

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI – 627012

B.Sc. BIOCHEMISTRY SYLLABUS

(OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM)

(Effective from the academic year 2026-2027 onwards)

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. BIOCHEMISTRY

(OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM)

(Effective from the academic year 2026-2027 onwards)

1. Vision of the University

To provide quality education to reach the un-reached

2. Mission of the University

- To conduct research, teaching and outreach programmes to improve conditions of human living.
- To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity.
- To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development.
- To provide quality/inclusive education, especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled.

3. Preamble

Biochemistry deals with the study of chemical and physical processes of living systems. Biochemistry holds promises in areas of Medical Science, Health Science and Agriculture. The B.Sc. Degree programme aims at providing in-depth knowledge and understanding of the core principles of Biochemistry and their practical aspects in order to pursue higher studies and employment. B.Sc. Biochemistry curriculum has been framed and mapped such that the compilation of the Outcomes of all Courses in the programme ensures the attainment of the programme outcomes in terms of RBT.

4. Programme Educational Outcomes (PEO)

In alignment with the Vision and Mission of the University, the following have been defined as the PEO for the graduates.

PEO1: Developing strong positive attitude to learn independently the concepts in the field of study.

PEO2: Ensuring confidence among the learners to apply the knowledge and skills gained to solve real life issues.

PEO3: Habituating ethical values among the learners to succeed in personal and professional life.

5. Programme Outcomes (PO)

After the successful completion of Undergraduate Programme from the University, the learner should be able to

PO1: Comprehend the knowledge acquired and communicate the same to others.

PO2: Analyze and compare the factual data / situation to comprehend and to critically evaluate to find solution to the problem ahead.

PO3: Apply theories and philosophies learned in solving the problem in scientific manner.

PO4: Think reflectively on the earlier activities and attempt for self-directed lifelong learning process.

PO5: Understand multicultural existence and identify the means to prolong moral/ethical values in personal and professional life.

PO6: Expose the learner to the digital technology to learn through multiple sources

PO7: Train the learner to be a responsible player in teams and impart leadership qualities in them.

6. Programme Specific Outcomes (PSO)

On completion of B.Sc. Biochemistry programme, the student should be able to

PSO1: Effectively communicate the concepts of biomolecules, enzymes, cell, organ system, metabolism of compounds, nutrients and their impacts in health status among others through enhanced reading of textbooks, library usage, presenting seminars, writing assignments etc.

PSO2: Develop critical thinking skill and laboratory skills in Biochemistry for designing, operating and interpreting experiments applied in biology and medical diagnosis.

PSO3: Develop problem solving ability by utilizing the conceptual knowledge and bioanalytical techniques, to solve problems.

PSO4: Create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate in addressing the biological and medical challenges faced by human kind.

PSO5: Contribute effectively in the development of ethical practices and societal contributions leading to responsible and competent professionals by means of awareness programmes, extension activities, extra-curricular sessions, social work etc.

PSO6: Utilize the existing digital technologies that help in addressing the biological and medical challenges faced by human kind through comprehensive knowledge and skills in Analytical, Physical, Metabolic, Clinical and Industrial Biochemistry.

PSO7: Work as team to share and impart in-depth knowledge about biological sciences and facilitate to pursue post-graduation in related fields in life sciences and inculcate the research aptitude.

7. Eligibility for admission to the course and examination

Candidates shall be admitted to the course provided he/she has passed plus two examinations of the State or Central Board with Chemistry/Biology/Biochemistry as one of the subjects or any other Science subject that may be considered as equivalent by the M.S. University.

8. Medium of instruction and examination

The medium of instruction as well as examination will be in English.

9. Duration of the Course

The students shall undergo the prescribed course of study for a period of not less than three academic years (Six semesters). Each semester contains 90 working days.

10. Theory examination

The external evaluation will be based on the examination to be conducted by the university at the end of each semester.

11. Practical examination

Practical examinations will be conducted at the end of each semester.

12. Evaluation

A. Each paper carries an internal component

B. There is a pass minimum of 40% for external and overall components

Theory External: Internal Assessment = 75:25

Practical External: Internal Assessment = 50:50

C. Internal Assessment

Internal marks for Theory shall be allocated in the following manner.

The average of the best two tests from three compulsory tests	20 Marks
Seminar / Active participation in class	5 Marks
Total	25 Marks

Note: Each test will be of one hour duration.

D. Practical

Internal marks for Practical shall be allotted in the following manner.

Experimental work	20 Marks
Observation	5 Marks
Record	5 Marks
Model Test	20 Marks
Total	50 Marks

E. Project Work

Internal marks for Project shall be allotted in the following manner.

Components	Marks
Project Report	25 Marks
Viva -Voce	25 Marks
Total	50 Marks

Note:

- i) Students should carry out group project in major subject.
- ii) For External, Project report will be evaluated by External Examiners and Viva-Voce will be conducted by both the External examiner and the Guide at the end of the 6th semester.

13. The question paper pattern for all theory papers shall be as follows.

Duration of Exam: 3 Hours

Section	Type of questions	Mark
Part-A	Multiple choice question (Two question from each unit compulsory)	10×1=10 Marks
Part-B	Internal Choice questions (One question from each unit: either/or)	5×5=25 marks
Part-C	Internal Choice questions (One question from each unit: either/or)	5×8=40 marks
	Total	75 Marks

14. The question paper pattern for all practical papers shall be as follows.

Duration of Practical Exam: 3 Hours

No.	Type of questions	Mark
1	Major experiment	25
2	Minor Experiment	10
3	Spotters	10
4	Record	05
	Total	50 Marks

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Model Question Paper
B.Sc. DEGREE EXAMINATIONS
Biochemistry – Main

NUTRITIONAL BIOCHEMISTRY
(For those who joined in June 2026 and afterwards)

Time: Three hours

Maximum: 75 marks

PART A- (10x1= 10 marks)
Answer ALL questions, Choose the correct answer

Question No.	Questions	Course Outcome	Cognitive level
1	The instrument used to measure calorific value of food is a) Centrifuge b) Bomb calorimeter c) Colorimeter d) Spectrophotometer	CO1	K1
2	BMR is important in nutrition because a) It measures blood pressure b) It indicates minimum energy requirement c) It measures digestion d) It measures pulse rate	CO1	K2
3	Proteins are called body building foods because a) They increase appetite b) They provide heat c) They prevent dehydration d) They repair and build tissues	CO2	K2
4	Kwashiorkor is caused mainly due to deficiency of a) Fat b) Vitamins c) Water d) Protein	CO3	K1
5	Why are junk foods harmful? a) They contain balanced nutrients b) They are rich in fiber c) They contain excess fat and sugar d) They improve immunity	CO2	K3
6	Infants require a balanced diet a) For proper growth and development b) To reduce metabolism c) To decrease immunity d) To prevent digestion	CO4	K3

7	Assertion: Artificial sweeteners are used in diabetic diet Reason: They provide sweetness with less or no calories a) Both assertion and reason are true and reason is the correct explanation of assertion b) Both assertion and reason are true but reason is not the correct explanation of assertion c) Assertion is true, but reason is false d) Assertion is false, but reason is true	CO3	K4, K5
8	Identify the part containing error Antioxidants help / prevent oxidation / of food products / by increasing rancidity	CO4	K5
9	A patient with poor digestion needs beneficial intestinal bacteria. Which dietary supplement should be recommended?	CO4	K5, K6
10	Identify the part containing error Probiotics are / non- digestible food ingredients / that support beneficial bacteria / and destroy gut microflora	CO2	K6

PART B (5x5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Question No.	Questions	Course Outcome	Cognitive level
11.a	Define energy and its units.	CO1	K1
11.b	Define BMR and list out the factors affecting BMR	CO2	K1
12.a	Outline the nutritional significance of carbohydrates.	CO1	K2
12.b	Discuss digestibility coefficient and mention its importance.	CO2	K1, K2
13.a	Illustrate the high-cost balanced diet for infants and children.	CO3	K3
13.b	Show the common junk foods and its adverse effects.	CO2	K3
14.a	Justify the use of antioxidants in daily diet.	CO3	K5
14.b	Categorize the advantages of natural and artificial sweeteners.	CO3	K5
15.a	Differentiate food supplements and dietary supplements.	CO4	K4
15.b	Analyse the role of ICMR in improving nutritional health.	CO4	K4

PART C – (5x8= 40marks)

Answer ALL questions choosing either (a) or (b).

Question No.	Questions	Course Outcome	Cognitive level
16.a	Discuss the measurement of calories by bomb calorimeter.	CO4	K6
16.b	Elaborate the determination of BMR.	CO4	K6
17.a	Interpret the physiological role and nutritional significance of protein.	CO2	K3
17.b	Demonstrate the effects of protein energy malnutrition.	CO3	K3
18.a	Discuss on ICMR classification of food groups and its significance.	CO5	K4
18.b	Evaluate balanced diet and its significance.	CO2	K4
19.a	Evaluate the advantages of natural food colours over artificial colours	CO2	K5
19.b	Evaluate the importance of antioxidants in food preservation	CO4	K5
20.a	Evaluate the properties and function of. Nutraceuticals.	CO5	K2
20.b	Assess the importance of food safety and standard act, 2006.	CO5	K2

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Model Question Paper
B.Sc. DEGREE EXAMINATIONS
Biochemistry – Main

Core Practical I – Nutritional Biochemistry
(For those who joined in June 2026 and afterwards)

Sub Code:

Time: Three hours

Maximum: 50 marks

Question No.	Questions	Course Outcome	Cognitive level
1	Estimate the amount of Calcium present in the given milk sample. Write the Principle, Procedure, result and significance of the Experiment. (25 Marks).	CO4	K1, K5, K6
2	Choose a suitable technique and write the procedure for the isolation starch from potato sample. (10 Marks)	CO1	K1, K2
3	Identify the Spotters A & B. (5x2 = 10 Marks)	CO2	K4
4	Record (5 marks)	CO3	K3

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B.Sc. Biochemistry

(Outcome Based Education - Choice Based Credit System)

Effective from the academic year 2026 - 2027 onwards

Programme Structure

FIRST YEAR: SEMESTER I

Part I/II/III/ IV/V	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part I		Language – I	2	1	0	0	3	6	25	75	100
Part II		English – I	2	1	0	0	3	6	25	75	100
Part III	Core Course 1	Nutritional Biochemistry	3	1	0	0	4	5	25	75	100
	Core Course 2	Core Practical I: Nutritional Biochemistry	0	0	3	0	3	3	50	50	100
	Allied Course 1	(Select any one) a. Food Biochemistry - I b. Allied Microbiology - I c. Allied Botany - I	3	1	0	0	4	4	25	75	100
	Allied Practical 1	(Select any one) a. Food Biochemistry Practical - I b. Allied Microbiology Practical - I c. Allied Botany Practical - I	0	0	2	0	2	2	50	50	100
Part IV	Skill Enhancement Course (SEC-1)	(Select any one) a. Health and Nutrition b. Lifestyle Diseases	1	1	0	0	2	2	25	75	100
	Foundation Course	Bridge course: Fundamentals of Biochemistry	1	1	0	0	2	2	25	75	100
Total							23	30			

FIRST YEAR: SEMESTER II

Part I/II/III/ IV/V	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part I		Language – II	2	1	0	0	3	6	25	75	100
Part II		English – II	2	1	0	0	3	4	25	75	100
Part III	Core Course 3	Biomolecules	3	1	0	0	4	5	25	75	100
	Core Course 4	Core Practical II: Biomolecules	0	0	3	0	3	3	50	50	100
	Allied Course 2	(Select any one) a. Food Biochemistry - II b. Allied Microbiology - II c. Allied Botany - II	3	1	0	0	4	4	25	75	100
	Allied Practical 2	(Select any one) a. Food Biochemistry Practical - II b. Allied Microbiology Practical - II c. Allied Botany Practical - II	0	0	2	0	2	2	50	50	100
Part IV	Skill Enhancement Course (SEC-2)	(Select any one) a. Medicinal Diet b. Hormones in Health and Disease	1	0	0	0	1	2	25	75	100
	Skill Enhancement Course (SEC-3) Discipline/ Subject specific	First Aid	1	0	0	0	1	2	25	75	100
	Naan Mudhalvan						2	2	25	75	100
Total							23	30			

SECOND YEAR: SEMESTER III

Part I/II/III/ IV/V	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part I		Language – III	2	1	0	0	3	6	25	75	100
Part II		English – III	2	1	0	0	3	6	25	75	100
Part III	Core Course 5	Biochemical Techniques	3	1	0	0	4	4	25	75	100
	Core Course 6	Core Practical III: Biochemical Techniques	0	0	3	0	3	2	50	50	100
	Allied Course 3	(Select any one) a. Applied Chemistry - I b. Allied Chemistry - I c. Allied Zoology - I	3	1	0	0	4	4	25	75	100
	Allied Practical 3	(Select any one) a. Applied Chemistry Practical - I b. Allied Chemistry Practical - I c. Allied Zoology Practical - I	0	0	2	0	2	2	50	50	100
Part IV	Skill Enhancement Course (SEC-4)	Entrepreneurial Based (Select any one) a. Medical Laboratory Technology b. Microbial Techniques	1	0	0	0	1	2	25	75	100
	EVS	Environmental Studies	1	0	0	0	1	2	25	75	100
	Naan Mudhalvan		1	0	0	0	1	2	25	75	100
Total							22	30			

SECOND YEAR: SEMESTER IV

Part I/II/III/ IV/V	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part I		Language – IV	2	1	0	0	3	6	25	75	100
Part II		English – IV	2	1	0	0	3	6	25	75	100
Part III	Core Course 7	Enzymes	3	1	0	0	4	4	25	75	100
	Core Course 8	Core Practical IV - Enzymes	0	0	3	0	3	2	50	50	100
	Allied Course 4	(Select any one) a. Applied Chemistry - II b. Allied Chemistry - II c. Allied Zoology - II	3	1	0	0	4	4	25	75	100
	Allied Practical 4	(Select any one) a. Applied Chemistry Practical - II b. Allied Chemistry Practical - II c. Allied Zoology Practical - II	0	0	2	0	2	2	50	50	100
Part IV	Skill Enhancement Course (SEC-5)	Discipline/ Subject specific (Select any one) a. Basics of Forensic Science b. Tissue Culture	1	1	0	0	2	2	25	75	100
	Value Education		1	1	0	0	2	2	25	75	100
	Naan Mudhalvan		2	0	0	0	2	2	25	75	100
Total							25	30			

THIRD YEAR: SEMESTER V

Part I/II/III/ IV/V	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part III	Core Course 9	Cell Biology	3	1	0	0	4	5	25	75	100
	Core Course 10	Intermediary Metabolism	3	1	0	0	4	5	25	75	100
	Core Course 11	Clinical Biochemistry	3	1	0	0	4	5	25	75	100
	Core Course 12	Core Practical V: Clinical Biochemistry	0	0	4	0	4	5	50	50	100
	Elective Course 1	(Select any one) 1A: Immunology 1B: Biochemical Pharmacology 1C: Research Methodology	3	0	0	0	3	4	25	75	100
	Elective Course 2	Elective Practical - I: Cell Biology and Immunochemical Techniques	0	0	3	0	3	4	50	50	100
	Internship/Field visit/Industrial visit/Knowledge updating activity*		0	2	0	0	2	-	50	50	100
	Naan Mudhalvan		2	0	0	0	2	2	25	75	100
Total							26	30			

*The students shall submit a report on Internship/Field visit/Industrial visit/Knowledge updating activity which will be evaluated at the end of 5th semester by the External examiners.
For Internship, the students should submit a Certificate of attendance from the concerned industry/laboratory along with report.

THIRD YEAR: SEMESTER VI

Part I/II/III/ IV/V	Course Category	Course	Credit Distribution				Overall Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
Part III	Core Course 13	Molecular Biology	3	1	0	0	4	6	25	75	100
	Core Course 14	Human Physiology	3	1	0	0	4	6	25	75	100
	Core Course 15	Plant Biochemistry and Plant therapeutics	3	1	0	0	4	6	25	75	100
	Elective Course 3	(Select any one) 3A: Biotechnology 3B: Bioinformatics 3C: Bioentrepreneurship	2	1	0	0	3	5	25	75	100
	Core Course 16	Project with Viva - Voce	0	1	2	0	3	5	50	50	100
Part IV	Naan Mudhalvan		1	0	0	0	1	2	25	75	100
Part V	Extension activity*		0	0	0	2	2	-	50	50	100
Total							21	30			

Total Credits: 140

*The students should choose any one of the Extension activities such as NSS/NCC/YRC/RRC/Games and Sports/Youth Welfare activities/Outreach Programmes/Migration awareness. The examination/evaluation will be conducted in the 6th semester.

Course – PSO Mapping

Title of the course	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	Total score
Nutritional Biochemistry	3	3	3	2.5	2.75	2.5	2.25	19
Core Practical I - Nutritional Biochemistry	3	3	3	2.5	2.5	3	2.5	19.5
Allied Course 1	3	2.75	2.5	2.25	2.25	2	2.25	17
Allied Practical 1	3	3	2.5	3	3	2.5	3	20
Skill Enhancement Course (SEC-1)	2.5	2.75	2.5	2	2	1.5	2	15.25
Foundation Course - Fundamentals of Biochemistry	2.5	2	1.25	1.5	1.75	1.75	1	11.75
Biomolecules	3	3	3	3	2	1.5	1.75	17.25
Core Practical II - Biomolecules	3	2.25	3	3	3	1	2.25	17.5
Allied Course 2	2.25	2.5	2	2	1	1.75	1	12.5
Allied Practical 2	2.5	2.5	2.25	1	2	1.5	1.5	13.25
Skill Enhancement Course (SEC-2)	2	1.25	1	2.75	1.75	1.75	3	13.5
Skill Enhancement Course (SEC-3) Discipline/Subject specific	2.5	3	3	2	2.5	1.5	3	17.5
Total score of all courses contributing to PSO	32.25	31	29	27.5	26.5	22.25	25.5	194

Level of contribution of the Course towards attaining PSOs

0 – No Contribution 1 – Low Level 2 – Medium Level 3 – High Level

FIRST YEAR: SEMESTER I
NUTRITIONAL BIOCHEMISTRY

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Core Course 1: Nutritional Biochemistry	Core	5	4	1	-	4	25	75	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Comprehend basic food groups viz. Carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value to describe regulation of human systems
CO2 (K3)	Illustrate the types of nutrients in foods and the specific functions in maintaining health of humans in every stage of life
CO3 (K4)	Distinguish the significance and effect of nutraceuticals to address nutritional deficiency disorders
CO4 (K5, K6)	Formulate strategies to adapt balanced diet for maintaining good health

Module I: Concepts of food and nutrition - General introduction and definition of Nutrition. Basic food groups-energy yielding, body building and protective foods. ICMR classification of five food groups, significance of food pyramid. Basic concepts of energy expenditure, units of energy. Functions of food and its relation to nutrition and clinical health. 12 Hrs

Module II: Importance and Source of nutrients - Physiological role and nutritional significance of carbohydrates, protein, fats and Minerals (Calcium, Phosphorous, Sodium and Potassium) and trace elements (Copper, Cobalt, Zinc, Iodine and Iron). 12 Hrs

Module III: Vitamins - definition, classification, sources, absorption, daily requirements, metabolism and nutritional significance. RDA for infants, children, adolescents (male and female), pregnant & lactating women and old age. 12 Hrs

Module IV: Nutritional Disorders - Protein malnutrition (Kwashiorkor) and undernutrition (Marasmus), their preventive and curative measures. Deficiency diseases of vitamins. Nutrigenetics and nutrigenomics (brief outline). 12 Hrs

Module V: Calorific value and Basal metabolism - Calorific value of Proteins, Carbohydrates and Fat. Measurement of Calories by bomb calorimeter. Energy - Basal metabolic rate (BMR), determination of BMR and factors affecting BMR. Regulation of body temperature, energy needs and total energy requirements. 12 Hrs

Text books

1. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. 2013. Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.
2. Swaminathan (1995) Principles of Nutrition and Dietetics. Bappco.
3. Tom Brody (1998). Nutritional Biochemistry (2nd ed), Academic press, USA
4. Garrow, JS, James WPT and Ralph A (2000). Human nutrition and dietetics (10th ed) Churchill Livingstone.
5. Andreas M. Papas (1998). Antioxidant Status, Diet, Nutrition, and Health (1st ed) CRC
6. Srilakshmi, B., Nutrition Science, New Age International (p) Ltd, Publishers, 2012.
7. Mahtab, S, Bamji, Kamala Krishnasamy, G.N.V. Brahman., Text book of Human Nutrition, Third edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2015.
8. Swaminathan, M.S. Handbook of Food and Nutrition, 5th Edition. The Bangalore Printing and Publishing Company, 2007.
9. M. Swaminathan, Advanced text book of food and nutrition, (Vol.1 & 2), 2nd edition.

Reference books

1. Brannen, A.L., Davidson PM & Salminen S. 2001. Food Additives. 2nd Ed. Marcel Dekker.
2. George, A.B. 1996. Encyclopedia of Food and Color Additives. Vol. III. CRC Press.
3. Advances in food biochemistry, Fatih Yildiz (Editor), CRC Press, Boca Raton, USA, 2010
4. Y.H. Hui (Editor), Food biochemistry & food processing, Blackwell Publishing, Oxford, UK, 2006.
5. Geoffrey Campbell-Platt. 2009. Food Science and Technology. Wiley-Blackwell, UK.
6. Kaveri Chakrabarty, A. S. Chakrabarty, Textbook of Nutrition in Health and Disease, Springer, 2019.

Web resources

1. <http://old.noise.ac.in/SecHmscicour/english/LESSON O3.pdf>
2. <https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html>.
3. <https://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and-minerals>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	2	2
CO2	3	3	3	3	3	2	2
CO3	3	3	3	2	3	3	3
CO4	3	3	3	3	2	2	2
Total Score	12	12	12	12	11	9	9

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2
CO4	3	3	3	2	2	2	2
Total Score	12	12	12	10	11	10	9

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER I

CORE PRACTICAL – I: NUTRITIONAL BIOCHEMISTRY

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Core Course 2: Core Practical I – Nutritional Biochemistry	Core	3	-	-	3	3	50	50	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Choose methods to determine the ash and moisture content of the food samples
CO2 (K3)	Prepare the macronutrients from the rich sources.
CO3 (K4)	Experiment to extract oil from its sources
CO4 (K5, K6)	Estimate the important biochemical constituents in the food samples.

TITRIMETRY

20hrs

1. Estimation of ascorbic acid in a citrus fruit.
2. Estimation of calcium in milk.
3. Estimation of glucose by Benedict's method in honey.
4. Estimation of phosphorous (Plant source)

BIOCHEMICAL PREPARATIONS

15 Hrs

1. Preparation of the following substances and its qualitative tests
2. Lecithin from egg yolk.
3. Starch from potato.
4. Casein and Lactalbumin from milk.

GROUP EXPERIMENTS

10Hrs

1. Determination of ash content and moisture content in food sample
2. Extraction of lipid by Soxhlet's method.

Text books

1. J. Jayaraman, Laboratory manual in Biochemistry, 2nd edition, New Age International Publishers, 2011,
2. David T. Plummer, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.

Reference books

1. Sadasivam S and Manickam A, Biochemical Methods, 4th edition, NewAge International Publishers, 2016
2. M.S. Swaminathan, Essentials of Food and Nutrition, Vol. I & II,
3. Bowman and Robert M. 2006. Present Knowledge in Nutrition. 9th edition, International Life Sciences Publishers.
4. Indrani TK. 2003. Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
5. Martha H. and Marie A. 2012. Biochemical, Physiological, and Molecular Aspects of Human Nutrition. 3rd edition. Chand Publishers.

Web resources

1. <https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors>
2. <http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf>
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	1	2	2
CO2	3	3	2	2	1	2	2
CO3	3	3	2	2	1	1	3
CO4	3	3	2	2	1	3	3
Total Score	12	12	8	8	4	8	10

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	2
CO3	3	3	3	2	2	3	2
CO4	3	3	3	2	2	3	3
Total Score	12	12	12	10	10	12	10

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER I

ALLIED COURSE 1: FOOD BIOCHEMISTRY - I

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Allied course 1: Food Biochemistry - I	Allied	4	3	1	-	4	25	75	100

COURSE OUTCOMES

CO	On completion of the course, the students will be able to
CO1 (K1, K2)	Recall the basic concepts of food and RDA and its importance in human health
CO2 (K3)	Practice several methods to process and preserve food by the use of freezing, drying and dehydration, using sugars, chemical, salts and fermentation
CO3 (K4)	Categorize food additives and food adulterants and prevent abuse
CO4 (K5, K6)	Formulate methods of quality testing, food laws and food standards

Module I: Concepts of Food and Nutrition. Functions of food; Food Composition, Balanced diet, Recommended dietary allowance (RDA). Food additives - definition; Common food additives, function and usage; Permissible limits of additives in foods; Implications of additives on consumers health; Artificial Sweeteners viz., saccharin, Aspartame and cyclamate. 12 Hours

Module II: Food Adjuncts and Adulterants. Food adjuncts: Essences, food colors - origin, classification, description, uses, specifications, procurement and storage. Food analysis. Food adulteration - meaning and definition; Types of food adulterants; Effect on health. Methods used for detection of food adulterants. 12 Hours

Module III: Testing of Food Quality. Food quality - meaning and need of food quality testing; Types of evaluation - subjective and objective; Subjective evaluation methods based on difference, rate, sensitivity etc.; Objective evaluation methods - tools and instruments used. Food Laws and Standards - Need and importance. 12 Hours

Module IV: Food preservation using low and high temperature. Importance of food preservation, Basic principles of food preservation. Preservation by the use of low and high temperature - refrigeration, freezing- advantages, factors to be considered; Preservation by the use of high temperature - drying and dehydration - methods of drying, mechanical dehydration, merits and demerits, factors affecting drying. Pasteurization. 12 Hours

Module V: Preservation using sugar, chemicals, salts and fermentation. Sugar concentrates - principles of gel formation, preparation of jam, jelly, sauce and squash preserves, candied, crystallized fruits; Preservation of fruit juices. Salt preservation - pickling- principle involved. Chemical preservatives - definition, permitted preservatives, FPO specification. Preservation by fermentation - common fermented foods. 12 Hours

Text books

1. Sivasankar, B. Food Processing and preservation 2nd edition, Prentice Hall, Pvt, Ltd., 2013.
2. Srilakshmi, N., Food Science, 6th Edition, New Age International Private Ltd., New Delhi, 2015.
3. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2014.
4. Early, R. Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London, 1995.
5. Gould, W.A. and Gould, R.W. Total Quality Assurance for the Food Industries, CTI Publications Inc, Baltimore, 1988.
6. Pomeranz, Y. and Meloan, C.E. Food Analysis: Theory and Practice, CBS Publishers and Distributor, New Delhi, 1996.
7. Askar, A. and Treptow, H. Quality Assurance in Tropical Fruit Processing, Springer-Verlag, Berlin, 1993.

Reference books

1. Branen, A.L., Davidson PM & Salminen S. 2001. Food Additives. 2nd Ed. Marcel Dekker.
2. Gerorge, A.B. 1996. Encyclopedia of Food and Color Additives. Vol. III. CRC Press.
3. Advances in food biochemistry, Fatih Yildiz (Editor), CRC Press, Boca Raton, USA, 2010
4. Food biochemistry & food processing, Y.H. Hui (Editor), Blackwell Publishing, Oxford, UK, 2006.
5. Geoffrey Campbell-Platt. 2009. Food Science and Technology. Wiley-Blackwell, UK.
6. Kaveri Chakrabarty, A. S. Chakrabarty, Textbook of Nutrition in Health and Disease, Springer, 2019.

Web resources

1. <http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3
Total Score	12	12	12	12	12	12	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	CO	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	2	2	2	2	2
CO2	3	3	3	2	2	2	2
CO3	3	3	2	2	2	2	2
CO4	3	3	3	3	3	2	2
Total Score	12	11	10	9	9	8	9

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER I

ALLIED PRACTICAL 1: FOOD BIOCHEMISTRY PRACTICAL - I

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Allied Practical 1: Food Biochemistry Practical - I	Allied	2	-	-	2	2	50	50	100

COURSE OUTCOMES

On completion of the course, the students will be able to

CO	On completion of the course, the students will be able to
CO1 (K1, K2)	Select suitable technique in assessment of various food additives and adulterants
CO2 (K3)	Apply the screening techniques for food adulterants and assess the food quality
CO3 (K4)	Analyze the essential components in food samples
CO4 (K5, K6)	Categorize the common food adulterants and experiment to identify the adulterant in commonly used packed food items

Quantitative/ Qualitative methods

30 Hrs

1. Detection and determination of starch and sucrose in milk.
2. Detection and determination of formalin, boric acid, and urea in milk.
3. Detection and determination of urea in puffed rice.
4. Detection of Khesari flour in besan.
5. Detection of Vanaspati in Ghee/Butter.
6. Detection of Metanil yellow in turmeric/coloured sweet products.
7. Detection of Chilly powder adulteration.
8. Detection of Argemone oil in edible oil.

9. Detection of artificially colour / foreign matter in tea (dust/leaves).
10. Detection of cane sugar in Honey.

Text books

1. J. Jayaraman, Laboratory manual in Biochemistry, 2nd edition, NewAge International Publishers, 2011,
2. David T. Plummer, An Introduction to Practical Biochemistry, 3 rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.
2. Srivastava R.P. Fruit and vegetable preservation – Principles and Practices, International Book Distributing Co., (IBDC), New Delhi, 2013.
3. Sadasivam, S. and Manickam, A. Biochemical Methods, Third Edition, New age International P. Ltd., Publishers, New Delhi, 2018.
4. Raghuramulu, N., Madhavan Nair, K. and Kalyana Sundaram, National Institute of Nutrition, A Manual of Laboratory Techniques, Hyderabad, 2013.

Reference books

1. Bowman and Robert M. 2006. Present Knowledge in Nutrition. 9th edition, International Life Sciences Publishers.
2. Martha H. and Marie A. 2012. Biochemical, Physiological, and Molecular Aspects of Human Nutrition. 3rd edition. Chand Publishers.
3. Swaminathan, M. Food Science, Chemistry and Experimental Foods, Bappco Publishers, 2013.

Web resources

1. <https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors>
2. <http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf>
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3
Total Score	12	12	12	12	12	12	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3
CO3	3	3	2	3	3	2	3
CO4	3	3	2	3	3	3	3
Total Score	12	12	10	12	12	10	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER I

SKILL ENHANCEMENT COURSE - SEC

HEALTH AND NUTRITION

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Health and Nutrition	SEC	2	1	1	-	2	25	75	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Understand about the importance of health and diet
CO2 (K3)	Employ measures to maintain daily requirements and prevent deficiencies of vitamins, minerals and water
CO3 (K4)	Point out the sources and functions of carbohydrates, fats and lipids and proteins and their impact on health to society
CO4 (K5, K6)	Interpret the different types of nutritionally deficient disorders and justify nutrition supplementation plans

Module I: Health - definition, Factors affecting human health. Importance of health care of children, adults and elderly people. Balanced diet and calorific value. Vitamins-definition, classification, sources, properties, functions and deficiency symptoms. Recommended daily allowances.

6Hrs

Module II: Carbohydrates - Definition, Composition, Nutritional classification, Functions, RDA and sources, Effects of too high and too low carbohydrates on health. Dietary fiber - Classification, sources and its role in Human nutrition.

Module III: Lipids - Definition, Nutritional classification, Functions, RDA, Sources and effects of deficiency. Role and nutritional significances of PUFA, MUFA, SFA and ω 3 fatty acids. Water as a nutrient, Function, Sources, Requirement, Water balance and effects of deficiency. 6Hrs

Module IV: Minerals - Role of minerals on human health, sources, biological functions, deficiency disorders with special reference to Calcium, Phosphorus. 6Hrs

Module V: Proteins - Definition, Composition, Nutritional classification and Functions, RDA and sources of Proteins and Amino acids. Role of proteins in health. Deficiency disorders – Kwashiorkor and Marasmus – supplementation programs in India and their implications. 6Hrs

Text books

1. S. Davidson and J.R. Passmore (1986) Human Nutrition and Dietetics, (8th ed), Churchill Livingstone
2. J. S. Garrow, W. Philip T. James, A. Ralph (2000), Human Nutrition and Dietetics (10th ed), Churchill Livingstone
3. Insel, P. et al., Discovering Nutrition, 4th Edition, Jones and Bartlett Publishers, 2013.
4. M. Swaminathan (1995) Principles of Nutrition and Dietetics, Bappco

Reference books

1. Margaret Mc Williams (2012). Food Fundamentals (10th ed), Prentice Hall
1. Tietz, Textbook of Clinical Chemistry and Molecular Diagnostics, 7th edition Saunders, 2014.

Web resources

1. <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-differentages>.
2. nhp.gov.in/healthyliving/healthydiet
3. www.anme.com.mx/libros/PrinciplesofNutrition.pdf

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	2	2	3
CO2	3	3	3	3	2	2	3
CO3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	2	3
Total Score	12	12	12	12	10	8	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	2	2	2	1	1
CO2	2	3	3	2	2	2	2
CO3	3	3	2	1	1	1	2
CO4	2	3	3	3	3	2	2
Total Score	10	11	10	8	8	6	8

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER I

LIFE STYLE DISEASES

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Lifestyle Diseases	SEC	2	1	1	-	2	25	75	100

COURSE OUTCOMES

CO	On completion of the course the students will be able to
CO1 (K1, K2)	Define Lifestyle diseases and describe the contributing factors
CO2 (K3)	Interpret the causes of the top lifestyle diseases and its impact on life
CO3 (K4)	Identify the lifestyle changes that affects the women's health and plan preventive measures
CO4 (K5, K6)	Generate treatment measures for common lifestyle diseases

Module I: Lifestyle diseases: Definition, Factors contributing to lifestyle diseases – Physical inactivity, Poor food habits, disturbed biological clock, sleep deprivation. 6Hrs

Module II: Top lifestyle diseases, Impact of Lifestyle diseases on family, society and economy of country. 6 Hrs

Module III: Causes, symptoms, types, preventive measures and treatment of Obesity, cardiovascular diseases, diabetes and cancer. 6 hrs

Module IV: Women's lifestyle diseases: Polycystic Ovarian Disease, Infertility, Breast and cervical cancer and Osteoporosis. 6 hrs

Module V: Prevention of lifestyle diseases: Balanced diet, sufficient intake of water, physical activity, sleep-wake cycle, stress management and meditation. 6Hrs

Text books

1. James M R, Lifestyle Medicine, 2nd Edition, CRC Press, 2013
2. Akira Miyazaki, New Frontiers in Lifestyle-Related Disease, Springer, 2008

Reference books

1. Steyn K, Lifestyle and related risk factors for chronic diseases
2. Willett WC, Prevention of chronic disease by means of diet and lifestyle.
3. Kumar M & R. Kumar, Guide to prevention of lifestyle diseases. Deep & Deep publications

Web resources

1. <https://youtu.be/jDdL2bMQXfE>
2. <https://youtu.be/7WnpSB14nDM>
3. <https://youtu.be/ollz9MqtW-U>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	2	2	3	2
CO2	2	3	2	2	2	3	3
CO3	2	3	2	2	2	3	2
CO4	2	3	2	2	2	3	3
Total Score	8	12	8	8	8	12	10

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	2	2	2	3	2
CO2	3	3	2	2	2	3	2
CO3	3	3	2	2	2	3	2
CO4	3	3	2	2	2	3	2
Total Score	12	12	8	8	8	12	8

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER I

FOUNDATION COURSE - BRIDGE COURSE

FUNDAMENTALS OF BIOCHEMISTRY

Course Code	Course Name	Category	Inst. hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Bridge Course: Fundamentals of Biochemistry	Foundation Course	2	1	1	-	2	25	75	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Identify and explain the use of basic laboratory instruments for analytical purposes
CO2 (K3)	Apply the skills using computers in the biochemical laboratories
CO3 (K4)	Distinguish the occurrence and abundance of biomolecules in biological system
CO4 (K5, K6)	Justify the role of biochemistry and its importance in biology and interdisciplinary field

Module I: Molecules of life – Carbohydrates, Lipids, Amino acids, Proteins and Nucleic acids (General classification and examples). Different types of chemical bonds. 6 hrs

Module II: Basic concepts of acids, bases, buffers and pH. Methods of expressing concentration – Molarity, Molality, Mass percentage and Parts per million(ppm). Preparation of Molar, Molal, percentage, ppm, Mass percentage solutions (calculation using an example). 6 hrs

Module III: Bio instruments – Working principles and major applications – pH meter, Colorimeter, Centrifuges, Incubator, Hot air oven, Chromatography and Electrophoretic units. Safe

handling of chemicals and reagents in Biochemistry lab – Prevention, Precaution and First aid of lab hazards. 6 hrs

Module IV: Scope of Biochemistry – Scope and role of a Biochemist in Agriculture, Medical diagnosis, Pharmaceuticals, Food industry, Forensic science, Medical coding and Biological Research laboratories. 6 hrs.

Module V: Computational Biology – Basic usage of computers - Bioinformatics, Biostatistics, Diagnostic imaging techniques, Automation in Medical diagnostic labs. 6hrs

Text books

1. U. Sathyanarayana & U. Chakrapani, Biochemistry, 2013, 5th edition Elsevier India Pvt. Ltd., Books & Allied Pvt. Ltd.
2. M N Chatterjee, Textbook of Medical Biochemistry, Rana Shinde, 2002, 8th edition, Jaypee Brothers.
3. L. Veerakumari, 2009, Bioinstrumentation, 1st edition, MJ P Publishers.
4. Avinash Upadhyay, Kakoli Upadhyay & Nirmalendu Nath, 2002, Biophysical Chemistry, Principles and Techniques, 3rd edition, Himalaya Publishing House.

Reference books

1. David L. Nelson, Michael M.Cox, 2005, Principles of Biochemistry, 4th edition W.H. Freeman and Company.
2. Terrance G. Cooper The tools of Biochemistry, 1977, John Wiley & Sons, Singapore.
3. Saroj Dua, Neera Garg, Biochemical Methods of Analysis, 2010, 1st edition, Narosa Publishing house.
4. B. Godkar. 2020. Textbook of Medical Laboratory Technology Vol 1 & 2 Paperback, 3rd edition, Bhalani Publishers.

Web resources

1. <https://www.britannica.com/science/biomolecule>
<https://en.wikipedia.org/wiki/Biomolecule>
<https://www.khanacademy.org/science/biology/macromolecules>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	2	1
CO2	3	3	2	1	1	2	1
CO3	2	2	3	3	3	2	1
CO4	3	2	1	1	2	3	1
Total Score	11	9	7	6	7	9	4

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	1	1	1	1	1	1
CO2	3	2	1	3	1	1	1
CO3	2	3	2	1	2	3	1
CO4	2	2	1	1	3	2	1
Total Score	10	8	5	6	7	7	4

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

BIOMOLECULES

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Core Course 3: Biomolecules	Core	5	4	1	-	4	25	75	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Recall the macromolecules and their building blocks in biological system
CO2 (K3)	Demonstrate the structural organization of proteins and nucleic acids
CO3 (K4)	Experiment with chemical reactions of carbohydrates and aminoacids
CO4 (K5, K6)	Assess the importance of biomolecules in the biological system

Module I: Carbohydrates-Classification and biological significance, physical properties - stereo isomerism, optical isomerism, anomers, epimers and mutarotation. Monosaccharides: Occurrence, linear and cyclic structure, Reactions of monosaccharides due to the presence of hydroxyl, aldehyde and keto groups. Disaccharides: Structure and properties of reducing disaccharides (lactose and mannose), non-reducing disaccharide (sucrose). Polysaccharides: Homopolysaccharides - Occurrence, structure and biological significance of starch, glycogen and cellulose. Heteropolysaccharides - Structure and biological significance of mucopolysaccharides - hyaluronic acid, chondroitin sulphate and heparin. 12 hrs

Module II: Amino acids -Classification based on composition of side chain and nutritional significance. General structure of amino acids. 3 - and 1- letter abbreviations. General structure of amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids. 12Hrs

Module III: Proteins-Classification based on shape, composition, solubility and functions. Properties of proteins - Ampholytes, isoelectric point, salting in and salting out, denaturation and renaturation, UV absorption. Levels of Organization of protein structure- Primary structure, Secondary structure, Tertiary structure and Quaternary structure with suitable examples. 12 Hrs

Module IV: Lipids- Lipids: Bloor's classification, chemical nature and biological functions. Fatty acids: classification, nomenclature, structure and properties of fatty acids (MUFA, PUFA). Triacyl glycerol –structure and general properties, Characterization of fats- iodine value, saponification value, acid number along with their significance. Compound lipids-Structure and functions of phospholipids and glycolipids. Derived lipids-Structure and functions of cholesterol, bile acids and bile salts. 12Hrs

Module V: Nucleic acids-Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, Z DNA, structure and biological significance. Types of RNA: mRNA, tRNA, rRNA and its biological importance. 12Hrs

Text books

1. U. Sathyanarayana & U. Chakrapani, Biochemistry, 2013, 5th edition Elsevier India Pvt. Ltd., Books & Allied Pvt. Ltd.
2. J. L. Jain, Sunjay Jain, Nitin Jain, Fundamentals of Biochemistry, 2013, 7th edition S. Chand & Company Ltd.
3. M N Chatterjee, Rana Shinde, Textbook of Medical Biochemistry, 2002, 8th edition, Jaypee Brothers.

Reference books

1. Robert K Murray et. al., Harper's Illustrated Biochemistry, 31st edition-McGraw Hill, 2018.
2. Nelson and Cox. Lehninger Principles of Biochemistry. Freeman, 7th ed. 2017.
3. Devlin, T.M., John Wiley & Sons, Inc. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., (New York).
4. Tymoczko, John L., Jeremy M. Berg, and Lubert Stryer. Biochemistry, 8th ed. Freeman 2015.
5. Garrett, Reginald, and Charles Grisham. Biochemistry. Nelson Education, 2012.
6. Voet, Donald, Judith G. Voet, and Charlotte W. Pratt. Fundamentals of biochemistry. NewYork: John Wiley & Sons, 5th Edition, 2016.

7. Lippincott Williams and Wilkins; Illustrated Reviews: Biochemistry, 7th edition, North American edition, 2016.
8. Zubay G. L, *et.al.*, 1995, Principles of Biochemistry, 1st edition, Wm C. Brown Publishers.

Web resources

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1. <https://www.britannica.com/science/biomolecule>
2. <https://en.wikipedia.org/wiki/Biomolecule>
3. <https://www.khanacademy.org/science/biology/macromolecules>
4. <https://biologydictionary.net/polysaccharide>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	2	1	1
CO2	3	3	3	3	2	2	1
CO3	3	3	3	3	2	1	1
CO4	3	3	3	3	2	1	1
Total Score	12	12	12	12	8	5	4

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	2	2	1
CO2	3	3	3	3	2	2	3
CO3	3	3	3	3	2	1	2
CO4	3	3	3	3	2	1	1
Total Score	12	12	12	12	8	6	7

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

CORE PRACTICAL – II: BIOMOLECULES

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Core Course 4: Core Practical II - Biomolecules	Core	3	-	-	3	3	50	50	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Identify the biomolecules such as carbohydrates aminoacids, proteins etc and report based on specific chemical tests
CO2 (K3)	Apply the specific chemical reactions for qualitatively analyzing the aminoacids and proteins and elaborate the chemical properties
CO3 (K4)	Analyse the methods of characterization of fats and evaluate the results obtained and apply the same in checking the adulteration of lipid products
CO4 (K5, K6)	Appraise the presence of nucleic acid from biological sources

I) Qualitative test for

15 Hrs

1. Carbohydrates

a) Glucose b) Fructose c) Arabinose d) Maltose e) Sucrose f) Lactose g) Starch

2. Amino acids

a) Arginine b) Cysteine c) Histidine d) Proline e) Tryptophan f) Tyrosine g) Methionine

II Titrimetric methods

15 Hrs

1. Determination of Saponification value of an edible oil

2. Determination of Iodine number of an edible oil
3. Determination of Acid number of an edible oil

III. Group Experiments

15 hrs

1. Isolation of DNA from plant/animal source.
2. Isolation of RNA from rich source.

Text books

1. T. N. Pattabiraman, Laboratory Manual and Practical Biochemistry, All India Publishers & Distributors, 4th edition, 2015.
2. J. Jayaraman, Laboratory Manual in Biochemistry - New Age International Publishers, 2nd edition, 2011.
3. S. Sadasivam, A. Manickam, Biochemical Methods - New Age International (P) Limited, 3rd edition, 2018.
4. David T. Plummer. An Introduction to Practical Biochemistry, Tata McGraw Hill Publishing Company, 3rd edition, 2017.

Reference books

1. Rageeb, Kiran Patil, M. Bakshi Rahman, Sufiyan Ahmad Raees. A Practical book on Biochemistry, Everest publishing house 1st edition, 2019
2. Introductory Practical Biochemistry – S.K. Sawhney, Randhir Singh, 2nd ed, 2005.
3. Anil Kumar, Sarika Garg and Neha Garg. Vinod Vasishtha, Biochemical Tests - Principles and Protocols. Viva Books Pvt Ltd, 2012.
4. Harold Varley, Practical Clinical Biochemistry, CBS. 6th edition, 2006.
5. Keith Wilson and John Walker. Principles and Techniques of Practical Biochemistry, 4th edition, Cambridge University press, Britain. 1995.

Web resources

1. <https://www.pdfdrive.com/instant-notes-analytical-chemistry-e912659.html> 14
2. <https://www.pdfdrive.com/analytical-biochemistry-e46164604.html>
3. <https://www.pdfdrive.com/biochemistry-books.html>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	1	1
CO2	3	2	3	3	3	2	1
CO3	3	2	3	3	3	1	1
CO4	3	2	3	3	3	1	1
Total Score	12	9	12	12	12	5	4

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	1	3
CO2	3	2	3	3	3	1	2
CO3	3	2	3	3	3	1	2
CO4	3	2	3	3	3	1	2
Total Score	12	9	12	12	12	4	9

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

ALLIED COURSE 2 - FOOD BIOCHEMISTRY - II

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Allied Course 2: Food Biochemistry - II	Core	4	3	1	-	4	25	75	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Classify the food groups and food commodities
CO2 (K3)	Apply suitable methods of processing of food commodities
CO3 (K4)	Analyze the proper selection and storage of milk, cereals, pulses, millets, fish, poultry, meat etc. for food preparations
CO4 (K5, K6)	Create valid techniques to prevent food spoilage and safety use of food additives

Module - I: Cereals, pulses and millets: Cereals breakfast cereals, cereal products, structure, processing, use in variety of preparations, selections, variety, nutritional aspects. Pulses and legumes production (in brief). Pulses - Structure, Selection and variety, storage, processing, use in variety of preparations, nutritional aspects. Millets - Definition, Composition of Corn and Ragi. Nutritive value.

12 Hours

Module - II: Milk - Composition, Types - Standardized, Toned, Double toned, Sterilized Milk products: Composition, classification, quality processing, storage, spoilage, uses, nutritional aspects of milk, Butter, Cheese, Curd paneer, khoa, cheese, ice-cream, kulfi and various kinds of processed milk.

12 Hours

Module - III: Egg - Composition, Nutritive value, Evaluation of egg quality, grading, selection, storage, spoilage. Culinary use of Meat - Nutritive value, Rigor mortis. Fish - Nutritive Value.

Selection criteria of fresh fish. Uses and nutritional aspects. Poultry and meat: Selection, storage, uses and nutritional aspects. Spoilage of fish, poultry and meat. 12 Hours

Module - IV: Vegetables & Fruits - Classification, Nutritive value, Water soluble pigments, Browning and its prevention, Variety, selection, purchase, storage, availability, uses and nutritional aspects of raw and processed vegetables and fruits. Spices - General functions of spices with examples, culinary use. 12 Hours

Module – V: Fats & Sugars. Fats- Composition, rancidity - types, prevention, changes due to repeated heating. Sugars - Stages in sugar cookery and its application. Tea, coffee, chocolate and coco powder, aerated beverages, juices - Processing, cost and nutritional aspects. 12 Hours

Text books

1. Srilakshmi, B. Food Science. New Delhi: New Age International Pvt., 2015.
2. Lavies, S (1998): Food Commodities Ltd. London.
3. Hughes, O. and Bennion, M; Introductory Foods, Macmillan & Co., New York, 1970.
4. Pyke, M., Catering Service and Technology, John Murrey Pube,' London., 1974.
5. S. Manay Foods Facts and Principles- New Age International Pvt. 2005.
6. F. P. Antia and Philip Abraham, Clinical Nutrition & Dietetics - Oxford University Press, 1998.

Reference books

1. Swaminathan, M.S. Handbook of Food and Nutrition, 5th Edition. The Bangalore Printing and Publishing Company, 2007.
2. Branen, A.L., Davidson PM & Salminen S. 2001. Food Additives. 2nd Ed. Marcel Dekker.
3. Gerorge, A.B. 1996. Encyclopedia of Food and Color Additives. Vol. III. CRC Press.
4. Advances in food biochemistry, Fatih Yildiz (Editor), CRC Press, Boca Raton, USA, 2010
5. Food biochemistry & food processing, Y.H. Hui (Editor), Blackwell Publishing, Oxford, UK, 2006.
6. Geoffrey Campbell-Platt. 2009. Food Science and Technology. Wiley-Blackwell, UK.
7. Kaveri Chakrabarty, A. S. Chakrabarty, Textbook of Nutrition in Health and Disease, Springer, 2019.

Web resources

1. <http://old.noise.ac.in/SecHmscicour/english/LESSON O3.pdf>
2. <https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html>.
3. <https://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and-minerals>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	2	1
CO2	2	3	2	1	1	1	1
CO3	3	2	1	1	2	1	1
CO4	3	3	2	3	3	2	3
Total Score	11	10	6	6	7	6	6

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	1	2	1	1	1
CO2	2	3	2	2	1	2	1
CO3	2	2	3	2	1	2	1
CO4	2	3	2	2	1	2	1
Total Score	9	10	8	8	4	7	4

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

ALLIED PRACTICAL 2: FOOD BIOCHEMISTRY PRACTICAL - II

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Allied Practical 2: Food Biochemistry Practical - II	Core	2	-	-	2	2	50	50	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Understand and check the quality of food samples
CO2 (K3)	Apply biological techniques to estimate nutritive constituents in fruits, vegetables, cereals, milk etc.
CO3 (K4)	Analyze the purity and contamination of food commodities
CO4 (K5, K6)	Develop skill assessing food safety and standards

Titrimetric/ Colorimetry/Microscopy

30 Hrs

1. Determination of pH of food products using pH meter.
2. Determination of alcoholic acidity in food sample.
3. Estimation of total carbohydrate in cereals.
4. Estimation of protein content in egg.
5. Determination of rancidity of oil.
6. Estimation of fructose content in fruits.
7. Detection of bacterial contamination in milk.

Text books

1. J. Jayaraman, Laboratory manual in Biochemistry, 2nd edition, NewAge International Publishers, 2011,
2. David T. Plummer, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.

3. Sadasivam, S. and Manickam, A. Biochemical Methods, Third Edition, New age International P. Ltd., Publishers, New Delhi, 2018.
4. Raghuramulu, N., Madhavan Nair, K. and Kalyana Sundaram, National Institute of Nutrition, A Manual of Laboratory Techniques, Hyderabad, 2013.

Reference books

1. Bowman and Robert M. 2006. Present Knowledge in Nutrition. 9th edition, International Life Sciences Publishers.
2. Swaminathan, M. Food Science, Chemistry and Experimental Foods, Bappco Publishers, 2013.

Web resources

1. <http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	2
CO2	3	2	3	1	1	2	1
CO3	3	2	2	2	2	2	1
CO4	3	1	3	2	2	2	1
Total Score	12	8	11	7	7	8	5

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	1	2	3	2
CO2	2	3	2	1	2	1	2
CO3	3	2	3	1	2	0	1
CO4	2	2	1	1	2	2	1
Total Score	10	10	9	4	8	6	6

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

SKILL ENHANCEMENT COURSE - SEC

MEDICINAL DIET

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Medicinal Diet	SEC	2	1	1	-	1	25	75	100

COURSE OUTCOMES

CO	On completion of this course, students will be able to
CO1 (K1, K2)	Review basic knowledge about diet
CO2 (K3)	Sketch diet plan for GI diseases, liver diseases, infectious disease, life style diseases
CO3 (K4)	Examine the influence of health status by diet modification
CO4 (K5, K6)	Prepare diet chart for Diabetes, Renal and Cardio-vascular diseases

Module I: Principles of Therapeutic Diet: Definitions of Normal diet, Therapeutic diet, Soft diet and Liquid diet. Objectives of Diet Therapy. Advantages of using normal diet as the basis for Therapeutic diet. Normal Diet-therapeutic modification of normal diet. 6 Hrs

Module II: Diet modification in Gastrointestinal diseases: Peptic ulcer, Diarrhea, Lactose intolerance, Constipation and Malabsorption syndrome. 6 Hrs

Module III: Diet Modification in liver and gall bladder in diseases: Etiology, symptoms and dietary treatment in jaundice, hepatitis, cirrhosis of liver and hepatic coma. 6 Hrs

Module IV: Diet Modification in Infectious Diseases: Fevers, Typhoid, Tuberculosis and Viral Hepatitis. Dietary modifications in Tuberculosis. 6 Hrs

Module V: Diet Modification in Diabetes, Cardio-vascular diseases, acute & chronic glomerulonephritis, nephrosis, renal failure, kidney stone and Hypertension. 6 Hrs

Text Books

1. M. Raheena Begum, A Text Book of Foods, Nutrition and Dietetics, Sterling Publishers Pvt. Ltd.
2. M.V. Raja Gopal, Sumati R., Mudambi, Fundamentals of foods and Nutrition, Wiley Eastern Limited, Year-1990.
3. William S. R Nutrition and Diet Therapy, 1985, 5th edition, Mosly Co. St. Louis.

Reference books

1. Rodwell Williams Nutrition and Diet Therapy, 1985, the C.V Mosly St. Louis.
2. M.V. Krause & M.A. Mohan, Food Nutrition and Diet Therapy, 1992 by W.B Saunders Company, Philadelphia, London.
3. Davidson and Passmore, Human Methods and Diabetics, 1976 the English Language Book Society and Churchill.

Web resources

1. <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-differentages>.
2. nhp.gov.in/healthyliving/healthydiet
3. www.anme.com.mx/libros/PrinciplesofNutrition.pdf

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	1	2	1	2	3
CO2	2	1	1	2	0	1	3
CO3	2	1	1	2	1	0	3
CO4	2	1	1	3	0	3	3
Total Score	8	5	4	9	2	6	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	2	2	1	2	1	2	3
CO2	2	1	1	3	2	2	3
CO3	2	1	1	3	2	1	3
CO4	2	1	1	3	2	2	3
Total Score	8	5	4	11	7	7	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

HORMONES IN HEALTH AND DISEASE

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	Hormones in Health and Disease	SEC	2	2	-	-	1	25	75	100

COURSE OUTCOMES

CO	On completion of the course, the students will be able to
CO1 (K1, K2)	Recall the structural organization of endocrine systems
CO2 (K3)	Relate the endocrine gland secretions and its effects in biological function
CO3 (K4)	Illustrate the coordinate regulation of hormones by carbohydrates, lipids and protein metabolism
CO4 (K5, K6)	Interpret the physiological effects of hormones during health and disorders

Module I: The Endocrine glands, Hormones - Definition, Classification, Autocrine glands, Paracrine glands. Hormone receptors – Structural features. 6 Hrs

Module II: Hypothalamic & Pituitary hormones. Biological effects of Vasopressin and Oxytocin, Growth hormone, FSH, LH, TSH, ACTH and Prolactin. Hyper and Hypopituitarism. 6 Hrs

Module III: Thyroid hormones and its biological effects. Hypo and hyperthyroidism. Role of parathyroid hormone, calcitonin and calcitriol in maintaining calcium and phosphorus homeostasis. Hypo and Hyper parathyroidism. 6 Hrs

Module IV: Hormones of the Pancreas and their biological actions. Insulin and Glucagon. Diabetes mellitus. 6 Hrs

Module V: Adrenal and Gonadal Hormones, Biological effects Glucocorticoids, Mineralocorticoids and Adrenal medullary hormones. Biological effects of gonadal hormones. 6 Hrs

Text books

1. Shlomo Melmed et al., Williams Text Book of Endocrinology, 13th edition, Saunders, 2015.
2. Robert K Murray et. al., Harper's Illustrated Biochemistry, 31st edition-McGraw Hill, 2018.
3. M.N. Chatterjee, Rana Shinde, Medical Biochemistry, Jaypee Brothers, 8th edition, 2012.

Reference books

2. Nelson and Cox. Lehninger, Principles of Biochemistry. Freeman, 7th ed., 2017.
3. Tietz, Textbook of Clinical Chemistry and Molecular Diagnostics, 7th edition Saunders, 2014.
4. Smith et al. Principles of Biochemistry. Mammalian Biochemistry. McGraw Hill 7th ed., 1982.
5. Andrew Day, Philip Mayne, Clinical Chemistry in diagnosis and treatment, 6th edition, Hodder Arnold Publication, 1994.
6. W.J. Marshall, S. K. Bengert, M. Lapsley, Clinical Chemistry, 8th edition, Elsevier, 2016.

Web resources

1. <https://www.slideshare.net/shibu989/hypopituitarism-96746917>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6761896/>
3. <https://www.webmd.com/diabetes/endocrine-system-facts>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	2	3	1
CO2	2	3	3	3	2	3	1
CO3	3	3	3	3	2	2	1
CO4	2	3	3	3	2	3	1
Total Score	10	12	12	12	8	11	4

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	1	3	1	3
CO2	2	3	3	1	2	1	3
CO3	3	3	3	3	3	2	3
CO4	2	3	3	3	2	2	3
Total Score	10	12	12	8	10	6	12

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

FIRST YEAR: SEMESTER II

FIRST AID

Course Code	Course Name	Category	Inst. Hours	L	T	P	Credits	Marks		
								CIA	External	Total
	First Aid	SEC (Discipline)	2	1	1	-	1	25	75	100

COURSE OUTCOMES

CO	On completion of the course, the students will be able to
CO1 (K1, K2)	Reproduce the rules of first aid, dealing during emergency and first aid techniques
CO2 (K3)	Practice the first aid techniques to be given during different types of emergencies
CO3 (K4)	Examine the kind of poisoning or bite or life-threatening emergencies and select suitable immediate aid
CO4 (K5, K6)	Justify the adoption of proper first aid method during emergencies to save the life

Module I: Aims and important rules of first aid, dealing with emergency, types and content of a first aid kit. First aid technique – Dressing and Bandages, fast evacuation technique, transport techniques.

6 Hrs

Module II: Basics of Respiration – CPR, first aid during difficult breathing, drowning, choking, strangulation and hanging, swelling within the throat, suffocation by smoke or gases and asthma.

6 Hrs

Module III: Common medical aid- first aid for wounds, cuts, head, chest, abdominal injuries, shocks, burns, amputations, fractures, dislocation of bones.

6Hrs

Module IV: First aid related to unconsciousness, stroke, fits, convulsions- seizures, epilepsy.

6Hrs

Module V: First aid in poisonous bites (Insects and snakes), honey bee stings, animal bites, disinfectant, acid and alkali poisoning. 6Hrs

Text books

1. Dr. Gauri Goel, Dr. Kumkum Rajput, Dr. Manjul Mungali.1First aid and health SBN-978-93-92208-19-5
2. Indian First Aid Manual- Indian Red Cross Society, 7th edition 2016.
3. Red Cross First Aid/CPR/AED Instructor Manual, 2016

Web resources

1. <https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online>.
2. <https://www.firstaidforfree.com/>
3. <https://www.indianredcross.org/publications/FA-manual.pdf>

MAPPING of COs with POs

CO-PO Mapping (Course Articulation Matrix)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	3	2	2	1
CO2	3	3	2	3	2	2	3
CO3	3	3	2	3	2	2	2
CO4	3	3	2	3	2	2	2
Total Score	12	12	8	12	8	8	8

Level of Correlation between COs and POs
 0 – No Correlation 1 – Low 2 – Medium 3 – High

MAPPING of COs with PSOs

CO-PSO Mapping (Course Articulation Matrix)

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	1	1	1	3	2	1
CO2	3	1	1	2	3	2	2
CO3	3	1	1	1	3	2	2
CO4	3	1	1	1	3	2	1
Total Score	12	4	4	4	12	8	6

Level of Correlation between COs and POs
 0 – No Correlation 1 – Low 2 – Medium 3 – High