SRI SANKARA ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

ENATHUR, KANCHIPURAM – 631 561
CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF MICROBIOLOGY

REGULATIONS
(With effect from the academic year 2016-2017)

1. ELIGIBILITY FOR ADMISSION:

Candidates for admission to the first year of the Degree of Bachelor of Science courses shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination. Provided that candidates for admission into the specific main subject of study shall be Possess such other qualifying conditions as may be prescribed by the University as given in the **APPENDIX-A.**

2. ELIGIBILITY FOR THE AWARD OF DEGREE:

A candidate shall be eligible for the award of the Degree only if he /she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years, passed the examinations all the Six-Semesters prescribed earning 140 Credits (in Parts-I, II, III, IV & V).

3. DURATION:

a) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semester respectively.

b) The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY:

The main Subject of Study for Bachelor Degree Courses shall consist of the following and shall be in accordance with **APPENDIX-B**

5. EXTENTION ACTIVITIES:

A candidate shall be awarded a maximum of 1 Credits for Compulsory Extension Service.

All the Students shall have to enrol for NSS /NCC/ NSO (Sports & Games) Rotract/ Youth Red cross or any other service organizations in the college and shall have to put in Complusory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS

40 HOURS ATTENDANCE in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

6. SCHEME OF EXAMINATION:

Scheme of Examination shall be given in **APPENDIX - C**

The following procedure to be followed for Internal Marks:

Theory Papers: Internal Marks 25

INTERNAL MARKS

Tests (2 out of 3)	= 10
Attendance	= 5
Seminars	= 5
Assignments	= 5

	25marks

Break-up Details for Attendance

Below 60%	- No marks
60% to 75%	- 3 marks
76% to 90 %	- 4 marks
91% to 100%	- 5 marks

Practical:	Internal Marks	40
Attendance		5 marks
Practical Test best 2 out of 3		30 marks
Record		5 marks

7. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER:

i. Candidates shall register their names for the First Semester Examination after the admission in UG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester Subjects.

iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed there for by the college from time to time.
Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the Course of study. Such Candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

8. PASSING MINIMUM:

A candidate shall be declared to have passed:

a) There shall be no Passing Minimum for Internal.

b) For External Examination, Passing Minimum shall be of 40% (Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.

c) In the aggregate (External + Internal) the passing minimum shall be of 40%.

d) He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in Parts-I, II, III, IV & V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 Credit to qualify for the Degree.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

PART- I TAMIL / OTHER LANGUAGES

TAMIL/OTHER LANGUAGES: Successful candidates passing the Examinations for the Language and securing the marks (1) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART – II ENGLISH

ENGLISH: Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVE with three courses:

Successful candidates passing the examinations for Core Courses together and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core courses together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the Third Class.

PART – IV (consisting of sub items 1 (a), (b) & (c), 2, 3 and 4) as furnished in the Regulations 4 Part-IV supra.

PART – V EXTENTION ACTIVITIES**:**
Successful Candidate earning of 1 credit SHALL NOT BE taken into consideration for Classification/Ranking/ Distinction.

10. RANKING:

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking/ Distinction.
Provided in the case of Candidates who pass all the examinations prescribed for the Course with a break in the First Appearance due to the reasons as furnished in the Regulations. 7 (iii) supra are only eligible for classification.

11. TRANSITORY PROVISION:

Candidates who have undergone the course of study prior to the academic year 2014 – 2015 will be permitted to appear for the examinations under those Regulations for a period of TWO years i.e. up to and inclusive of April/May 2018 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

Question Paper Pattern

SECTION – A (30 words)				
10 OUT OF 12	-	10 X 2 marks	=	20 marks
SECTION – B (200 words)				
5 out of 7	-	5 x 5 marks	=	25 marks
SECTION – C (500 words)				
3 out of 5	-	3x 10 marks	=	30 marks

		TOTAL	=	**75 marks**

QUESTION PAPER FOR PRACTICALS

The external examiner will prepare a question paper on the spot with the help of the Question Bank supplied by the Controller's office.

APPENDIX – A

ADDITIONAL ELIGIBILITY CONDITIONS FOR ADMISSION TO THE FOLLOWING COURSE

(1) CANDIDATES FOR ADMISSION TO THE FOLLOWING COURSES SHALL HAVE PASSED THE QUALIFYING EXAMINATION WITH THE SUBJECTS NOTED AGAINST EACH:

(i) MICROBIOLOGY : ANY SCIENCE GROUP

APPENDIX - B

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT/ELECTIVES WITH THREE COURSES

PART – IV

1.(a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6^{th} Standard).

(b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses.

(c) Others who do not come under a + b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS (ELECTIVE) - (SOFT SKILLS)

3. ENVIRONMENTAL STUDIES

4 VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

APPENDIX – C

Model Scheme

Course Component **Name of the course**	**Inst. Hour**	**Credits**	**Exam Hours**	**Max. Marks**		
				Ext. mark	**Int. mark**	**Total**
PART-I Language				**75**	**25**	**100**
PART-II English				**75**	**25**	**100**
PART-III Core subject :				**75**	**25**	**100**
Core Subject				**75**	**25**	**100**
Allied Subject				**75**	**25**	**100**
PART – IV 1.(a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard). (b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses. (c) Others who do not come under a + b can choose non-major elective comprising of two courses.						
2*Skill based subjects(Elective) – (Soft Skill)						

SYLLABUS
(With effect from the academic year 2016-2017)

B.Sc. DEGREE COURSE IN MICROBIOLOGY

SCHEME OF EXAMINATION

FIRST SEMESTER

Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
					Internal	External	Total
Language	Tamil/Sanskrit - 1	5	3	3	25	75	100
Language	English 1	5	3	3	25	75	100
Core 1 – theory	General Microbiology and Microbial physiology	5	4	3	25	75	100
*Core 1 – Practical	General Microbiology and Microbial physiology	3	4	6	40	60	100
Allied 1 – theory	Biochemistry I	5	4	3	25	75	100
*Allied 1 – Practical	Biochemistry I	3	4	3	40	60	100
Non Major Elective	Cellular Organization	2	2	3	25	75	100
Soft skills	Soft skills I	2	2	3	25	75	100

SECOND SEMESTER

Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
					Internal	External	Total
Language	Tamil/Sanskrit - 2	5	3	3	25	75	100
Language	English 2	5	3	3	25	75	100
Core 2 – theory	Immunology & Microbial Genetics	5	4	3	25	75	100
*Core 2 – Practical	Immunology & Microbial Genetics	3	4	6	40	60	100
Allied 2 – theory	Biochemistry II	5	4	3	25	75	100
*Allied 2 – Practical	Biochemistry II	3	4	3	40	60	100
Non Major Elective	Diversity Life forms	2	2	3	25	75	100
Soft skills	Soft skills II	2	2	3	25	75	100

THIRD SEMESTER

Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
					Internal	External	Total
Language	Tamil/Sanskrit - 3	5	3	3	25	75	100
Language	English 3	5	3	3	25	75	100
Core 3 – theory	Molecular biology	6	4	3	25	75	100
*Core 3 – Practical	Molecular biology	3	4	6	40	60	100
Allied 3 – theory	Bioinstrumentation	6	4	3	25	75	100
*Allied 3 – Practical	Bioinstrumentation	3	4	3	40	60	100
Soft skills	Soft skills III	2	2	3	25	75	100

FOURTH SEMESTER

Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
					Internal	External	Total
Language	Tamil/Sanskrit - 4	5	3	3	25	75	100
Language	English 4	5	3	3	25	75	100
Core 4 – theory	Soil & Agricultural Microbiology	5	4	3	25	75	100
*Core 4 – Practical	Soil & Agricultural Microbiology	3	4	6	40	60	100
Allied 4 – theory	Biostatistics	5	4	3	25	75	100
*Allied 4 – Practical	Biostatistics	3	4	3	40	60	100
Extra disciplinary	Environmental Studies	2	2	3	25	75	100
Soft skills	Soft skills IV	2	2	3	25	75	100

FIFTH SEMESTER

Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
					Internal	External	Total
Core 5 – theory	Medical Bacteriology	6	4	3	25	75	100
Core 6 – theory	Medical Mycology & Parasitology	6	4	3	25	75	100
Core 7 – theory	Medical Virology	6	4	3	25	75	100
*Core 5,6,7 – Practical	Medical Bacteriology, Mycology, Parasitology & Virology	5	4	6	40	60	100
Elective I	Genetic Engineering	5	3	3	25	75	100

SIXTH SEMESTER

Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
					Internal	External	Total
Core 8 – theory	Environmental Microbiology	6	4	3	25	75	100
Core 9 – theory	Food & Dairy Microbiology	6	4	3	25	75	100
*Core 8,9 – Practical	Environmental, Food & Dairy Microbiology	5	4	6	40	60	100
Elective 2	Industrial and Pharmaceutical Microbiology	5	3	3	25	75	100
Elective 3	Biotechnology	5	3	3	25	75	100

*** Practical examination will be conducted in even semester.**

SYLLABUS
(With effect from the academic year 2016-2017)

B.Sc. DEGREE COURSE IN MICROBIOLOGY

ALLIED I- Paper I- BIOCHEMISTRY I

CREDITS: 3

UNIT I

Definition and classification of carbohydrates, linear and cyclic forms (Haworth projection) for glucose, fructose and mannose and disaccharides (maltose, lactose, sucrose).

UNIT II

General properties of monosaccharides and disaccharides. Occurrence and significance of polysaccharides.

UNIT III

Amino acids, various classifications, amphoteric nature, isoelectric point. Reactions of carboxyl and amino groups.

UNIT IV

Proteins- classification - biological functions ,physical properties- ampholytes, isoionic point, salting in and salting out, denaturation, nature of peptide bond. Secondary structure, α-helix and β-pleated sheet, tertiary structure, various forces involved- quaternary structure. Deamination, transamination and urea cycle.

Books Recommended

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6^{th} ed) W.H. Freeman.
2. Voet.D & Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Lubert Stryer (2010) Biochemistry,(7^{th} ed), W.H.Freeman
4. Satyanarayan,U (2014) Biochemistry (4^{th} ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
5.Jain J.L.(2007) Fundamentals of Biochemistry,S.Chand publishers

ALLIED- II- Paper I- BIOCHEMISTRY- II

UNIT I

Fats - function, classification, simple lipids, fatty acids (saturated and unsaturated), compound lipids, derived lipids, properties- saponification, rancidity, reduction, oxidation, halogenation. Functions of phospholipids, Cholesterol – biological importance, chemical properties.

UNIT II

Purine and pyrimidine bases, nucleosides, nucleotides, polynucleotides, DNA structure, various types, properties- absorbance, effect of temperature. Different types of RNA, structure and function, Genetic code.

UNIT III

Enzymes - definition, units of enzyme activity, enzyme nomenclature, specificity, isoenzymes, factors affecting enzyme activity- substrate concentration, pH, temperature. Michaelis and Menten equation. Lineweaver- Burk plot, Enzyme inhibition, competitive, uncompetitive and and non competitive inhibition

UNIT IV

Vitamins, definition, classification, water soluble vitamins, B1, B2, B3, B6, B12 and Vitamin C. Deficiency diseases. Fat soluble vitamins- A, D, E and K- Deficiency diseases.

Books Recommended:

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6^{th} ed) W.H. Freeman.
2. Voet.D & Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Lubert Stryer (2010) Biochemistry,(7^{th} ed), W.H.Freeman
4. Satyanarayan,U (2014) Biochemistry (4^{th} ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
5.Jain J.L.(2007) Fundamentals of Biochemistry,S.Chand publishers

ALLIED- I & II- BIOCHEMISTRY PRACTICALS (I & II)
UBYY21B

1. Volumetric analysis
   a. Estimation of ascorbic acid using 2,6 – dichlorophenol indophenol as link solution.
   b. Estimation of calcium in milk.
2. Qualitative analysis
   a. Qualitative analysis of carbohydrates- glucose, fructose, galactose, lactose, maltose and sucrose.
   b. Qualitative analysis of amino acids – arginine, cysteine, tryptophan and tyrosine.
3. Quantitative analysis: (demonstration)
   a. Colorimetric estimation of protein by Biuret method.
   b. Colorimetric estimation of phosphorus.
4. Biochemical preparations
   a. Preparation of casein from milk.
   b. Preparation of starch from potato.

ALLIED III - Paper I - BIOINSTRUMENTATION

UNIT –1 BASIC LABORATORY INSTRUMENTS

Common laboratory equipment –anaerobic incubator – Biosafety Cabinent - Principle and working of pH meter, Laminar-air flow. Centrifugation: Types & principles and their applications- Lyophilizer - Flow cytometry.

UNIT – 2 CHROMATOGRAPHIC TECHNIQUES

Theory, principles and applications of paper, thin layer, gel filtration, ion exchange,

UNIT – 3 ELECTROPHORETIC TECHNIQUES

Basic principles of electrophoresis, theory and application of paper, agarose,

UNIT – 4 SPECTROSCOPY

Spectroscopic techniques, theory and applications of UV, Visible, NMR, Fluorescence, CD, ORD.

UNIT – 5 RADIOISOTOPIC TECHNIQUES

Use of radioisotopes in life sciences, radioactive labeling, principle and application of tracer techniques, detection and measurement of radioactivity using ionization chamber, proportional chamber, Geiger- Muller and Scintillation counters, autoradiography and its applications.

ALLIED III – Paper II
PRACTICAL III (BIOINSTRUMENTATION)

1. Studies on pH titration curves of amino acids/ acetic acid and determination of pKa values and Handerson-Hasselbach equation.
2. Separation of bacterial lipids/amino acids/sugars/ by TLC or Paper Chromatography.
3. Separation of serum protein by horizontal submerged gel electrophoresis.
4. Study of UV absorption spectra of macromolecules (protein, nucleic acid, bacterial pigments).
5. Quantitative estimation of hydrocarbons/pesticides/organic Solvents /methane by Gas chromatography. (Demonstration)
6. Demonstration of PCR, DNA sequencer, Fermenter, Flow cytometry

REFERENCES
LABORATORY / ONLINE

1. Instrumental Methods of Analysis. 6th Edition by H.H. Willard, L.L. Merritt Jr. and others. 1986. CBS Publishers and Distributors.
2. Instrumental Methods of Chemical Analysis. 1989 by Chatwal G and Anand, S. Himalaya Publishing House, Mumbai.
3. A Biologists Guide to Principles and Techniques of Practical Biochemistry. 1975 by Williams, B.L. and Wilson, K.
4. Spectroscopy. Volume 1. Edited by B.B. Straughan and S. Walker. Chapman and Hall Ltd.
5. Gel Electrophoresis of Proteins- A Practical Approach by Hanes.
6. Chromatography: Concepts and Contrasts- 1988 by James Miller. John Wiley and Sons.Inc., New York.
7. Analytical Biochemistry by Holme.
8. Introduction to High Performance Liquid Chromatography by R R. J. Hamilton and P. A. Sewell.
9. Spectroscopy by B.P. Straughan and S. Walker.
10. John G. Webster. (2004). Bioinstrumentation. University of Wisconsin, John Wiley & Sons, Inc.

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