

RAJAH SERFOJI GOVT. COLLEGE, (AUTONOMOUS)

THANJAVUR -613 005

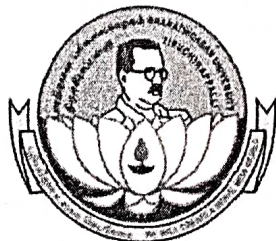
(Reaccredited with "A" Grade by NAAC)



AFFILIATED TO

BHARATHIDASAN UNIVERSITY

TRICHIRAPPALLI -24.



PG & RESEARCH DEPARTMENT OF BIOCHEMISTRY

SYLLABUS -B.Sc BIOCHEMISTRY

(For the students admitted from 2022-2023 onwards)

B.Sc BIOCHEMISTRY



DEPARTMENT OF BIOCHEMISTRY
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
Accredited at 'A' Grade by NAAC & DST-FIST Sponsored College
Thanjavur - 613 005, Tamil Nadu,
India

CHOICE BASED CREDIT SYSTEM (CBCS) UNDERGRADUATE COURSES

Rajah serfoji govt College (Autonomous), strives to maintain and uphold the academic excellence. Students experience or enjoy their choice of courses and credits for their horizontal mobility. The existing curricular structure as specified by TANSCHÉ and other higher educational institutions facilitate the credit-transfer across the disciplines, a uniqueness of the choice based credit system (CBCS).

In the CBCS weightage to a course is given in relation to the hours assigned for the course. The credits and hours of each course of a programme is given in the table of Programme Pattern. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 140 credits as mentioned in the programme pattern table. The total number of minimum courses offered by the Department is given in the Programme Structure.

Outcome-Based Education (OBE)

Outcome -Based Education is an educational theory that bases each part of an educational system around goals. By the end of the educational experience, each student should have achieved the goal. There is no single specified style of teaching or assessment in OBE; instead, classes, opportunities and assessments should all help the students achieve the specific outcomes.

Outcome Based Education, depends on Outcomes and not Inputs. The outcomes in OBE are expected to be measurable. The ultimate goal is to ensure that there is a correlation between education and employability.

OBE is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve, stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.

Some important aspects of the Outcome Based Education

1. **Course:** is defined as a theory, practical or theory cum practical subject studied in a semester.
2. **Course Outcomes (COs):** are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.
3. **Programme:** is defined as the specialization or discipline of a Degree.
4. **Programme Outcomes (POs):** Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.
5. **Programme Specific Outcomes (PSOs):** PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

6. **Programme Educational Objectives (PEOs):** The PEOs of a programme are the statements that describe the expected achievement of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after Graduation.
7. **Core Courses (CC) :** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the concerned academic program.
8. **Discipline Specific Elective Courses (DSE)** Elective course may be offered by the main discipline of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen.
9. **Generic Elective Courses:** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of other disciplines. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.
10. **Skill Enhancement Elective Courses (SECs):** These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.
11. **Self-paced Learning Courses:** It is a course for two credits. It is offered to promote the habit of independent/self- learning of Students. Since it is a two credit course, syllabus is framed to complete within 45 hours.
12. **Field Study/Industrial Visit/Case Study:** It has to be completed during the fifth semester of the degree programme.
13. **Internship:** Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester.
14. **Extra Credit Online Courses:** In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL and etc.

Programme Pattern:

The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:
Part -I : Tamil

Part-II : English

Part-III : Core Course (Theory, Practical, Discipline Specific Electives, Allied courses, Project, Internship, and field visit /industrial visit/Case Study)

Part-IV: Value Education, Ability Enhancement Courses, Skill Enhancement Courses/Soft Skills, Generic Electives, Self paced courses, etc.

Part-V: Outreach Programme NCC, NSS, YRC, RRC, BDC, CCC.

The Post Graduate degree programme consists of Part-III : Core Course only (Theory, Practicals, Discipline Specific Electives, Allied courses, Project Work, Self-paced courses, Internship, and field visit /industrial visit/Case Study)

Course Coding:

The following system is adopted for coding the various courses in the different Programmes. The Course Code for UG Course is set as follows:

A (SEMESTER NUMBER) (PRG/COURSE IDENTIFIER) (NUMBER OF THE COURSE).

The Code for PG Course is set as follows:

A (SEMESTER NUMBER) P (PRG/COURSE IDENTIFIER) (NUMBER OF THE COURSE).

Semester number ranges from 1 to 6 for UG and 1 to 4 for PG, programme identifier and course identifier are followed as found below:

PROGRAMME IDENTIFIER	
TL	B.Lit. Tamil Literature
EL	B.A. English
BC	B.Sc. Bio-Chemistry
BT	B.Sc. Bio-Technology
CH	B.Sc. Chemistry
CS	B.Sc. Computer Science
M	B.Sc. Mathematics
PH	B.Sc. Physics
ST	B.Sc. Statistics
Z	B.Sc. Zoology
BA	BBA Business Administration
CO	B.Com. Commerce
EC	B.A. Economics
PTL	M.A. Tamil Literature
PEL	M.A. English

PBC	M.Sc. Bio-Chemistry
PCH	M.Sc. Chemistry
PCS	M.Sc. Computer Science
PM	M.Sc. Mathematics
PH	M.Sc. Physics
PST	M.Sc. Statistics
PZ	M.Sc. Zoology
PEC	M.Sc. Economics
PCO	M.Com. Commerce
COURSE IDENTIFIER	
T	Tamil
E	English
CC	Core Course
SB	Skill Enhancement Elective Course
VE	Value Education
GS	Gender Studies
ES	Environmental Studies
SSD	Skill Enhancement Compulsory Course
PW	Project Work
EL	Discipline Specific Elective Course
ELO	Generic Elective
A	Allied Course

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

The Programme Outcomes (POs)/Programme Specific Outcomes (PSOs) are the qualities that must be imbibed in the graduates by the time of completion of their programme. At the end of each programme the PO/PSO assessment is done from the CO attainment of all curriculum components. The POs/PSOs are framed based on the guidelines of LOCF. There are five POs for UG programme and five POs for PG programs framed by the Heads of the concerned Programme collectively. PSOs are framed by the departments and they are five in number. For each Course, there are five Course Outcomes to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs. All course outcomes shall have linkage to POs/PSOs in such a way that the strongest relation has the weight 3 and the weakest is 1. This relation is defined by using the following table.

Mapping	<40%	≥ 40% and < 70%	≥ 70%
Relation	Low Level	Medium Level	High Level
Scale	1	2	3

Mean Scores of COs = Sum of values / Total No. of POs& PSOs

Mean Overall Score = Sum of Mean Scores / Total No. of COs

Result for Mean Overall Score: If < 1.2, it is of low relationship

If ≥ 1.2 and < 2.2 , it is of medium relationship

If ≥ 2.2, it is of high relationship

the relationship is found low, the course-in-charge has to redesign the Particular course content so as to achieve high level.

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
	K1	Knowledge/Remembering	It is the ability to remember the previously learned
	K2	Comprehension/ Understanding	The learner explains ideas or concepts
	K3	Application/Applying	The learner uses information in a new way
	K4	Analysis/Analysing	The learner distinguishes among different parts
	K5	Evaluation/Evaluating	The learner justifies a stand or decision
	K6	Synthesis /Creating	The learner creates a new product or point of view

Continuous Internal Assessment:

The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points. Evaluation for each course shall be done by a continuous internal assessment by the course teacher concerned as well as by an end semester examination and will be consolidated at the end of the course.

The Components for Continuous Internal Assessment for UG /PG Programme:

Internal Tests (Minimum Two Tests, first one for Two units (2 hours-to be converted to 4 marks) and the second for all the five units (3 hours-to be converted to 6 marks))	10 Marks
Assignment Activity* (Minimum Two Assignment Components, as appropriate to the Course Objective)	5 Marks
Seminar/ other Activity * (Minimum Two Seminar/other Components, as appropriate to the Course Objective)	5 Marks
Attendance	5 Marks

- *Assignment Activity includes
1. Problem-solving assignments;
 2. Practical assignment
 3. Laboratory reports;
 4. Observation of practical skills;
 5. Individual project reports
 6. Team project reports;
 7. Paragraph/essay writing,
 8. Writing composition,
 9. Field visit Report,
 10. Publication in peer-reviewed journals

- **Seminar/ other Activity includes
1. Oral seminar presentations,
 2. Viva-voce interviews;
 3. Listening comprehension,
 4. Reading comprehension,
 5. Open-book tests;
 6. Group discussion,
 7. Library referencing,
 8. Paper Presentations
 9. Computerized online test;
 10. Quiz (descriptive / objective),

Question paper pattern and Distribution of marks for Mid the Semester Test:

From academic year 2022-23 onwards, unless otherwise specifically mentioned by the Board of stud differently, Mid-Semester Tests for Part-I, Part-II, and Part-III Courses of UG, PG, and M.Phil. Programs is followed under:

Part-A	5 x 2	= 10 Marks
Part-B	4 x 5 (Open choice- 3 out of 5 Questions)	= 20 Marks
Part-C	2 x 10 (Open choice- 3 out of 5 Questions)	= 20 Marks
TOTAL		= 50 Marks

For Part-IV Courses, (Except self-study Extra Credit Course), from 2022-23 onwards, the Question paper pattern followed as under:

Part-A	4 x 5	= 20 Marks
Part-B	3 x 10 (Open choice- 3 out of 5 Questions)	= 30 Marks
TOTAL		= 50 Marks

Question paper pattern and Distribution of marks for Model Test and Semester:

From academic year 2022-23 onwards, unless otherwise specifically mentioned by the Board of studies differently, Model Tests and Semester Examinations for Part-I, Part-II, and Part-III Courses of UG, PG, and M.Phil. Programs.

Part-A	10 x 2 (Two questions from each unit)	= 20 Marks
Part-B	5 x 5 (Internal Choice- Either or Type Questions)	= 25 Marks
Part-C	3 x 10 (Open choice- 3 out of 5 Questions)	= 30 Marks
TOTAL		= 75 Marks

For Lab Experiment papers - 100 Marks (CIA-40 Marks Evaluation -60 Marks)

For Part-IV Courses, (Except self-study Extra Credit Course), from 2022-23 onwards, the Question paper pattern followed as under:

Part-A	5 x 6 (Two questions from each unit, Internal Choice- Either or Type Questions)	= 30 Marks
Part-B	3 x 15 (Open choice- 3 out of 5 Questions)	= 45 Marks
TOTAL		= 75 Marks

For Part-IV Extra Credit self-study Courses, there are no CIA Components, and the semester examination paper will be for 100 Marks. Depending on the nature of the Course it may have any of the following question paper patterns:

1. Pattern-1: Essay Type alone with 5 Questions one from each unit with internal choice (5x20=100 marks)
2. Pattern-2: Descriptive pattern

Part-A	(5 Questions out of 8)	5 x 8 = 40 Marks
Part-B	(5 Questions out of 8)	5 x 12 = 60 Marks
Total		=100 Marks (or)
3. Pattern-3: Multiple Choice with objective type 100 x 1 =100 Marks (or)
4. Pattern-4: Lab Oriented Courses Lab Experiment -100 Marks (Record-20 Marks + Evaluation -80 Marks).

Passing Minimum

1. In UG courses, the passing minimum for CIA & Semester Examination shall be 40%. For all theory courses all the programs ratio between CIA and End Semester Examination will be 25:75 and 40:60 for all Practical Courses.
2. In PG and M.Phil Programmes also, the passing minimum for CIA & Semester Examination shall be 50%. Passing minimum for PG / M.Phil. Project work also will be 50% -each for evaluation and Viva-Voce.

Passing Minimum for the UG/PG/M.Phil. Programmes

Nature of the Course	CIA	ESE	Aggregate
FOR UG PROGRAMMES			
Theory	40% of 25 Marks (i.e., 10 Marks)	40% of 75 Marks (i.e., 30 Marks)	40% of 100 Marks (i.e., 40 Marks)
Practical	40% of 40 Marks (i.e., 16 Marks)	40% of 60 Marks (i.e., 24 Marks)	40% of 100 Marks (i.e., 40 Marks)
FOR PG/ M.PHIL. PROGRAMMES			
Theory	50% of 25 Marks (i.e., 12 Marks)	50% of 75 Marks (i.e., 38 Marks)	50% of 100 Marks (i.e., 50 Marks)
Practical	50% of 40 Marks (i.e., 20 Marks)	50% of 60 Marks (i.e., 30 Marks)	50% of 100 Marks (i.e., 50 Marks)

WEIGHTAGE of K *- LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS →	Lower Order Thinking			Higher Order Thinking			Total %
	K1	K2	K3	K4	K5	K6	
Proportion of Marks in %	27	33		40			100

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION

DURATION: 3. 00 Hours.

Max Mark : 75

K- LEVELS	K1	K2	K3	K4	K5	K6	Total Mark
SECTIONS							
SECTION-A (One Mark, No choice)(10x2 =20)	10Q						20
SECTION-B (5- Marks) (Either/or type) (5x5=25)		5Q	5Q				25
SECTION-D (10 Marks) (3 out of 5)(3x10=30)				10Q			30
Courses having only K4 levels							
Courses having K4 and K5 levels							
One K5 level question is compulsory				6Q	4Q		
Courses having all the 6 cognitive levels							75
One K5 and K6 level questions can be compulsory				5Q	3Q	2Q	
Total							

Grading System: The total marks will be calculated by adding both CIA and end-semester examinations for each of the courses. The total marks thus obtained will then be graded. From the second semester onwards the total performance within a semester and the continuous performance starting from the first semester are indicated

Semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$\text{Grade Point Average (GPA)} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

$$\text{WAM (Weighted) Average Marks} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$$

where

C_i is the Credit earned for the Course i ;

G_i is the Grade Point obtained by the student for the Course i .

M is the Marks obtained for the course i and

n is the number of Courses passed in that semester.

CGPA is Average GPA of all the Courses starting from the first semester to the current semester.

The GPA and the CGPA shall be calculated separately for the following three parts : Part I : LCs ; Part II : ELCs ; a Part-III : CCs, DSECs, and Allied.

When a student completes his / her UG/ PG programmes after the fixed duration of the course, the maximum Division will be only First Class with the respective grade. They cannot be considered for award of Distinction/ Outstanding categories. Once the marks of the CIA and semester examinations for each course are available, they will be added. The marks thus obtained will then be graded. From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated by Semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).

Classification of Final Results

For each of the three parts, there shall be separate classification on the basis of the CGPA. For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/ Excellent/ Very Good/ Good/ Above Average/ Average, the marks and the corresponding CGPA earned by the candidate in Part III alone will be the criteria provided he / she has secured the prescribed passing minimum in the LCs and the ELCs.

Grade in Part IV and Part V shall be shown separately and it shall not be taken into account for classification.

Grading of the Courses (UG)

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
40 and above but below 50	5	C
Below 40	N.A.	R.A.

Final Result (UG)

CGPA	Corresponding Grade	Classification of Final Results
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	R.A.	Re-Appearence

Grading of the Courses (PG)

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
Below 50	N.A.	R.A.

Final Result (PG)

CGPA	Corresponding Grade	Classification of Final Results
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
Below 5.00	R.A.	Re- Appearance

Credit structure for Under Graduate Programmes

The following is the credit structure for B.Sc. (Except Mathematics w.e.f. 2022-23

Part	Course	No.of Papers	Credit	Total Credit
Part I	TAMIL	4	3	12
Part II	ENGLISH	4	3	12
Part III	CORE	8	4	32
		4	5	20
		2	6	12
	ELECTIVE	2	4	8

	ALLIED	6	4	24
Part IV	NON-MAJOR ELECTIVE	2	2	4
	EXTRA CREDIT COURSE	2	4	(8)
	ES,VE	2	2	4
	SKILL BASED	3	2	6
	SSD	1	2	2
	GS	1	2	2
Part V	EXTRA ACTIVITIES	1	2	2
TOTAL		39		140

* Not Considered for CGPA

Credit structure Post Graduate Programmes:

The following is the credit structure for M.A, M.Sc, and M.Com programmes with effect from 2022-23

Nature of Courses	No of papers	Credit
Core courses	14	56
Elective courses	5	20
NME/Supportive/Generic Elective/Open Elective/EDEC	2	4
Soft Skills	2	4
Project	1	4
Internship	-	2
Extra Credit Course	2	4*
Total	24	90

DEPARTMENT OF BIOCHEMISTRY

VISION

Forming globally competent, committed, compassionate and holistic persons promoting a just society.

MISSION

1. Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
2. Cultivating comprehensive learning and best practices through innovative and value driven pedagogy.
3. Contributing significantly to Higher Education through Teaching, Learning, and Research and Extension activities.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. Graduates will be able to accomplish professional standards in the global environment.
2. Graduates will be able to uphold integrity and human values.
3. Graduates will be able to appreciate and promote pluralism and multiculturalism in work environment.

PROGRAMME OUTCOMES (POs)-UG

Upon completion of the UG Degree Programme, students will be able to

- PO1- To understand the central features of the extra ordinary diverse fields of life sciences
- PO-2- To impart critical thinking and problem solving ability
- PO3- To acquire and to apply knowledge for development of diagnostic methods
- PO4- To inculcate aptitude towards research
- PO5- To sensitise towards gender health and environmental related issues
- PO6- To Apply and advance the knowledge and skills acquired, to become a creative professional in their chosen field.
- PO7- The students will be able to demonstrate an understanding of fundamental biochemical principles such as the structure and functions of biomolecules and metabolic pathways.
- PO8- The students will be able to demonstrate the structure and functions of various organs of human body.
- PO9- The students will be able to demonstrate practical skills in handling biological specimens, analysis and their safe disposal.



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 18th August 2022

The meeting of the Board of Studies in Commerce, for the Academic Year 2022-23, was held on 18th August 2022 at 11.30 am at Department of Biochemistry, Rajah Serfoji Government College, Thanjavur-5.

The following members attended the meeting:

1	Dr. A. SUBRAMANIAN	Chairperson	Assistant Professor, Department of Biochemistry
2	Dr. M. JEYARAJ	Subject Expert & University Nominee	Asst Professor and Head, Govt Arts College Kumbakonam -01.
3.	Dr. S MANOHARAN	Subject Expert Academic Council Nominee	Professor, Dept of Biochemistry and Biotechnology, Annamalai University, Annamalai Nagar, Chidambaram
4	Dr. S. VELAVAN	Industrialist	Harman Research Institute, Thanjavur
5	Dr.V. MURALI KRISHNAN	Faculty Member	Assistant Professor, Dept of Biochemistry
6.	Dr.L.MALARVANNAN	Faculty Member	Assistant Professor, Dept of Biochemistry
7.	Mrs.G.UMARANI	Faculty Member	Assistant Professor, Dept of Biochemistry
8.	Dr.S.MAHALAKSHMI	Faculty Member	Assistant Professor, Dept of Biochemistry

Dr. A. SUBRAMANIAN, Chairperson, BoS and Assistant Professor, 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.

2) It is decided to introduce Internship for BSc Biochemistry Students as a part of the Curriculum in fifth semester.

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

CHAIRMAN:

1. **Dr. A SUBRAMANIAN**

Assistant Professor, Department of Biochemistry

A. Subramanian
18/8/2022

MEMBERS OF THE BOARD:

2. **Dr. M. JEYARAJ**

Subject Expert & University Nominee,
Asst Professor and Head, Govt Arts College
Kumbakonam -01.

M. Jeyaraj
18.8.2022

3. **Dr. S. MANOHARAN**

Subject Expert
Professor, Dept of Biochemistry and Biotechnology,
Annamalai University, Annamalai Nagar, Chidambaram

S. Manoharan
18/8/22

4. **Dr. S. VELAVAN**

Industrialist
Harman Research Institute, Thanjavur.

S. Velavan
18/8/22

MEMBERS

5. **Dr. V. MURALI KRISHNAN**

Assistant Professor, Dept. of Biochemistry

V. Murali Krishnan
18/8/22

6. **Dr. L. MALARVANNAN**

Assistant Professor, Dept. of Biochemistry

L. Malarvannan
18/08/2022

7. **Mrs. G. UMARANI**

Assistant Professor, Dept. of Biochemistry

G. Umarani
18/8/22

8. **Dr. S. MAHALAKSHMI**

Assistant Professor, Dept. of Biochemistry

S. Mahalakshmi
18-08/22

[Signature]

CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR - 613 005.

[Signature]

பிரதான சிபிஐ அலுவலர் (தானாவூர்)
தானாவூர் 613005.

PROGRAMME SPECIFIC OUTCOMES (PSO)- B.Sc BIOCHEMISTRY

On completion of the Programme, the BSc BIOCHEMISTRY Under Graduates will be able to;

- 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.
- PSO-3.** The students will be able to demonstrate practical skills in handling biological specimens, analysis and their safe disposal.
- PSO-4.** Communicate the fundamental concepts of specific molecules, enzymes, cells, organ systems and metabolism of compounds.
- PSO-5.**Apply the knowledge and expertise in industries, diagnostic laboratories and various research fields
- PSO-6.**Impart practical skills and scientific knowledge in domains of Molecular biology, enzymology, genetics, clinical biology and immunology
- PSO-7.**Develop problem solving ability by utilizing the conceptual knowledge, analytical techniques, computational and statistical approaches.
- PSO-8.**Facilitate to pursue post graduation in related fields in life sciences and contribute their knowledge to the betterment of the society in various research and health care sectors.

SYLLABUS FOR B.Sc BIOCHEMISTRY
(For the students admitted from 2022-2023 onwards)

RAJAH SERFOJI GOVT COLLEGE (AUTONOMOUS), THANJAVUR-5

COURSE STRUCTURE FOR Science Course

COURSE : B.Sc BIOCHEMISTRY

(Applicable to the Candidates admitted from the academic year 2022-2023 onwards)

SEMESTER	PART	COURSE	SUBJECT CODE	TITLE	HRS	CREDIT	EXAM HOURS	MARKS		TOTAL
								IE	WE	
I				I SEMESTER				IE	WE	
	I	LT	A1T1	PART I Tamil - I	6	3	3	25	75	100
	II	LE	A1E1	PART - II English - I	6	3	3	25	75	100
	III	CC1	A1BC1	Biomolecules	4	4	3	25	75	100
	III	CC2	A2BCP1	Major Practical - I	3	-	-	-	-	-
	III	Allied 1	A1ACH1	Allied Chemistry - I	4	4	3	25	75	100
	III	Allied 2	A2AHP	Allied Chemistry Practical	3	-	-	-	-	-
	IV	VE	A1VE	Value Education	2	2	3	25	75	100
		CLP		TOTAL	30	17				500
II				II SEMESTER				IE	WE	
	I	LT	A2T2	PART I Tamil - II	6	3	3	25	75	100
	II	LE	A2E2	PART - II English - II	6	3	3	25	75	100

	III	CC2	A2BC2	Biochemical Techniques	4	4	3	25	75	100
	III	CC3	A2BCP1	Major Practical - I	3	4	3	40	60	100
	III	Allied 2	A2ACH2	Allied Chemistry - II	4	4	3	25	75	100
	III	Allied 3	A2ACHP	Allied Chemistry Practical	3	4	3	40	60	100
	IV	ES	A2ES	Environmental Studies	2	2	3	25	75	100
				TOTAL	30	25				700
	PART	COURS E	CODE	T I T L E	HRS	CRED IT		MARKS		TOTA L
III				III SEMESTER				IE	WE	
	I	LT	A3T3	PART I Tamil - III	6	3	3	25	75	100
	II	LE	A3E3	PART - II English - III	6	3	3	25	75	100
	III	CC4	A3BC3	Human Physiology	6	4	3	25	75	100
	III	CC5	A4BCP2	Major Practical - II	3	-	-	-	-	-
	III	Allied 4	A3ABO1	Allied Botany - I	4	4	3	25	75	100
	III	Allied 5	A4ABOP	Allied Botany Practical	3	-	-	-	-	-
	IV	SEC1	A3SB1	Apiculture	2	2	3	25	75	100
				TOTAL	30	16				500
IV				IV SEMESTER				IE	WE	

(Signature)

உதவி பேராசிரியர்
உயிர் அறிவியல் துறை

மாண்புமிகு கல்வி அமைச்சர், தமிழ்நாடு

I	LT	A4T4	PART I Tamil - IV	6	3	3	25	75	100
II	LE	A4E4	PART - II English - IV	6	3	3	25	75	100
III	CC5	A4BC4	Cell and Molecular Biology	6	4	3	25	75	100
III	CC6	A4BCP2	Major Practical - II	3	4	3	40	60	100
III	Allied 5	A4ABO2	Allied Botany - II	4	4	3	25	75	100
III	Allied 6	A4ABOP	Allied Botany Practical	4	3	3	40	60	100
IV	A4SB2	SEC2	Bio Fertilizer	2	2	3	25	75	100
			TOTAL	30	25				700
PART	CODE	COURSE	T I T L E	HRS	CREDIT		MARKS		TOTAL
V			V SEMESTER				IE	WE	
III	CC7	A5BC5	Enzymes	6	5	3	25	75	100
III	CC8	A5BCP3	Major Practical - III	5	5	3	40	60	100
III	CC9	A5BC6	Biochemistry of Plants and Microbes	5	5	3	25	75	100
III	DSE1	A5BCEL1A	Food and Nutrition	5	4	3	25	75	100
		A5BCEL1B	Hospital Management						
		A5BCEL1C	Food Processing						
	DSE2	A5BCEL2A	Bioenergetics and Metab	4	4	3	25	75	100

			olism							
III		A5BCEL2B	Personal Hygiene							
		A5BCEL2C	Communication and Personality Development							
IV	SSD	A5SSD	Soft Skill Development	2	2	3	25	75	100	
IV	SEC3	A5SB3	Mushroom Cultivation and Value Addition	2	2	3	25	75	100	
IV	ECC1		Communication and Personality development	-	4	3	-	100	100	
III			Internship	-	2	-	-	-	-	
			TOTAL	30	28				800	
VI			VI SEMESTER				IE	WE		
III	CC10	A6BC7	Immunology	6	5	3	25	75	100	
III	CC11	A6BC8	Clinical Biochemistry	6	5	3	25	75	100	
III	CC12	A6BC9	Pharmaceutical Chemistry	6	5	3	25	75	100	
III	CC13	A6BCP4	Major Practical - IV	5	4	3	40	60	100	
	DSE3	A6BCEL3A	Basic Biotechnology	5	4	3	25	75	100	
III		A6BCEL3B	Biotechnology for Human Welfare							
		A6BCEL3C	Public Health and Hygiene							
IV	GS	A6GS	GENDER STUDIES	2	2	3	25	75	100	
IV	ECC2		Public health and Hygiene	-	4	3	-	10	100	



			olism							
III		A5BCEL2B	Personal Hygiene							
		A5BCEL2C	Communication and Personality Development							
IV	SSD	A5SSD	Soft Skill Development	2	2	3	25	75	100	
IV	SEC3	A5SB3	Mushroom Cultivation and Value Addition	2	2	3	25	75	100	
IV	ECC1		Communication and Personality development	-	4	3	-	100	100	
III			Internship	-	2	-	-	-	-	
			TOTAL	30	28				800	
VI			VI SEMESTER				IE	WE		
III	CC10	A6BC7	Immunology	6	5	3	25	75	100	
III	CC11	A6BC8	Clinical Biochemistry	6	5	3	25	75	100	
III	CC12	A6BC9	Pharmaceutical Chemistry	6	5	3	25	75	100	
III	CC13	A6BCP4	Major Practical - IV	5	4	3	40	60	100	
	DSE3	A6BCEL3A	Basic Biotechnology	5	4	3	25	75	100	
III		A6BCEL3B	Biotechnology for Human Welfare							
		A6BCEL3C	Public Health and Hygiene							
IV	GS	A6GS	GENDER STUDIES	2	2	3	25	75	100	
IV	ECC2		Public health and Hygiene	-	4	3	-	10	100	



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	V		EXT. ACTIVITIES	NSS/NCC/S PORTS/RE DCROSS	2	-		-	-	-
				TOTAL	30	27				600
				GRAND TOTAL		140				3900
				No. of Papers x Credit		Total Credit				
		PART-I	TAMIL	4x3		12				
		PART-II	ENGLISH	4x3		12				
			CORE	8x5=40,5x4=20		60				
		PART-III	ELECTIVE	3x4		12				
			ALLIED	6x4		24				
		PART - IV	NON- MAJOR ELECTIVE	2x3		6				
			* EXTRA CREDIT COURSE	2 X 4		8				
			ES, VE	2 X 2		4				
			SKILL BASED	3 X 2		6				
			SSD	1x2		2				
			GS	1 x 2		2				
			EXTENSION ACTIVITIES	1x1		1				

* Not Considered for CGPA

Separate Passing Minimum is prescribed for Internal and External

a) The Passing minimum for CIA shall be 40%

b) The Passing minimum for Autonomous Examinations shall be 40%

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மக்கள் தொடர்பு அலுவலகம் (தனியார்)
தஞ்சாவூர் 613005.

Credits	5	Hrs/week	6	Sub Code	A1BC1	Semester	I	Medium of Instruction	English
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Semester : I- CORE COURSE-1
(For the students admitted from 2022-23 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: Carbohydrates: 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 chondroitin 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 quaternary 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. Biochemistry 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)



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மகன்வர் சரபோஜி அரசு கல்லூரி (தன்னாட்சி)
தஞ்சாவூர் 613005.

Credits	4	Hrs/week	3	Sub Code	A2BCP1	Semester	I & II	Medium of Instruction	English
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Semester - I & II-CORE COURSE -3
(For the students admitted from 2022-23 onwards)
Major Practicals- I

COURSE OBJECTIVE

To identify various types of sugars
 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.
 D.

Quantitative analysis.

- A. Estimation of reducing sugar by Benedicts quantitative 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

At the end of the course, the students will be able to		Cognitive level
CO 1	Apply the techniques for qualitative analysis	Ap
CO 2	Acquiring skills on identification of biomolecules.	Ac

(Ap- Apply, Ac-Acquiring)

Questions paper pattern

Internal – 40marks , External – 60marks
 Major experiment – 30 marks, Minor experiments – 20 marks, Record – 10 marks



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மன்னர் சரபோஜி அரசு கல்லூரி (தன்னார்வ)
தஞ்சாவூர் 613005.

Credits	5	Hrs/week	6	Sub Code	A2BC2	Semester	II	Medium of Instruction	English
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Semester : II-CORE COURSE -2
(For the students admitted from 2022-2023 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-Hasselbalch 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

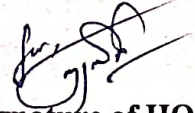
Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

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)



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மகன் சரிபாதி அரசு கல்லூரி (தன்ன
தஞ்சாவூர் 613005.

Credits	5	Hrs/week	6	Sub Code	A3BC3	Semester	III	Medium of Instruction	English
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Semester : III-CORE COURSE -4
(For the students admitted from 2022-2023 onwards)
HUMAN PHYSIOLOGY

COURSE OBJECTIVES

To understand the digestive and circulatory systems.

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 protein

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

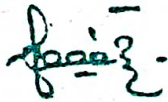
Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

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)



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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR - 613 005.

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Credits	4	Hrs/week	3	Sub Code	A4BCP2	Semester	III	Medium of Instruction	English
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Core course -5

SEMESTER – III- MAJOR PRACTICALS- II

(For students admitted from 2022-2023 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 descending 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

At the end of the course, the students will be able to		Cognitive level
CO 1	Apply the methods for preparation of buffers Evaluate the estimation of biomolecules	Un
CO 2	Attain technical knowledge on separation techniques	Ev
CO3		An

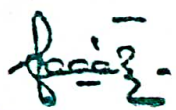
(Un- Understand, Ev-Evaluate, An – Analyse)

Questions paper pattern

Internal – 40marks , External – 60marks

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

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உயர் பகுதியில் தயார
 பக்கவர் சரிபாடி அரசு கல்லூரி (தஞ்சாவூர்)
 தஞ்சாவூர் 613005.

Credits	2	Hrs/week	2	Sub Code	A3SB1	Semester	III	Medium of Instruction	English
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SEMESTER – III- SKILL BASED
(For the students admitted from 2022-2023 onwards)
APICULTURE

COURSE OBJECTIVES

To learn history and importance of honey bee

To understand 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 uses National 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. Apply and learn honey bee foraging. Remember the importance of honey bee. Analyse honey composition and its nutritional value. Evaluate the financial assistance for apiculture .	Un
CO 2		Ap
CO3		Re
CO4		An
CO5		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

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

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

Exam duration : 3 hours


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மன்னர் சரபோஜி அரசு கல்லூரி (தன்னாட்சி)
தஞ்சாவூர் 613005.



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Credits	5	Hrs/week	6	Sub Code	A4BC4	Semester	IV	Medium of Instruction	English
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SEMESTER –IV-CORE COURSE 6
(For the students admitted from 2022-2023 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 Learn cell structure with its organelles Apply the experiments for DNA as a genetic material Remember genetic code , and various types of mutation Exemplify the protein synthesis mechanism	Un
CO 2		Ap
CO3		Ap
CO4		Re
CO5		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)

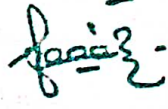
Question paper pattern Max Marks: 75

Exam duration : 3 hours

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

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

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



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மன்னர் சரபோஜி அரசு கல்லூரி (அன்னை)
தஞ்சாவூர் 613005.

Credits	2	Hrs/week	2	Sub Code	A4SB2	Semester	IV	Medium of Instruction	English
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SEMESTER IV-SKILL BASED
(Applicable to the students admitted from 2022-2023 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, Cyndrospermum) - 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 of biofertilizers with its importance Remember nitrogen and phosphorus cycle Apply mass cultivation techniques Attain the knowledge about the vermiculture Demonstrate the VAM association	Un
CO 2		Re
CO3		Ap
CO4		An
CO5		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

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

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

Exam duration : 3 hours


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Credits	5	Hrs/week	5	Sub Code	A5BC5	Semester	V	Medium of Instruction	English
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SEMESTER : V- CORE COURSE 7
(For the students admitted from 2022-2023 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 Comprehend the methods of enzyme isolation and purification	Re
CO 2	Apply the kinetics of enzyme such as MM equation, LB plot and Eadie Einstein	Un
CO3	Demonstrate the mechanism of enzymes – Chymotrypsin and lysozyme	Ap
CO4	Discuss the immobilized enzymes and its applications	An
CO5		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)


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Credits	4	Hrs/week	5	Sub Code	A5BC6	Semester	V	Medium of Instruction	English
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SEMESTER –V-CORE COURSE -8
(For the students admitted from 2022-2023 onwards)

BIOCHEMISTRY OF PLANTS AND MICROBES

COURSE OBJECTIVES:

- To understand the role of chlorophyll and its pigments in photosynthesis
- To discuss the nitrogen fixation with its mechanism.
- 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 N₂ 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 viruses . 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 Apply the kinetics of enzyme such as MM equation, LB plot and Eadie Einstein	Un
CO3	Demonstrate the mechanism of enzymes – Chymotrypsin and lysozyme	Ap
CO4	Discuss the immobilized enzymes and its applications	An
CO5		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)



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Credits	4	Hrs/week	5	Sub Code	A5BCP3	Semester	V	Medium of Instruction	English
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SEMESTER : V- CORE COURSE 9
(For the students admitted from 2022-2023 onwards)

Major Practicals- III
FOOD & MICROBIOLOGY PRACTICALS

COURSE OBJECTIVES

To demonstrate moisture and ash content in food samples

To estimate the amount of carbohydrate, and protein in the food samples

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.

COURSE OUTCOMES

At the end of the course, the students will be able to		Cognitive level
CO 1	Demonstrate the ash and moisture content in food samples Estimate the amount of nutrients in food samples	De
CO 2		An

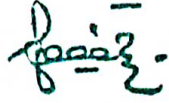
CO3	Demonstrate staining procedure	De
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(De- Demonstrate, An-Analyse)

Questions paper pattern

Internal – 40marks , External – 60marks

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



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Credits	4	Hrs/week	4	Sub Code	A5BCEL1A	Semester	V	Medium of Instruction	English
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SEMESTER V- MAJOR ELECTIVE COURSE 1 (A)
(For the students admitted from 2022-2023 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 Outline the micro and macro nutrients Illustrate the organization of hospital with its charts Gain knowledge on need of nutrients for different age groups Learn the diet therapy with its method and application.	Re
CO 2		Un
CO3		Ap
CO4		An
CO5		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)



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Credits	4	Hrs/week	4	Sub Code	A5BCEL1B	Semester	V	Medium of Instruction	English
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Semester – V- MAJOR ELECTIVE COURSE 1 (B)
(For the students admitted from 2022-2023 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 Acquire the knowledge on leadership qualities in management	Re
CO 2	Illustrate the Hospital organization Learn medical audit and insurance	Un
CO3	Explore on hospital communication and health tourism	Ap
CO4		An
CO5		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)



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Credits	4	Hrs/week	4	Sub Code	A5BCEL1C	Semester	V	Medium of Instruction	English
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Semester – V- MAJOR ELECTIVE COURSE 1 (C)
(For the students admitted from 2022-2023 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 Acquire the knowledge on rice and wheat technology Explore ideason mushroom cultivation, fish cultivation Find out the methods for preservation of vegetables Demonstrate on various types of food preservatives	Re
CO 2		Un
CO3		Ap
CO4		An
CO5		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)


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Credits	4	Hrs/week	4	Sub Code	A5BCEL2A	Semester	V	Medium of Instruction	English
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SEMESTER : V- MAJOR ELECTIVE COURSE 2 (A)

(For the students admitted from 2022-2023 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 Acquire the knowledge on Biological oxidation	Re
CO 2	Outline the major pathways in carbohydrate metabolism Learn about lipid metabolism and its importance	Un
CO3	Explore on basic reactions and its concepts in protein metabolism	Ap
CO4		An
CO5		Ev

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

Text BOOK

1. Biochemistry by U.Satyanarayana, Allied Book Publishers, 3rd edition (2006)
2. Fundamentals of Biochemistry by J.L.Jain, S.Chand & Company Ltd, 4th edition (2005).

3. 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)



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Credits	4	Hrs/week	4	Sub Code	A5BCEL2B	Semester	V	Medium of Instruction	English
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SEMESTER –V- MAJOR ELECTIVE COURSE 2 (B)
(For the students admitted from 2022-2023 onwards)
PERSONAL HYGIENE

COURSE OBJECTIVES:

- To learn about Health education and its importance
- To exemplify the importance of personal health
- To gain knowledge on physical health 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 Acquire the knowledge on personal health and its factors	Re
CO 2	Know the mental and physical health Understand environmental health and its hazards	An
CO3	Explore concepts on solid waste management	Ap
CO4		Un
CO5		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 :Epidemiology, 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)

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Credits	4	Hrs/week	4	Sub Code	A5BCEL2C	Semester	V	Medium of Instruction	English
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Semester – V- MAJOR ELECTIVE COURSE 2 (C)
(For the students admitted from 2022-2023 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: self awareness, 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 Know the importance of communication	Re
CO 2	Explore the concepts of group communication Understand various types of interviews	An
CO3	investigate methodology of effective communication	Ap
CO4		Un
CO5		Ev

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

Text Books & Reference Books

1. Kaulacharya Jagdish 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.

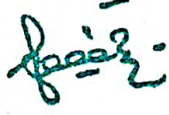
Question paper pattern Max Marks: 75

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)



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THANJAVUR - 613 005.



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யானார் சரபோஜி அரசு கல்லூரி (தன்னா
தஞ்சாவூர் 613005.

Credits	3	Hrs/week	4	Sub Code	A5SELO1	Semester	V	Medium of Instruction	English
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SEMESTER – V – NON MAJOR ELECTIVE
(For students admitted from 2022-2023 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 Classification of data and its tabulation Know the measure of central tendency Understand the measures of skewness Evaluate the use of correlation analysis in science	Re
CO 2		An
CO3		Ap
CO4		Un
CO5		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)

Credits	2	Hrs/week	1	Sub Code	A5SB3C	Semester	V	Medium of Instruction	English
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SEMESTER – V- SKILL BASED
(For the students admitted from 2022-2023 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 (*Volvvariella 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)

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உயிர் வேதியியல் துறை

மன்னர் சரபோஜி அரசு கல்லூரி (தன்னாட்சி)

தஞ்சாவூர் 613005.

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THANJAVUR - 613 005.

Credits	5	Hrs/week	6	Sub Code	A6BC7	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- CORE COURSE – 10
(For the students admitted from 2022-2023 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, immunoelectrophoresis, radio immuno assay, immunofluorescence, compliment fixation and ELISA techniques.

Unit IV-Immuno haematology- 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 Acquire the knowledge on types of immunoglobulins	Re
CO 2	Demonstrate the various immunological techniques Understand immune haematology	An
CO3	Explore concepts on and reactions of hypersensitivity and its prevention	Ap
CO4		Un
CO5		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, 6th edition (2008)
3. Immunology by Tizard, Elsevier Publishers, 8th edition (2010).

Question paper pattern

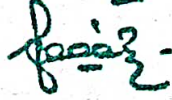
Max Marks: 75

Exam duration : 3 hours

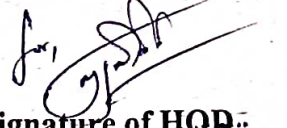
Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

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)



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மன்னர் ராஜபோஜி அரசு கல்லூரி (தன்னார்வ)
தஞ்சாவூர் 613005.

Credits	5	Hrs/week	6	Sub Code	A6BC8	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- CORE COURSE – II
(For the students admitted from 2022-2023 onwards)
CLINICAL BIOCHEMISTRY

COURSE OBJECTIVES:

- To understand the disorders of major type of metabolism
- To know the 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 Learn disorders of carbohydrate metabolism	Re
CO 2	Know the metabolism disorder of lipid metabolism Understand the disorders of protein metabolism.	An
CO3	Discuss the disorders of endocrine systems	Ap
CO4		Un
CO5		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)



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THANJAVUR - 613 005.



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உயிர் வேதியியல் துறை
பஞ்சவர்ண அரசு கல்லூரி (தஞ்சை)
தஞ்சாவூர் 613005.

Credits	5	Hrs/week	6	Sub Code	A6BC9	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- CORE COURSE – 12
(For the students admitted from 2022-2023 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		Cogniti velevel
CO 1	Study the classification of drugs based on source. Learn the drug metabolism with its enzymes.	Re
CO 2	Discuss the chemotherapy. Understand and apply the adverse reactions of drugs .	An
CO3	Investigate the use of anaesthetics .	Ap
CO4		Un
CO5		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

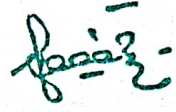
Max Marks: 75

Exam duration : 3 hours


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

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

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



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THANJAVUR - 613 005.



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உதவி பேராசிரியர்
உயிர் வேதியியல் துறை
மன்னர் ராஜாஜி அரசு கல்லூரி (தனி) -
தஞ்சாவூர் 613005.

Credits	4	Hrs/week	6	Sub Code	A6BCP4	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- CORE COURSE -13
MAJOR PRACTICAL- IV
(For the students admitted from 2022-2023 onwards)

COURSE OBJECTIVES :

To demonstrate the experiments both qualitative and quantitative in clinical samples.

To estimate compounds in urine and blood samples

SYLLABUS

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./ Internship to Clinical laboratory with their purpose and record of their visit

COURSE OUTCOMES

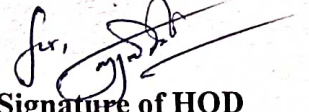
At the end of the course, the students will be able to		Cognitive level
CO 1	Estimate the compounds in urine samples Estimate the various compounds in blood samples	Un
CO 2	Know the methods of heamatology	An
CO3		Ap

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

Questions paper pattern

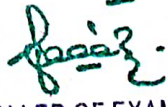
Internal – 40marks , External – 60marks

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



Signature of HOD

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மன்னர் சரபோஜி அரசு கல்லூரி (தன்னார்வ)
தஞ்சாவூர் 613005.



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THANJAVUR - 613 005.

Credits	4	Hrs/week	6	Sub Code	A6BCEL3A	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- MAJOR ELECTIVE- 3 (A)
(For the students admitted from 2022-2023 onwards)
BASIC BIOTECHNOLOGY

COURSE OBJECTIVE

- To understand the history and scope of biotechnology
- To learn the plant tissue culture and its applications.
- To demonstrate waste 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

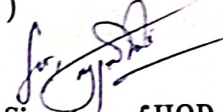
At the end of the course, the students will be able to		Cognitive level
CO 1	Learn fermentation process Discuss plant tissue culture	Re
CO 2	Application of plant biotechnology Understand animal cell culture and its techniques	An
CO3	Investigate the waste water treatment and bioremediation	Ap
CO4		Un
CO5		Ev

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

Text Books & Reference Books

1. Biotechnology by U.Sathyararyana, 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

உயிர் தொழில்நுட்ப
பல்கலைக் கல்லூரி, தஞ்சாவூர் (தன்னாட்சி)
தஞ்சாவூர் 613005.


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THANJAVUR - 613 005.

Credits	4	Hrs/week	6	Sub Code	A6BCEL3B	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- MAJOR ELECTIVE COURSE 3 (B)
(For the students admitted from 2022-2023 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, antimicrobials 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. Learn the food and dairy biotechnology	Re
CO 2	Application of biotechnology for disease and diagnosis Understand and apply biotechnology for treatment and prevention	An
CO3	Knowing the basic concept of environmental biotechnology	Ap
CO4		Un
CO5		Ev

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

Text Books & Reference 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.

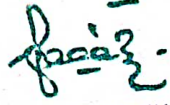
Question paper pattern Max Marks: 75

Exam duration : 3 hours

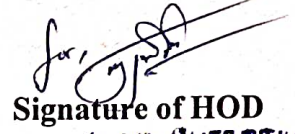
Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

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)



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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR - 613 005.



Signature of HOD

உதய வேளாண்மை
உயிர் வேதியியல் துறை
மன்னர் சரபோஜி அரசு கல்லூரி (தன்னாட்சி)
தஞ்சாவூர் 613005.

Credits	4	Hrs/week	6	Sub Code	A6BCEL3C	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- MAJOR ELECTIVE COURSE 3 (C)

(For the students admitted from 2022-2023 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 Gain knowledge on Environmental hazards	Re
CO 2	Aware of communicable disease Understand non communicable diseases	An
CO3	Deliberate the concept of health education in India	Ap
CO4		Un
CO5		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

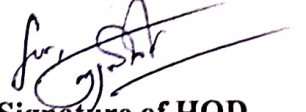
Part A 10 x 2 = 20 Answer all questions (Two Questions from each unit)

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)



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உயர் வேதியியல் துறை
மணலர் சரபோஜி அரசு கல்லூரி (தனி)
தஞ்சாவூர் 613005.**

Credits	3	Hrs/week	4	Sub Code	A6BTELO2	Semester	VI	Medium of Instruction	English
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SEMESTER- VI- NON MAJOR ELECTIVE
(For the students admitted from 2022-2023 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)

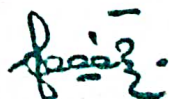
Signature of HOD

உதவியுள்ளவர்

உயர் வேதியியல் துறை

மகன் ஆர் கரவேலி அரசு கல்லூரி (தன.கா.பி)

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**RAJAH SERFOJI GOVT COLLEGE, (AUTONOMOUS)
THANJAVUR -613 005
(Reaccredited with "A"Grade by NAAC)**



**AFFILIATED TO
BHARATHIDASAN UNIVERSITY
TRICHIRAPPALLI -24**



DEPARTMENT OF BIOCHEMISTRY
SYLLABUS (NON MAJOR ELECTIVES & ALLIED PAPERS)
(For the students admitted from 2022-2023 onwards)

Credits	4	Hrs/week	4	Sub Code	A3ABC1	Semester	III	Medium of Instruction	English
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Allied I – GENERAL BIOCHEMISTRY

COURSE OBJECTIVES

To know about the basic biomolecules and its functions in our body.

To learn the 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 and 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
CO 3	Know the classification of proteins and lipids	Ap
CO 4	Understand the nature of nucleic acid with its structure	Un
CO 5	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

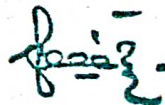
Max Marks: 75

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)



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71

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தஞ்சாவூர் 613005.

Credits	4	Hrs/week	4	Sub Code	A4ABC2	Semester	IV	Medium of Instruction	English
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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, Sawhane 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)

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72

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மணலி எரியூட்டி அரசு கல்லூரி (அதனாங்கீ)
தஞ்சாவூர் 613005.

Credits	4	Hrs/week	3	Sub Code	A4ABCP	Semester	IV	Medium of Instruction	English
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**ALLIED PRACTICAL
BIOCHEMISTRY PRACTICAL**

COURSE OBJECTIVES

To learn qualitative analysis 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 Demonstrate the preparation of buffers Study and apply the separation of amino acids by paper chromatography	Un
CO 2		De
CO3		Ap

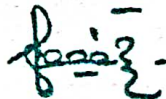
(Un- Understand, Ap – Apply, De- Demonstrate)

Text Books and Reference books

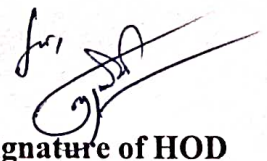
1. Practical Biochemistry By Varley.
2. Practical Manual by Jeyaraman,
3. Biochemical methods by Sadasivam

Question paper pattern

Internal – 40 marks, external – 60 marks
Major Experiment – 30, Minor experiment 20, Record -10



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தஞ்சாவூர் 613005.

Credits	3	Hrs/week	4	Sub Code	A5BCELO1	Semester	V	Medium of Instruction	English
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SEMESTER – V-NON MAJOR ELECTIVE
(For the students admitted from 2022-2023 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 Understand the vitamin and its deficiency diseases Apply the knowledge of food preservatives Create awareness on life style changes Gain knowledge on health insurance policies , WHO, UNICEF	Le
CO 2		Un
CO3		Ap
CO4		Un
CO5		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)


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மன்னர் சரபோஜி அரசு கல்லூரி (தன்னாட்சி)
தஞ்சாவூர் 613005.

Credits	3	Hrs/week	4	Sub Code	A6BCELO2	Semester	VI	Medium of Instruction	English
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SEMESTER – VI -NON MAJOR ELECTIVE
(For the students admitted from 2022-2023 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 Understand the vitamin and its deficiency diseases	Le
CO 2	Apply the knowledge of food preservatives Create awareness on life style changes	Un
CO3	Gain knowledge on health insurance policies , WHO, UNICEF	Ap
CO4		Un

CO5		Ap
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(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

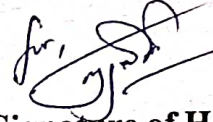
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Part C 3 x 10 = 30 Answer any Three questions (one question from each unit)



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