypsin) and acid base catalysis (Lysozyme) , Mechanism of bisubstrate reactions, Allosteric enzymes with examples.

Unit V- Multienzyme complex, pyruvate dehydrogenase, isoenzyme of lactate dehydrogenase. Enzymes of clinical importance . Immobilized enzymes – Definition, types of immobilization and applications of immobilized enzymes. Industrial applications of enzymes. Biosensors – Types and applications.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Remember the classification of enzymes and its properties Coenzymes – its structure and functions	Re
CO 2	Comprehend the methods of enzyme isolation and purification	Un
CO3	Apply the kinetics of enzyme such as MM equation,LB plot and Eadie Einstein	Ap
CO4	Demonstrate the mechanism of enzymes – Chymotrypsin and lysozyme	An

CO5	Discuss the immobilized enzymes and its applications	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Book & Reference Book:

1. Understanding enzymes by Trevor Palmer, Prentice Hall Publishers, 4th edition (1997)
2. Enzymes by P.Asokan, Chinna publications , 2nd edition, (2005)
3. Enzymes by Dixon and webb, Academic Press, New York (1982)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	5	Sub Code	S5BC6	Semester	V	Medium of Instruction	English

SEMESTER –V-CORE COURSE -8

(For the students admitted from 2018 onwards)

BIOCHEMISTRY OF PLANTS AND MICROBES

COURSE OBJECTIVES:

1. To understand the role of chlorophyll and its pigments in photosynthesis
2. To discuss the nitrogen fixation with its mechanism.
3. To comprehend Soil and water microbiology with its importance

Unit I- Photosynthesis- Photosynthesis, pigments, and photosynthetic apparatus, Light and dark reactions. Hill reaction, Emerson Effect, Photosystems, Photophosphorylation. Dark reactions-carbon dioxide fixation in C3, C4 and CAM Plants. Factors affecting photosynthesis and photorespiration.

Unit II- Nitrogen fixation – Symbiotic and non symbiotic N_2 fixation, nitrogenase, nitrate assimilation, nitrate reductase, sulphur and carbon cycles, Plant growth hormones - Auxin, gibberellins, cytokinins, abscisic acid and ethylene . Plant growth inhibitors and retardants.

Unit III - Prokaryotes – Bacteria - Structure and Physiology of E.Coli, Conjugation and transformation in bacteria. Blue green algae – morphology – economic importance of higher algae. Yeast and fungi – morphology, important stages in the life cycle of an yeast – spores of fungi.

Unit IV- Soil and water microbiology – Soil formation, Rhizosphere, Purification of drinking water, test for purity of water. Food and water borne diseases.Typhoid , cholera, bacillary dysentery, hepatitis, amoebiosis, Air borne pathogens – tuberculosis, small pox, diphtheria and poliomyelitis.

Unit V-Viruses – Structure and replication of animal and plant virues . Oncogenic viruses, retroviruses, HIV, T even phages, Lambda phages – Lytic and Lysogeny cycles.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Remember the classification of enzymes and its properties Coenzymes – its structure and functions	Re
CO 2	Comprehend the methods of enzyme isolation and purification	Un
CO3	Apply the kinetics of enzyme such as MM equation,LB plot and Eadie Einstein	Ap
CO4	Demonstrate the mechanism of enzymes – Chymotrypsin and lysozyme	An
CO5	Discuss the immobilized enzymes and its applications	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Book:

1. Plant physiology by M.Devlin, John Wiley Publications, 3rd Edition (1996)
2. Plant Physiology by S.N .Pandey, Vikas publishing House, 4th Edition (2008)
3. Microbiology by N.Arumugam, Saras Publications , (2005)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	5	Sub Code	S5BCP3	Semester	V	Medium of Instruction	English

SEMESTER : V- CORE COURSE 9
(For the students admitted from 2018 onwards)

Major Practicals- III

Food & Microbiology Practicals

1. Moisture content of food materials
2. Ash Content of food materials.
3. Estimation of carbohydrate by anthrone method in food samples.
4. Estimation of protein by Lowrys method in food samples.
5. Estimation of phosphorus in food sample
6. Estimation of calcium.
7. Estimation of fat content in food samples (wheat, rice flour, gram flour)

Microbiology:

1. Cleaning of glasswares.
2. Preparation of nutrient media.
3. Streak plate technique.
4. Grams staining.
5. Estimation of fat in milk
6. Estimation of acidity in milk and curd
7. Estimation of lactose in milk by benedicts method.
8. Microbial quality of milk by methylene blue dye reduction test.
9. Spotters.

Questions paper pattern

Internal – 40marks , External – 60marks

Major experiment – 30 marks, Minor experiments – 20 marks, Record – 10 marks

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S5BCEL1A	Semester	V	Medium of Instruction	English

SEMESTER V- MAJOR ELECTIVE COURSE 1 (A)

(For the students admitted from 2018 onwards)

FOOD AND NUTRITION

COURSE OBJECTIVES

To understand the Types of Food and its chemistry
To impart knowledge on source of food and its energy value
To apply the importance of micro and macro nutrients

Unit I- Sources, food consumption, properties and storage of common foods. Functions of food in relation to health – classification of food groups. New Proteins, new fat foods. Food groups to provide nutritive requirement for normal health classification of foods based on nutrition – body building foods, energy foods and protective foods.

Unit II- Essential nutrients- Fats , carbohydrates and proteins , energy value of foods, energy needs. Definition of unit of energy – Kcal , RQ, SDA , NPU, Basal metabolism – measurement-factors influencing BMR , Role of fibre in diet.

Unit III- Micro and macro mineral nutrients – Distribution, sources, metabolic functions and deficiency manifestation . Vitamins – classification, distribution, sources , functions , hyper and hypovitaminosis , water distribution – maintenance of water and electrolyte balance.

Unit IV- Nutrition through life cycle - infants, children, adolescents, pregnant, lactating women, old aged person and sports persons. Food additives, Food adulteration and labeling of food. Guide lines for good health.

Unit V - Principles of diet therapy. Marasmus, Kwashiorkor, Diet during stressed conditions and therapeutic diets for anemia, malnutrition, obesity, diabetes mellitus and ulcer. Formulation of therapeutic diet.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the various types of food and food groups	Re
CO 2	Outline the micro and macro nutrients	Un
CO3	Illustrate the organization of hospital with its charts	Ap
CO4	Gain knowledge on need of nutrients for different age groups	An
CO5	Learn the diet therapy with its method and application.	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text books & Reference Book

1. Nutrition and Dietetics by Shubhagini, Tata Mc Graw Publishers, 3rd edition, (2010).
2. Human Nutrition by B.Srilakshmi, New Age Publishers, 2nd edition (2008) .
3. Food Science by B.Srilakshmi, New Age Publishers, 5th edition (2010).

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S5BCEL1B	Semester	V	Medium of Instruction	English

Semester – V- MAJOR ELECTIVE COURSE 1 (B)
(For the students admitted from 2018 onwards)

HOSPITAL MANAGEMENT

COURSE OBJECTIVES

To understand the role of administration in patient care ,planning and management
To understand the importance of information system in hospitals
To understand the policy and procedures in clinical services

Unit I- Principles of Management – Introduction Definition – Organizational Development – Types of Organizations .Motivation in Hospitals – Meaning – Types – Motivational theories – Their impact on Hospital Management – Motivating the employees hospitals – Financial Management – Basic Concepts and application of Operation Research Techniques.

Unit II

Hospital Organization- Short introduction with reference to American Hospital System – Historical Development – Types of Hospital Organization with reference to types of Service, Demography, Bed strength and Types of ownership – Organization flowchart (Governmental and Non – Governmental Chart)

Unit III

Direction – Meaning and significance – Principles of effective direction – Supervision – Leadership in hospital – Meaning – Scope importance - Styles – Qualities of successful leader – Span of control – Authority and responsibility – Delegation of authority – Obstacles – Effective delegation – centralization and decentralization – Memories and Limitations.

Unit IV

Medical Audit and Research Methodologies – Quality assurance in Hospitals - Methods of Quality assessment – Studies of Structure – Studies of process – Studies of outcome – Studies combining process and outcome (Trajectories and Tractors) –n Evaluation of strategies (Criteria Maps, Molding and Clinical trials).

Unit V

Hospital communications – Types – Barriers – Methods to overcome barriers – Principles of effective communication – coordination – Importance of Coordination in hospital – Techniques of coordination. Recent development in Management: Business process – Outsourcing – Enterprise Resource Planning – Supply Chain Management – Corporate Principles – Health Tourism – Medical transcription .

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the Various principles of hospital management	Re
CO 2	Acquire the knowledge on leadership qualities in management	Un
CO3	Illustrate the Hospital organization	Ap
CO4	Learn medical audit and insurance	An
CO5	Explore on hospital communication and health tourism .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text books & Reference Books:

1. Essentials of Management - Koontz and O'Donnel
2. Management - Griffin
3 Material Management in Hospital – Johnson.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S5BCEL1C	Semester	V	Medium of Instruction	English

Semester – V- MAJOR ELECTIVE COURSE 1 (C)
(For the students admitted from 2018 onwards)

FOOD PROCESSING

COURSE OBJECTIVES

To learn about food processing unit and its operations
To understand the food preservation methods .
To apply the rice technology and wheat technology

UNIT I- Magnitude, Division and Interdependent activities of the food industry, unit operations of the food industry. Food processing sector –vision and mission, opportunities, strategies and constraints in the Indian food processing sector. Post harvest priority requirements, Strengths, weakness, opportunities and threats (SWOT) of food sector.

UNIT II - Rice Technology - Production, processing, milling of rice, parboiling, processes, by products of rice milling and their utilization. Nutrient loss during processing. Wheat Technology - Production, processing, manufacture of breakfast cereals Millets - Production, processing.

UNIT III - Mushroom - Production, processing, utilization. Meat - Production, processing, smoking and curing of meat, grading. Poultry - Production, preparing poultry for consumption, packaging. Fish - Production, effect of handling practices, storage of eggs, manufacturing and packaging of egg products.

UNIT IV - Vegetables - Drying and dehydration techniques –drum drying, vacuum puffing, foam mat drying, freeze drying, accelerated freeze drying. Processing of Vegetables and fruits .Canning -steps, spoilage of canned foods,advantages,disadvantages. Bottling –steps ,advantages,disadvantages.

UNIT V-Preservation using high sugar and salt concentrates - Processing of jam,jellies,marmalades,preserves,squash. Pickling – processing of sauerkraut,dill pickles. Latest technologies in food preservation –principles, advantages and disadvantages.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the Unit operation and food processing	Re
CO 2	Acquire the knowledge on rice and wheat techcnology	Un
CO3	Explore ideason mushroom cultivation, fish cultivation	Ap
CO4	Find out the methods for preservation of vegetables	An
CO5	Demonstrate on various types of food preservatives .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Saiauel, A. Matz., The Chemistry and Technology of cereals of Foods and Feed", CBS Publishers and Distributors, 1996.

2. G.C. Banerjee, Poultiy, Oxford and IBH Publishing CODUB Ltd., New Delhi.
3. Giridhari Lal,G.S.Sidhappa and G.L.Tandon-Preservation of fruits and vegetables,ICAR,New Delhi,1998

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S5BCEL2A	Semester	V	Medium of Instruction	English

SEMESTER : V- MAJOR ELECTIVE COURSE 2 (A)

(For the students admitted from 2018 onwards)

BIOENERGETICS AND METABOLISM

COURSE OBJECTIVES :

To learn the free energy and entropy reactions
To gain knowledge on biological oxidation and ETC
To understand the metabolic pathways in human system and its significance.
To impart basic concepts in lipid metabolism

Unit- I- Bioenergetics: Free energy and entropy changes in biological system, coupling of endergonic and exergonic processes. High energy phosphates. An overview of intermediary metabolism .

Unit II- Biological Oxidation- Enzymes and coenzymes involved in oxidation and reduction reactions, electron transport chain, inhibitors of ETC. Oxidative phosphorylation. Inhibitors and uncouplers of oxidative phosphorylation.

Unit III-Carbohydrate metabolism: Glycolysis and its energetic. gluconeogenesis, oxidation of pyruvate to acetyl CoA, TCA cycle and its energetic, anaplerotic reactions, Hexose monophosphate pathway, glycogenesis and glycogenolysis.

Unit IV- Lipid metabolism: Biosynthesis of fatty acids- biosynthesis and catabolism of triglycerides, phospholipids and glycolipids. Oxidation of fatty acids α, β and γ oxidation; Cholesterol-synthesis and degradation. Ketogenesis.

Unit V-Protein and nucleic acid metabolism: Deamination, decarboxylation, transamination of amino acids, glucogenic and ketogenic amino acids, urea cycle, biosynthesis and catabolism of amino acids- Glycine, phenylalanine, tyrosine, serine and methionine. Metabolism of purine and pyrimidine nucleotides.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Understand the free energy and high energy compounds	Re
CO 2	Acquire the knowledge on Biological oxidation	Un
CO3	Outline the major pathways in carbohydrate metabolism	Ap
CO4	Learn about lipid metabolism and its importance	An
CO5	Explore on basic reactions and its concepts in protein metabolism .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Biochemistry by Harper , Mc Graw Hill publishers, 25th edition (2003)
2. Biochemistry by U.Satyanarayana, Allied Book Publishers, 3rd edition (2006)
3. Fundamentals of Biochemistry by J.L.Jain, S.Chand & Company Ltd, 4th edition (2005).
4. Biochemistry by S.Nagini, Scitech Publications (2007)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S5BCEL2B	Semester	V	Medium of Instruction	English

SEMESTER –V- MAJOR ELECTIVE COURSE 2 (B)
(For the students admitted from 2018 onwards)

PERSONAL HYGIENE

COURSE OBJECTIVES:

To learn about Healtheducation and its importance
To exemplify the importance of personal health
To gain knowledge on physical healtlh and mental health

Unit I
Health Education: Definition – Importance - Principles of Health education – content of health education. Health education – planning – methods of teaching - recognition of opportunity for teaching – preparation of low cost aids for teaching - audiovisual aids.

Unit II
Personal health – Factors contributing to relationship between health and disease – healthy habits, Oral Hygiene

Unit III
Physical health – Care of skin, ear, eyes, teeth, hands and feet, recreation and posture, menstrual hygiene, care of the sick and disabled, care of old people (geriatrics)

Unit IV
Mental health – Definition –Causes and Types - Characteristics of a mentally healthy person – Factors contributing to mental health.

Unit V
Environmental health – Relation of environment to health - health hazards – purification of water - efficient disposal (different methods like bore - hole latrine) - Solid waste disposal and control - food and milk sanitation – pest and rodent control.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn health education with its principles and importance	Re
CO 2	Acquire the knowledge on personal health and its factors	An
CO3	Know the mental and physical health	Ap
CO4	Understand environmental health and its hazards	Un
CO5	Explore concepts on solid waste management .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Reference
1. J.H. Helberg :Community Health
2. David morley and others:Practicing health for all

3. Gill Watt :Health Policy
4. W.B. Saunders :Epidemology, Biostatistics and Preventive medicine, 1996 5. J.E.Park & K. Park:Preventive And Social MedicineBrown And Io.1978

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S5BCEL2C	Semester	V	Medium of Instruction	English

Semester – V- MAJOR ELECTIVE COURSE 2 (C)
(For the students admitted from 2018 onwards)

COMMUNICATION AND PERSONALITY DEVELOPMENT

COURSE OBJECTIVES

To understand the types of communication,
To know the types of communication
To gain knowledge on group communication and types of interviews

UNIT I
Personality Development: concept of personality development, the self: selfawareness, self-actualization, self-esteem and self-development.

UNIT II
Communication: Importance of communication in personality development, Communication skills, Language skills, listening skills, interpretive skills, feedback in communication.

UNIT III
Groupcommunications: Dynamics of group communication, process and methods, role of individuals in group communication.

UNIT IV
Interview: Types of interviews, preparing for an interview, answering in an interview, importance of body language in an interview.

UNIT V
Communication activities for students: Role play, one to one communication, use of body language, expressions, group communication, public speaking. Methodology: The students will have a theoretical and practical orientation on using communication as a tool for personality development.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn various types of communications	Re
CO 2	Know the importance of communication	An
CO3	Explore the concepts of group communication	Ap
CO4	Understand various types of interviews	Un
CO5	investigate methodology of effective communication .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. KaulacharyaJagdish Sharma (2010).Body Language, Fusion Books.

2. Rajeev Sethi (2004).Building a Successful Career, Infinity books.
3. Worchel & Cooper (1976). Understanding social Psychology, The Dorsey Press.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	3	Hrs/week	4	Sub Code	S5SELO1	Semester	V	Medium of Instruction	English

SEMESTER – V – NON MAJOR ELECTIVE

(For students admitted from 2018 onwards)

STATISTICAL DATA ANALYSIS

COURSE OBJECTIVES

To identify the collection of data
To learn the classification and tabulation of data
To measure central tendency

Unit-I: Collection of Statistical data - Primary and Secondary – Methods -Preparation of Questionnaire and Schedules.

Unit -II: Classification and tabulation - Bar diagrams - Pie diagram – Histogram - Frequency polygon - Frequency Curve - Merits and Demerits.

Unit -III: Measures of central tendency-mean, median, mode-measures of dispersion-range, mean deviation, standard deviation and coefficient of variation.

Unit -IV: Measures of Skewness – Definition – types – methods – Karl Pearson's Skewness, Bowley's Skewness - Merits and Demerits. (Simple problems only)

Unit -V: Correlation analysis – Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation Coefficient. (Simple problems only)

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn various types of data	Re
CO 2	Classification of data and its tabulation	An
CO3	Know the measure of central tendency	Ap
CO4	Understand the measures of skewness	Un
CO5	Evaluate the use of correlation analysis in science .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books and Reference

S.P.Gupta: Statistical Methods, Sultan chand and Sons, New Delhi.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	2	Hrs/week	1	Sub Code	S5SB3C	Semester	V	Medium of Instruction	English

SEMESTER – V- SKILL BASED
(For the students admitted from 2018 onwards)

MUSHROOM CULTIVATION AND VALUE ADDITION

COURSE OBJECTIVES

To learn basics of mushroom cultivation
To know the types of edible types of mushroom
To understand principles of mushroom cultivation

Unit I

Mushroom – Introduction-Taxonomical rank -History and Scope of mushroom cultivation - Edible and Poisonous Mushrooms-Vegetative characters.

Unit II

Structure and key for identification of edible mushrooms, Button mushroom (*Agaricus bisporus*), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus sajorcaju*) and paddy straw mushroom *(Volvariella volvcea*).

Unit III

Structure and key for identification of poisonous mushrooms– Truffles (*Tuber elanosporum*), *Ammanita* sp , *Galerina marginata*, and *Chlorophyllum molybdites*.

Unit IV

Principles of mushroom cultivation- Sterilization and disinfections of substrates. -Pasteurization of different substrates –spore printing, pure culture, spawn production and their maintenance.

Unit V

Nutritional and medicinal values of mushrooms-value added products of mushrooms soup, cutlet, vegetable curry, samosa, omelette, pickle etc. Research Centres – National level and Regional Level Cost benefit ratio –Marketing in India and abroad – Export value.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn the basics of mushroom cultivation	Re
CO 2	Acquire the knowledge on structure and functions of various types of mushroom	An
CO3	Identify poisonous mushroom	Ap
CO4	Demonstrate the method of mushroom cultivation	Un
CO5	Apply the nutritional and medical values of mushrooms .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text book and Reference Book

1. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. V.N. Pathak, Nagendra Yadav and Maneesha Gaur, Mushroom Production and Processing Technology/ Vedams Ebooks Pvt Ltd., New Delhi (2000)

Question paper pattern **Max Marks: 50** **Exam duration : 3 hours**

Part A 5x4 = 20 Answer any five questions (out of seven)

Part B 3x10 = 30 Answer any three questions (out of five)

Signature of HOD

Credits	5	Hrs/week	6	Sub Code	S6BC6	Semester	VI	Medium of Instruction	English

SEMESTER- VI- CORE COURSE – 10
(For the students admitted from 2018 onwards)
IMMUNOLOGY

COURSE OBJECTIVES

To understand the basics of immune systems
To study different types of immunoglobulins
To demonstrate the immunological techniques
.

Unit I- The immune systems- Introduction, Lymphocytes, their origin and differentiation, Antigen presenting cells – Macrophages, dendritic cells, Langerhans cells , their origin and function. Mechanism of phagocytes, Antigens- their structure and classification, compliments and their biological functions- Types of immune responses.

Unit II- Immunoglobulins – Structure of immunoglobulins, antibody specificity,biological functions of immunoglobins, generation of diversity, antigen – antibody interactions, antitoxins, agglutination, opsonin, bacteriolysin and precipitation.

Unit III- Techniques, production of antigens – the precipitation reaction, immunodiffusion, immunoeletrophoresis, radio immuno assay, immunoflorescence, compliment fixation and ELISA techniques.

Unit IV-Immuno haemotology- Blood group antigens, Rhesus – incompatibility- maternal response to fetal antigens – other blood group systems. Major histocompatibility complex.(HLA).Autoimmune diseases- types and mechanism.

Unit V- Immunity to infection – hypersensitivity reactions, types of hypersensitivity,mechanism of T cell activation, macrophage activation and granuloma formation, transplantation – immunologic response, graft rejection, mechanism and prevention of graft rejection, immune suppressive drugs.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Know basic of immune response	Re
CO 2	Acquire the knowledge on types of immunoglobulins	An
CO3	Demonstrate the various immunological techniques	Ap
CO4	Understand immune haematology	Un
CO5	Explore concepts on and reactions of hypersentivity and its prevention .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Immunology by N.Arumugam, Saras Publications (2009)
2. Immunology by Kuby , Freeman Publishers, 6^{th} edition (2008)
3. Immunology by Tizard, Elsevier Publishers, 8^{th} edition (2010).

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	5	Hrs/week	6	Sub Code	S6BC7	Semester	VI	Medium of Instruction	English

SEMESTER- VI- CORE COURSE – 11
(For the students admitted from 2018 onwards)

CLINICAL BIOCHEMISTRY

COURSE OBJECTVES:

To understand the disorders of major type of metabolism
To know disorders of carbohydrate , lipid , nucleic acid and protein metabolism
To apply the concepts of disorders of endocrine systems.

Unit I- Disorders of fluids, electrolyte balance and gastrointestinal system, disorder involving change in hydrogen ion concentration, Metabolism of bilirubin. Liver function tests, jaundice, haemolytic , hepatic and obstructive jaundice. Renal function tests, normal and abnormal constituents of urine.

Unit II- Disorders of carbohydrate metabolism – Sugar level in normal blood, maintenance of blood sugar concentration – endocrine influence on carbohydrate metabolism, hypoglycemia, glycosuria, renal threshold value, diabetes mellitus – classification, complications, glucose tolerance test (GTT), diabetic coma, diabetic ketoacidosis, glycogen storage diseases, fructosuria, galactosemia, and hypoglycemic agents.

Unit III- Disorders of lipid metabolism – lipid metabolism in liver and adipose tissue, plasma lipoproteins, cholesterol triglycerides and phospholipids in health and diseases, fatty liver, atherosclerosis, lipid storage diseases, hypolipoproteinemia and hyperlipoproteinemia.

Unit IV- Disorders of protein, amino acid and nucleic acid metabolism – plasma proteins, their origin, significance and variation in diseases. Nitrogen balance, proteinuria, multiple myeloma, Wilsons disease. Phenyl ketonuria, alkaptonuria, tyrosinosis, albinism, Hartnups disease. Fanconic syndrome, cystinuria, Gout.

Unit V-Disorders of endocrine systems – Disorders and laboratory investigations associated with thyroid, pituitary, adrenal medulla and sex hormones. Disturbances in blood clotting mechanisms, hemophilia, anemia , porphyria and anticoagulants.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Study metabolic disorders	Re
CO 2	Learn disorders of carbohydrate metabolism	An
CO3	Know the metabolism disorder of lipid metabolilsm	Ap
CO4	Understand the disorders of protein metabolism.	Un
CO5	Discuss the disorders of endocrine systems .	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Medical Biochemistry by N.V.Bhagavan, Elsevier Publishers (2002) (For Unit 1 &2)
2. Text Book of Biochemistry by M.N.Chatterjee, Jaypee Publishers (2006) (For Unit 3, 4 & 5).
3. Fundamentals of Biochemistry by Ambika shanmugam, S.Chand Publishers (1986)
4. Medical Laboratory Technology by Mukherjee, Tata Mc Graw Publishers (1988)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	5	Hrs/week	6	Sub Code	S6BC8	Semester	VI	Medium of Instruction	English

SEMESTER- VI- CORE COURSE – 12
(For the students admitted from 2018 onwards)

PHARMACEUTICAL CHEMISTRY

COURSE OBJECTIVES

To expose the students on drug classification , drug metabolism.
To learn the types of preservatives, drug addiction, drug allergy.
To gain knowledge on chemotherapy and drug abuse

Unit I-Classification of drugs based on source- mode of administration, site of action, absorption of drugs, drugs distribution and elimination, Role of kidney in elimination.

Unit II-Drugs metabolism – chemical pathways of drug metabolism . Phase I and Phase II reactions, role of cytochrome P450 , non- microsomal reactions of drug metabolism, drug metabolizing enzymes.

Unit-III- Chemotherapy- Biochemical mode of action of antibiotics- penicillin , streptomycin, tetracyclins and chloramphenicol. Action of alkaloids, antiviral and antimalarial substances. Biochemical mechanism of drug resistance.

Unit IV- Adverse response and side effects of drugs, allergy, Drug intolerance, Drug addiction, drug abuses and their biological effects. Rational therapy. Drugs prescribed in old age, infants and pregnancy. Treatment of myasthenia gravis.

Unit V- Anaesthetics -General and local anaesthetics, ether and vinyl ether, halogenated hydrocarbons like chloroform, intravenous anaesthetics-thiopentane sodium and cocaine. Antiseptics and disinfectants–phenols and related compounds, Preservatives and food additives.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Study the classification of drugs based on source	Re
CO 2	Learn the drug metabolism with its enzymes	An
CO3	Discuss the chemotherapy	Ap
CO4	Understand and apply the adverse reactions of drugs	Un
CO5	investigate the use of anaesthetics	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Text Book of pharmaceutical chemistry by Jayashree Ghosh , S.Chand publishers (2010)

2. Pharmaceutical chemistry by Tripathi, Jaypee Publishers, 6th edition (2008)
3. Pharmacology by satoskar, Elsevier Publications (2008).
4. Principles of medicinal chemistry by W.O.Foye, Lippincott Publications (2007)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)

Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	6	Sub Code	S6BCP4	Semester	VI	Medium of Instruction	English

SEMESTER- VI- CORE COURSE -13
MAJOR PRACTICAL- IV
(For the students admitted from 2018 onwards)

COURSE OBJECTIVES :

To demonstrate the experiments both qualitative and quantitative in clinical samples.
To estimate compounds in urine and blood samples

1. Qualitative tests of urine, abnormal constituents – sugar, albumin, acetone, bile salts & bile pigments.
2. Quantitative estimations in urine:
   a. Sugar.
   b. Chloride.
   c. Urea
   d. Uric acid
   e. Creatinine
   f. Creatine.
3. Qualitative estimation in blood
   a. Glucose
   b. Cholesterol
   c. Calcium
   d. Urea.
   e. Iron
   f. Protein
   g. Uric acid
   h. Bilirubin
   i. Determination of SGOT & SGPT.
4. ESR, PVC, TC/DC Count, haemoglobin, content and blood grouping.

   Industrial Visit to Various pharmaceutical / food industry/ Educational /Research Institutions.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Estimate the compounds in urine samples	Un
CO 2	Estimate the various compounds in blood samples	An
CO3	Know the methods of heamatology	Ap

(Un- Understand, Ap – Apply, An- Analyse,)

Credits	4	Hrs/week	6	Sub Code	S6BCEL3A	Semester	VI	Medium of Instruction	English

SEMESTER- VI- MAJOR ELECTIVE- 3 (A)
(For the students admitted from 2018 onwards)

BASIC BIOTECHNOLOGY

COURSE OBJECTIVE

To understand the history and scope of biotechnology
To learn the plant tissue culture and its applications.
To demonstrate waster water treatment and animal cell culture

Unit I- History of biotechnology and scope of biotechnology, Recombinant DNA- Construction, restriction endonucleases, cloning vectors, plasmids, phage, cosmid, Ligases, Methods of gene transfer, Isolation & insertion of desired gene, Introduction to host, selection and screening of recombinants, cDNA cloning, southern blotting, western blotting and PCR.

Unit II- Culture of microorganism- solid state fermentation, types of bioreactors, Media preparation, Batch culture, continuous culture, Fed batch culture, stages of downstream processing, Fermentation process- commercial production of amylase, ethanol, citric acid, glutamic acid, riboflavin, fermented foods- cheese, yoghurt.

Unit III- Plant tissue culture, cell culture, callus culture, media preparation . Protoplast culture- isolation , culture, and regeneration of protoplast, Agrobacterium mediated gene transfer,

Applications of plant biotechnology- insect resistant plants, herbicide resistant plants, improvement of crop yield and quality, genetically engineered plants as protein factories.

Unit IV- Animal cell culture, culture media, cell lines, cell and animal cloning, production of peptide hormones, vaccines, antibodies. Human genome project.

Transgenic animals- importance of transgenic animals, gene transfer- retroviral method,microinjection method, Embryonic stem cell method, gene knockout, Dolly. Application of transgenic animals in human welfare and animal husbandary.

Unit V- Waste water and sewage treatment, Biofuels, Biodegradation, bioremediation, microbial mining biomass production and conservation, Biofertilizers. Patent and intellectual property rights, Green house effect and global warming.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn fermentation process	Re
CO 2	Discuss plant tissue culture	An
CO3	Application of plant biotechnology	Ap
CO4	Understand animal cell culture and its techniques	Un

CO5	Investigate the waste water treatment and bioremediation	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Biotechnology by U.Sathyanarayana, Allied Book publications, 2nd edition (2006)
2. Animal Biotechnology by V.Kumaresan, Saras Publications, (2009)
3. Biotechnology by R.C.Dubey, S.Chand Publications (2009)
4. Biotechnology by S.S.Purohit, Saraswati Publishers (2005)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	6	Sub Code	S6BCEL3B	Semester	VI	Medium of Instruction	English

SEMESTER- VI- MAJOR ELECTIVE COURSE 3 (B)

(For the students admitted from 2018 onwards)

BIOTECHNOLOGY FOR HUMAN WELFARE

COURSE OBJECTIVES

To know the basics of agricultural biotechnology
To understand the food and dairy biotechnology
To gain knowledge on use of biotechnology for disease

Unit I - Agricultural Biotechnology. Organic farming. Integrated farming, Vermicompost, Crop Improvement.

Unit II

Food & Dairy Biotechnology. Microbes as food, feed. Prebiotics. Probiotics. Algae - SCP, Beta carotene, Fungi as food – Mushroom. Fermented food products.

Unit III

Biotechnology for disease diagnosis. Clinical diagnosis. Lab diagnosis – Microscopy, Macroscopy, Biochemical, serological & Molecular diagnosis of diseases – PCR, RT –PCR, RAPD, RFLP, Karyotyping.

Unit IV

Biotechnology for treatment & prevention of diseases. Treatment – Symptomatic therapy, specific therapy, antimocrobials Prevention – Active immunization, passive immunization, combined immunization, herd immunity.

Unit V

Environmental Biotechnology. Waste management – Solid, liquid, sewage, municipal waste Bioremediation. Bioleaching. Biodegradation.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Demonstrate the techniques including vermicomposting.	Re
CO 2	Learn the food and dairy biotechnology	An
CO3	Application of biotechnology for disease and diagnosis	Ap
CO4	Understand and apply biotechnology for treatment and prevention	Un
CO5	Knowing the basic concept of environmental biotechnology	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Refernce Books

1. D. Balasubramanian, C. F. A. Bryce, K. Dharmalingham, J. Green and K.Jayaraman.1996. Concepts in Biotechnology. Universities Press.
2. Ashok K. Chauhan. 2009. A Textbook of Molecular Biotechnology. I.K. International Publishing house Pvt. Ltd.
3. Chandrakant Kokate, SS Jalalpure, Pramod H.J. 2011. Textbook of Pharmaceutical Biotechnology. A division of Reed Elsevier India Pvt. Ltd.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	6	Sub Code	S6BCEL3C	Semester	VI	Medium of Instruction	English

SEMESTER- VI- MAJOR ELECTIVE COURSE 3 (C)
(For the students admitted from 2018 onwards)

PUBLIC HEALTH AND HYGIENE

COURSE OBJECTIVES

To understand the public health and health hazards which expose health awareness.

To communicative and non communicative diseases

To know health education in India.

UNIT I
Scope of Public health and Hygiene – nutrition and health – classification of foods – Nutritional deficiency diseases- Vitamin deficiency diseases.

UNIT II
Environment and Health hazards: Environmental degradation – Pollution – Air, Water, Land and Noise-associated health hazards.

UNIT III
Communicable diseases and their preventive and control measures. Measles, Malaria, Hepatitis, Cholera, Filariasis, HIV /AIDS.

UNIT IV
Non-Communicable diseases and their preventive measures. Genetic diseases, Cancer, Cardio vascular diseases, Chronic respiratory disease, Diabetes, Epilepsy,

UNIT V
Health Education in India – WHO Programmes – Government and Voluntary Organizations and their health services – Precautions, First Aid and awareness on epidemic/sporadic diseases.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn public health and hygiene	Re
CO 2	Gain knowledge on Environmental hazards	An
CO3	Aware of communicable disease	Ap
CO4	Understand non communicable diseases	Un
CO5	Deliberate the concept of health education in India	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text Books & Reference Books

1. Park and Park, 1995: Text Book of Preventive and Social Medicine – Banarsidas Bhanot Publ. Jodhpur – India. Reference
2. Verma, S. 1998 : Medical Zoology, Rastogi publ. – Meerut – India
3. Singh, H.S. and Rastogi, P. 2009 : Parasitology, Rastogi Publ. India.
4. Dubey, R.C and Maheswari, D.K. 2007 : Text Book of Microbiology- S. Chand & Co. Publ. New Delhi – India.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	3	Hrs/week	4	Sub Code	S6BTELO2	Semester	VI	Medium of Instruction	English

SEMESTER- VI- NON MAJOR ELECTIVE

(For the students admitted from 2018 onwards)

PHARMACEUTICAL BIOTECHNOLOGY

COURSE OBJECTIVES

To understand the concept of pharmaceutical biotechnology with its applications
To explore on cloning vectors and rDNA
To learn Types of immunity

Unit – I – Brief introduction to biotechnology with reference to pharmaceutical science, Enzyme biotechnology- methods of enzyme immobilization and applications, Biosensors- working and applications of biosensors in pharma industry.

Unit II – Study of cloning vectors, Restriction endonuclease and ligase. Recombinant DNA technology, applications of genetic engineering in medicine- interferons production, vaccines- hepatitis B, Hormone – insulin.

Unit – III – Types of Immunity, humoral and cellular , immunoglobulin structure and functions. Hybridoma technology- production of maps, purification and applications .

Unit – IV- Mutation- types of mutation, DNA repair mechanism, Gene therapy- introduction, types , introduction to drug designs, evaluation of drugs.

Unit –V – Fermentation methods – fermentor design and control, study of production of penicillin, vitamin B12, griseofulvin, advantages and disadvantages of pharmaceutical biotechnology

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Study the introduction to biotechnology	Re
CO 2	Learn the restriction enzymes its applications	An
CO3	Know the types of immunity	Ap
CO4	Understand the types of mutation	Un
CO5	Apply and evaluate the basics of fermentation methods	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text book & Reference Books

1. Immunology , Nandhini shetty (2013), An introductory text book, Newage int. publishers
2. Brown TA (2010), Gene cloning and DNA analysis – an introduction , Wiley Blackwell publishers.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

RAJAH SERFOJI GOVT COLLEGE,(AUTONOMOUS)

THANJAVUR –613 005
(Reaccredited with "A"Grade by NAAC)

AFFLIATED TO BHARATHIDASAN UNIVERSITY ,

TRICHIRAPPALLI –24

DEPARTMENT OF BIOCHEMISTRY

SYLLABUS (NON MAJOR ELECTIVES & ALLIED PAPERS)

(For the students admitted from 2018–2019 onwards)

Credits	4	Hrs/week	4	Sub Code	S3ABC1	Semester	III	Medium of Instruction	English

Allied I – GENERAL BIOCHEMISTRY

COURSE OBJECTIVES

To know about the basic biomolecules and its functions in our body.
To learn classification of carbohydrates , proteins and lipids
To understand the nature of nucleic acid and its functions

UNIT – I : CARBOHYDRATES

Definition, classification of carbohydrates, sources, chemistry and biological functions of monosaccharides, disaccharides and polysaccharides.

UNIT –II PROTEINS

Definition, biological functions of proteins, classification of amino acids, chemical reactions of amino acids, classification and properties of proteins.

UNIT –III- LIPIDS

Classification of lipids, properties of lipids and fatty acids, saturated and unsaturated fatty acids, structure ad functions of phospholipids , cholesterol and bile acids**.**

UNIT – IV – NUCLEIC ACIDS

Purines and pyrimidines, structure and biological functions of DNA and RNA. Properties of DNA and RNA.

UNIT – V – VITAMINS

Definition, chemistry, sources, daily allowances, functions and deficiency diseases of fat soluble vitamins (Vitamin A, D, K and E) and Water soluble vitamins (Vitamin B & C)

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn and remember the biomolecules	Re
CO 2	Study the classification of carbohydrates and its functions	An
CO3	Know the classification of proteins and lipids	Ap
CO4	Understand the nature of nucleic acid with its structure	Un
CO5	Apply the uses of vitamins and vitamin deficiency diseases	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text books & Reference Books :

1. Text Book of Biochemistry – A.C.Deb.
2. Text Book of Biochemistry – Lehinger.
3. Text Book of Biochemistry – Ambika shanmugam.

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	4	Sub Code	S4ABC2	Semester	IV	Medium of Instruction	English

Allied 2 – BIOCHEMISTRY II

COURSE OBJECTIVES

To know about the basic biochemical techniques and its applications.
To learn principle, and applications of chromatographic techniques
To understand the principle and applications of electrophoresis

UNIT – I

pH meter- pH scale, Henderson- Hasslbath equation, Buffer solutions, Buffer systems of blood – Hb, Protein and Phosphate Buffer systems.

UNIT – II

Chromatography- Principle, materials, methods & Applications of paper chromatography, TLC ion exchange , affinity chromatography and Gel filtration chromatography.

UNIT – III

Electrophoresis- Principles, instrumentation and applications of paper electrophoresis, agar gel, starch gel, SDS PAGE , immuno electrophoresis.

UNIT IV

Principle, instrumentation and application of colorimetry, Spectrophotometry, Fluorimetry and Flame photometry.

UNIT V

Tracer and other techniques – radioactive decay, unit of radioactivity , GM Counter, scintillation counter, applications of radio isotopes in biological and medical sciences.

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Demonstrate the types of buffer systems	Re
CO 2	Learn the principle and applications of chromatographic techniques	An
CO3	Understand the method of electrophoresis with its applications	Un
CO4	Understand the method of colorimetry	Un
CO5	Explore the techniques of GM counter and its applications	Ev

(Un- Understand, Ap – Apply, An- Analyse, Ev- Evaluate, Re – Remember)

Text books and Reference books

1. Instrumental methods of chemical analysis by Sharma B.K
2. Instrumental method of chemical analysis by Kudesia V.P, Sawhaney H
3. An introduction to practical biochemistry by David T.Palmer.

\Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	4	Hrs/week	3	Sub Code	S4ABCP	Semester	IV	Medium of Instruction	English

ALLIED PRACTICAL

BIOCHEMISTRY PRACTICAL

COURSE OBJECTIVES

To learn qualitative analaysis of carbohydrates
To demonstrate the techniques of chromatography

QUALITATIVE ANALYSIS

1. Qualitative analysis of monosaccharides (Glucose, Fructose, galactose)
2. Qualitative analysis of disaccharides (Lactose and Sucrose)
3. Qualitative analysis of polysaccharides (Starch)
4. Qualitative analysis of amino acids.

DEMONSTRATION EXPERIMENTS

1. Preparation of buffers and its pH measurements using pH meter.
2. Separation of amino acids by Circular paper chromatography

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn the qualitative analysis of carbohydrates	Un
CO 2	Demonstrate the preparation of buffers	De
CO3	Study and apply the separation of amino acids by paper chromatography	Ap

(Un- Understand, Ap – Apply, De- Demonstrate)

Text Books and Reference books

1. Practical Biochemistry By Varley.
2. Practical Manual by Jeyaraman,
3. Biochemical methods by Sadasivam

Question paper pattern

Internal – 40 marks, external – 60 marks

Major Experiment – 30, Minor experiment 20, Record -10

Signature of HOD

Credits	3	Hrs/week	4	Sub Code	S5BCELO1	Semester	V	Medium of Instruction	English

SEMESTER – V-NON MAJOR ELECTIVE
(For the students admitted from 2018 onwards)

HEALTH SCIENCE & HEALTH EDUCATION
(For B.Sc Statistics)

COURSE OBJECTIVES

To understand the basics in nutrition and health education
To learn the basic of nutrition and its energy level
To know food preservatives

UNIT – I- Introduction to Nutrition –Definition, General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food. Fruits and vegetables for good health. Energy - Definition of Kilocalories, Joule, energy value of foods, basal metabolic rate (BMR).

UNIT II- Defintion , Source, and biological functions of carbohydrates, proteins, and lipids. Vitamins - Source , functions and deficiency diseases of vitamin A, D, C , folic acid. Recommended Dietary allowance (RDA)- Protein energy malnutrition- Marasmus, Kwashiorkor.

UNIT III- Food preservation-general principles and methods. Preservation by addition of sugar. General principles and methods of preparation of jams, jellies , theory of gel formation. Preservation by addition of salt- Pickling. Preparation of Indian Pickles, Food adulteration. Guide lines for good health.

UNIT IV- Life Style Changes - Urbanization, Westernization, Work style, Food habits and Food behavior changes, drug addiction and harmful effects .Weight related disorders - Underweight-Etiology, assessment, dietary management, Role of dietary fibre and health.

UNIT V- Health education – Definition, importance of health education, Personal hygiene.
Physical education – Meaning & scope, role of exercises and yoga in improving health.
Health insurance scheme (Government & Non Government) – Mediclaim Policy, Employee State Insurance Scheme, Specialised Insurance Scheme.
National Nutrition Policy and Progress- World health Organization (WHO),
UNICEF and its functions,

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn types of nutrition and related diseases	Le
CO 2	Understand the vitamin and its deficiency diseases	Un
CO3	Apply the knowledge of food preservativies	Ap
CO4	Create awareness on life style changes	Un
CO5	Gain knowledge on health insurance policies , WHO, UNICEF	Ap

(Un- Understand, Le-Learn , Ap – Apply)

Text books & Reference Books

1. Nutrition and Dietetics by Shubhagini, Tata Mc Graw Publishers, 3rd edition, (2010)
2. Human Nutrition by B.Srilakshmi, New Age Publishers, 2nd edition (2008)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD

Credits	3	Hrs/week	4	Sub Code	S6BCELO2	Semester	VI	Medium of Instruction	English

SEMESTER – VI-NON MAJOR ELECTIVE

(For the students admitted from 2018 onwards)

NUTRITION & HEALTH SCIENCE
(For B.Sc Biotechnology)

COURSE OBJECTIVES

To understand the basics in nutrition and health education
To learn the basic of nutrition and its energy level
To know food preservatives

UNIT – I- Introduction to Nutrition –Definition, General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food. Fruits and vegetables for good health. Energy - Definition of Kilocalories, Joule, energy value of foods, basal metabolic rate (BMR).

UNIT II- Defintion , Source, and biological functions of carbohydrates, proteins, and lipids.
Vitamins - Source , functions and deficiency diseases of vitamin A, D, C , folic acid. Recommended Dietary allowance (RDA)- Protein energy malnutrition- Marasmus, Kwashiorkor.

UNIT III- Food preservation-general principles and methods. Preservation by addition of sugar. General principles and methods of preparation of jams, jellies , theory of gel formation. Preservation by addition of salt- Pickling. Preparation of Indian Pickles, Food adulteration. Guide lines for good health.

UNIT IV- Life Style Changes - Urbanization, Westernization, Work style, Food habits and Food behavior changes, drug addiction and harmful effects .Weight related disorders - Underweight-Etiology, assessment, dietary management, Role of dietary fibre and health.

UNIT V- Health education – Definition, importance of health education, Personal hygiene.
Physical education – Meaning & scope, role of exercises and yoga in improving health.
Health insurance scheme (Government & non Government) – Mediclaim Policy, Employee State Insurance Scheme, Specialised Insurance Scheme.National Nutrition Policy and Progress- World health Organization (WHO),UNICEF and its functions,

COURSE OUTCOMES

At the end of the course, the students will be able to		**Cognitive level**
CO 1	Learn types of nutrition and related diseases	Le
CO 2	Understand the vitamin and its deficiency diseases	Un
CO3	Apply the knowledge of food preservativies	Ap
CO4	Create awareness on life style changes	Un
CO5	Gain knowledge on health insurance policies , WHO, UNICEF	Ap

(Un- Understand, Le-Learn , Ap – Apply)

Text books & Reference Books

3. Nutrition and Dietetics by Shubhagini, Tata Mc Graw Publishers, 3rd edition, (2010)
4. Human Nutrition by B.Srilakshmi, New Age Publishers, 2nd edition (2008)

Question paper pattern **Max Marks: 75** **Exam duration : 3 hours**

Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)
Part B 5 x 5 = 25 Answer all questions (either or type two questions from each unit)
Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)

Signature of HOD