RATHNAVEL SUBRAMANIAM COLLEGE OF ARTS & SCIENCE (AUTONOMOUS) SULUR, COIMBATORE-641402

DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

Syllabus effective for the students admitted during the Academic Year 2016 – 2017 Batch & onwards

(2016- 2019)

HOD PRINCIPAL COE

PROGRAMME OUTCOMES (POs):

PO1	Graduates can have strong fundamentals in their specific discipline along with DIGITAL STRATEGIC knowledge.
PO2	To increase student's ability to communicate effectively with the community /society in verbal /written courage for such as to give or receive clear instruction.
PO3	To enhance their ability to understand and identify the professional and ethical responsibilities.
PO4	To enrich their personality and character development

PROGRAMME SPECIFIC OUTCOMES: (PSOs)
Upon completion of Bachelor of Microbiology Degree,
STUDENTS are able to achieve the following outcomes

PSO1	Inculcate the learners to acquire, articulate, retain and apply the knowledge of microbiology in Medical, Diagnosis, Agricultural, Industrial, Pharmaceutical and other relevant fields.
PSO2	To prepare, promote and apply microbial knowledge to excel as succeeding microbiologist on isolation and identification of challenging microbes in the field of medical and agricultural field.
PSO3	Demonstrate the knowledge of interaction between humans and microorganisms by formally applying in quality analysis of production and products in the industrial level
PSO4	Understand and develop ability to use, the scientific methods including observation, hypotheses testing, data collection, and analysis to engage in higher studies and scholarly research activities.

GRADUATE ATTRIBUTES

- DISIPLINEKNOWLEDGE
- PROBLEMANALYSIS
- CRITICALTHINKING
- MODERN TOOLSUSAGE
- SOFTSKILLS
- SELFLEARNING
- LIFE LONGLEARNING
- INDIVIDUAL & TEAMWORK
- PROJECT MANAGEMENT &FINANCE

RATHNAVEL SUBRAMANIAM COLLEGE OF ARTS & SCIENCE (AUTONOMOUS) SULUR, COIMBATORE-641402

DEPARTMENT OF MICROBIOLOGY

SYLLABUS FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2016 BATCH ONWARDS

TOTAL NUMBER OF PAGES: 45 pages

SIGNATURE OF HOD **SIGNATURE OF PRINCIPAL** **SIGNATURE OF COE**

RATHNAVEL SUBRAMANIAM COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS),
SULUR, COIMBATORE – 641 402

REGULATIONS FOR B.Sc., MICROBIOLOGY DEGREE COURSE
With Semester System under Choice Based Credit System (With effect from 2016 onwards)

1. Eligibility for Admission to the Course

Candidate for admission to the first year of the UG degree course shall be required to have passed the higher secondary examination (Academic or Vocational) conducted by the Govt.of Tamil Nadu or other examinations accepted as equivalent thereto by the Syndicate, subject to such other conditions as may be prescribed therefor.

2. Duration of the Course

The course shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

3. Course of Study

The course of study for the UG degree course shall consist of the following

a) Part - I

Tamil or any one of the following modern/classical languages i.e. Malayalam, Hindi, French and Arabic. The subject shall be offered during the first four semesters with one examination at the end of each semester. **(4 Courses – 16 Credits)**

b) Part – II: English

The subject shall be offered during the first four semesters with one examination at the end of each semester. **(4 Courses – 16 Credits)**

c) Part – III

(i) Major subject – As prescribed in the scheme of examinations.
Examination shall be conducted in the core subjects at the end of every semester.

(ii) Allied subjects - 4 papers - As prescribed in the scheme of examinations four **subjects,** one each in **I, II, III and IV semester.** Examination shall be conducted in the allied subjects at the end of first four semesters. **(4 Courses – 16 Credits)**

(iii) Elective subjects - 3 papers - Electives shall be offered one in the **IV, V and VI semester**. Elective subjects shall be selected from the list of elective subjects prescribed by the Board of Studies concerned. Examination shall be conducted at the end of the respective semesters. **(2 Courses – 8 Credits) Elective – II** will be **EDC (Extra Disciplinary Course)** selected over choice with examination at the end of **V semester**. **(3 Credits)**

Part – IV

(i) Foundation Course (FC) - The Foundation course shall comprise of two stages as follows:
Foundation Course A: Value Education - Environmental Studies (Self Study) (I semester).
Foundation Course B: General Awareness (Self Study) (II semester).
The Foundation Course A shall comprise of only one paper which shall have Value Education - Environmental Studies. Examination will be at the end of the I semester. **(2 Credits)**
The Foundation Course B shall comprise of only one paper which shall have General Awareness. Examination will be at the end of the II semester. **(2 Credits)**

(ii) Skill Based Course (SBC) – **4 papers**. All the UG programmes shall offer as compulsory Skill Based Course and it shall be offered in II, III, IV and V semesters. SBC –I, II and IV papers shall be offered for their respective departments and SBC – III will be **Aptitude Skills.** Examination will be at the end the respective semesters. **(4 Courses – 12 Credits)**

(iii) Non Major third Language (NML)

(a) Basic Tamil (BT) – Those who have not studied Tamil up to XII Standard and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two courses (Level will be 6^{th} Standard). It is offered in the **III & IV semesters**. Examination will be on Continuous Internal Assessment (CIA) basis only. **(2 Courses – 4 Credits)**

(b) Advanced Tamil (AT) – Those who have studied Tamil up to XII Standard and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses. **(2 Courses – 4 Credits)**

(c) Non Major Elective (NME) – Those who do not come under a (or) b can choose Non – Major Elective comprising of two courses. **(2 Courses – 4 Credits)**

1. Human Rights (III semester)
2. Constitution of India (IV semester)

Part – V

Extra - Curricular activities (EC): NSS/Sports/Games

Every student shall participate compulsorily for a period of not less than two years (4 semesters) in any one of the above programmes. The above activities shall be conducted outside the regular working hours of the College. The Student's performance shall be examined by the Staff-in-charge of extension activities along with the Head of the respective department and a senior member of the Department on the following parameters. The marks shall be sent to the Controller of Examinations before the commencement of the final semester examinations.

- 60% of marks for Regular Activities
- 40% of marks for Special Camps

This mark shall be incorporated in the mark sheet to be issued at the end of the **IV semester**. (Handicapped students who are unable to participate in any of the above activities shall be required to take a test in the theoretical aspects of any one of the above fields and be certified accordingly). **(1 Credit)**

4. **Extra Credits**

a) Employability Skills (ES) encompassing all the soft skills necessary for our Students to succeed in job interviews. To evaluate the Students, examination shall be conducted **at the end of II, IV and V semesters for the UG Students.** Evaluation shall be done by Internal Examiners**. A UG Student is awarded 3 Extra Credits** provided he/she attends and secures a minimum of 40% in the examinations mentioned above. Grades shall be assigned to the Students according to their performance in the above mentioned examinations. Common grading system applicable to all other subjects shall be followed. Qualifying in this evaluation system becomes **'Mandatory'** to become eligible to receive a Degree.

b) Advanced Learners Course in Thrust Area (ALCTA)

Each department will offer a course in thrust area, which will be of a self study nature. The student can do this only during the V semester and take up the examination at the end of V semester and clear it in a single attempt. The marks secured will not be considered for awarding class. The course will carry grades along with **4 extra credits**.

5. **Requirements to appear for the examinations**

a) A candidate will be permitted to appear for the End of Semester Examinations for any semester if

i) He/she secures not less than 75% of attendance in the number of working days during the semester. (Proforma – I)

ii) He/she earns a progress certificate from the Head of the institution, of having satisfactory completed the course of study prescribed in the subjects as required by these regulations, and

iii) His/her conduct has been satisfactory.

Provided that it shall be open to the Principal, or any authority delegated with such powers by the Principal, to grant exemption to a candidate who has failed to earn **75%** of the attendance prescribed, for valid reasons, subject to usual conditions. (Proforma – II)

b) A candidate who has secured **less than 65% but 55%** and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides earning the required percentage of attendance in that semester and appear for both semester papers together at the end of the later semester. (Proforma – III). Otherwise, they will not be permitted to appear for both the previous and current semester examinations and they have to re-do the programme from the previous semester in the following academic year, if vacancy is available from the Bharathiar University and the Principal through the HoD concerned.

c) A candidate who has secured **less than 55%** of attendance in any semester will not be permitted to appear for the regular examinations and to continue the study in the subsequent semester. He/she has to rejoin the semester in which the attendance is less than 55% (Proforma – IV)

d) A candidate who has secured **less than 65%** of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned Head of the department after rejoining the same course.

The Principal is authorized to condone deficiency in attendance upto a maximum of 10% of the number of days for each semester.

6. EXAMINATIONS

Students of UG courses are evaluated in the theory and practical paper through two components:

A) Continuous Internal Assessment (CIA) carrying a maximum of 25 marks.
B) End Of Semester Examinations (EOSE) carrying a maximum of 75 marks.

A. CONTINUOUS INTERNAL ASSESSMENT (CIA):

i) COMPONENTS AND BREAK UP

Theory: Continuous Internal Assessment has the following components with the given break up of marks.

The following are the distribution of Internal Marks for Theory papers of UG courses

S. No	For Theory – UG courses	Distribution of Marks
01	Test (50 marks for 2 hours)	10
02	End semester Model Test (75 marks for 3 hours)	10
03	Assignments – 1 No.	05
	Total Marks	25

CONDUCT OF CIA PROGRAMMES

During each semester one test and one model examination will be conducted as scheduled below:

- The test will be conducted at the end of the 40th day and model exam at the end of the 90th day from the commencement of the particular course.
- The duration of the Test will be 50 marks for 2 hours & Model examination will be for 3 hours carrying a maximum of 75 marks.
- Question paper for the test and model examination will be set by course teachers in the prescribed pattern.
- To ensure that this program is conducted systematically and efficiently, the process will be centralized with the CIA Cell. The CIA Co-ordinators are responsible for framing and announcing the time table, obtaining relevant question papers and distribution of the answer scripts for valuation by course teachers.

ii) Practical: The following are the distribution of Internal Marks for UG Practical papers**.**

S. No	For Practical – UG courses	Distribution of Marks
01	Model Test	30
02	Observation / Regularity	10
	Total Marks	**40**

Minimum 10 experiments to be conducted per practical paper per semester. The marks for class performance based on time and performance and should be assessed in each practical class and recorded. There will be one model exam on par with the end of semester theory examinations.

b. Safeguards for Students

To protect the interests of students against indifferent indiscriminate and vindictive valuation, two safeguards will build into the system:

Answer script verification : The valued answer scripts of the test and model exam will be handed over to students for verification to satisfy themselves that all question have been valued, correct marks awarded and totaling has been done correctly.

Appeal system: A candidate who is not satisfied with the marks awarded for any CIA program may appeal to the Head of the department in writing not later 7 working days after the announcement of the marks of the particular examination by the course teacher concerned. Appeals received thereafter will be summarily rejected. If the candidates if not satisfied by the decision of the HoD, he/she may address the appeals committee through the Principal. The decision of the committee is final.

c. Semester Examination

- Semester examination will be conducted at the end of each semester after completing a minimum of 90 days.
- Semester examinations for the even semester will generally be held during April / May and odd semesters during November / December.
- The question paper for all the courses will be set by the external examiners.
- To keep the identity of the students confidential dummy number system will be adopted. There will be a single valuation for UG and PG courses with external examiners.

i. **Question paper pattern for Theory: (75 marks)**

Section A 10 marks (10 questions - 1 mark each - MCQ)
Section B 25 marks (5 questions either or type - 5 marks each)
Section C 40 marks (5 questions either or type - 8 marks each)
In all the sections the questions should be uniformly set from to all the five units.

Question paper pattern for Theory: (FC – A, BT / AT/ NME - 50 marks)

Section A 10 marks (10 questions - 1 mark each - MCQ)
Section B 40 marks (5 questions either or type - 8 marks each)
In all the sections the questions should be uniformly set from to all the five units.

Question paper pattern for Theory: (FC – B - 50 marks)
50 marks (50 questions - 1 mark each - MCQ)
The questions should be uniformly set from to all the five units.

ii. **Practical / Project Examinations:** Practical examinations will be conducted with one internal examiner and one external examiner. The question paper for practical examinations will be jointly set by both internal and external examiners.

iii. **Supplementary examinations** will be conducted for the benefit of final year students after 15 days of the declaration of the even semester results. Maximum of any two papers of any semester including COP.

iv. **Retotalling:** A candidate may request for a retotalling of answer script by addressing the Controller of Examination through the Principal, paying the prescribed fees. This provision will be available for all written papers taken in the current semester examination.

v. **Revaluation:** If the candidates are not satisfied with the marks awarded to them in any theory paper in the semester examination they can apply for revaluation of the relevant paper on payment of the prescribed fee. This is applicable for all UG courses.

vi. **Improvement:** Candidates who have passed in a subject will be permitted to appear once again for examinations to enable them to improve their marks in that subject only once for the papers written in the previous semester. It is permitted for regular papers only. (Not applicable for any arrear paper)

d. PASSING REQUIREMENTS

The passing requirements for UG courses are as follows:

CRITERIA FOR UG COURSES

- Minimum pass mark in each paper (EOSE+CIA) - 40%
- Minimum pass mark in semester examination-40% (i.e.30 out 0f 75)
- No minimum pass mark for CIA

e. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Classification of successful candidates in UG courses will be as follows:

UG COURSES

Candidates who have passed in all the papers in parts I, II and III and have secured a total of

- 75% and above : Distinction(first attempt)
- 60% and above : I class
- 50% and above but below 60% : II class
- 40% and above but below 50% : III class

7. Restrictions to appear for the examinations

a) Any candidate having arrear paper(s) shall have the option to appear in any arrear paper along with the regular semester papers.

b) Candidates who fail in any of the papers in Part I, II, III, IV and V of UG degree examinations shall complete the paper concerned **within 5 years** from the date of admission to the said programme, and should they fail to do so, they shall take the examination in the texts/

revised syllabus prescribed for the immediate next batch of candidates. If there is no change in the texts/syllabus they shall appear for the examination in that paper with the syllabus in vogue until there is a change in the texts or syllabus. In the event of removal of that paper consequent to change of regulation and / or curriculum after 5 year period, the candidates shall have to take up an equivalent paper in the revised syllabus as suggested by the Chairman of the concerned board and fulfill the requirements as per regulation/ curriculum for the award of the degree.

8. Medium of Instruction and examinations

The medium of instruction and examinations for the papers of Part I and II shall be the language concerned. For part III and IV subjects other than modern languages, the medium of instruction shall be either Tamil or English and the medium of examinations is in Tamil / English irrespective of the medium of instruction. For modern languages, the medium of instruction and examination shall be in the languages concerned.

9. Submission of Record Note Books for practical examinations

Candidates appearing for practical examinations should submit bonafide Record Note Books prescribed for practical examinations, otherwise the candidates will not be permitted to appear for the practical examinations.

10. Passing Minimum

a) A candidate who secures not less than 40% of the total marks in any subject in the EOS examinations shall be declared to have passed the examinations. (Theory /Practical / Project / Viva - Voce and Industrial Training of all concerned examinations).

b) A candidate who passes the examinations in all the subjects of Parts I, II, III, IV, V including COP and Employability Skills shall be declared to have passed, the whole examination.

11. Improvement of Marks in the subjects already passed

Candidates desirous of improving the marks awarded in a passed subject in their first attempt shall reappear once within a period of subsequent two semesters. The improved marks shall be considered for classification but not for ranking. When there is no improvement, there shall not be any change in the original marks already awarded.

12. Classification of Successful candidates

a) A candidate who passes all the Part III examinations in the First attempt within a period of three years securing 75% and above in the aggregate of Part III marks shall be declared to have passed B.A/ B.Sc. /B.Com. /BBA degree examination in **First Class with Distinction.**

b) (i) A candidate who passes all the examinations in Part I or Part II or Part III securing not less than 60 per cent of total marks for concerned part shall be declared to have passed that part in **First Class**

(ii) A candidate who passed all the examinations in Part I or Part II or Part III securing not less than 50 per cent but below 60 per cent of total marks for concerned part shall be declared to have passed that part in **Second Class**

(iii) All other successful candidates shall be declared to have passed the Part I or Part II or Part III examination in **Third Class**

13. Conferment of the Degree

No candidate shall be eligible for conferment of the Degree unless he / she

(i) - has undergone the prescribed course of study for a period of not less than six semesters in an institution approved by/affiliated to the University or has been exempted from in the manner prescribed and has passed the examinations as have been prescribed therefore.

(ii) - has completed all the components prescribed under part I to Part V in the CBCS pattern to earn 140 Credits.

(iii) - has successfully completed the prescribed Field Work/ Institutional Training as evidenced by certificate.

(iv) – has successfully completed the prescribed components of COP and Employability Skills.

14. **Evening College**

The above regulations shall be applicable for candidates undergoing the respective courses in Evening Colleges also.

15. **Syllabus**

The syllabus for various subjects shall be clearly demarcated into five viable units in each Paper / Subject.

16. Revision of Regulations and Curriculum

The above Regulation and Scheme of Examinations will be in vogue without any change for a minimum period of **three years** from the date of approval of the Regulations. The College may revise /amend/ change the Regulations and Scheme of Examinations, if found necessary.

17. **Evening College**

The above regulations shall be applicable for candidates undergoing the respective courses in Evening Colleges also.

18. **Syllabus**

The syllabus for various subjects shall be clearly demarcated into five viable units in each Paper / Subject.

19. Revision of Regulations and Curriculum

The above Regulation and Scheme of Examinations will be in vogue without any change for a minimum period of **three years** from the date of approval of the Regulations. The College may revise /amend/ change the Regulations and Scheme of Examinations, if found necessary.

20. Transitory Provision

Candidates who have undergone the Course of Study prior to the **Academic Year 2012-2013** will be permitted to take the Examinations under those Regulations for a period of **four years** i.e. up to and inclusive of the Examination of **April 2017** thereafter they will be permitted to take the Examination only under the Regulations in force at that time.

SCHEME OF EXAMINATION
B.Sc MICROBIOLOGY
2016 BATCH ONWARDS- BASED ON CHOICE BASED CREDIT SYSTEM.

Semester	Part	Type	Title of the paper	Hours of Instructions/ Week	Credits	Duration of Examination in Hours	Marks		
							CIA	EOS	Total
I	I	L-I	Tamil/ Hindi/ French/Malayalam	6	4	3	25	75	100
	II	E-I	English- I	6	4	3	25	75	100
	III	M-I	Foundations in Microbiology	4	4	3	25	75	100
	III	M-II	Microbial Diversity	4	4	3	25	75	100
	III	MP-I	Major practical I - Lab in Microbiological Techniques	5	-	-	-	-	-
	III	A-I	Applied Biochemistry Theory	5	4	3	25	75	100
	IV	FC-A	Foundation Course-A Environmental Studies (Self Study)	SS	2	3	50	-	50
	V	EC	NSS / Sports / Games	-	-	-	-	-	-
II	I	L-II	Tamil/ Hindi/ French/Malayalam	6	4	3	25	75	100
	II	E-II	English-II	6	4	3	25	75	100
	III	M-III	Microbial Physiology	6	4	3	25	75	100
	III	MP-I	Major practical I - Lab in Microbiological Techniques	5	4	3	40	60	100
	III	AP-I	Applied Biochemistry Practical	5	4	3	40	60	100
	IV	FC-B	Foundation Course-B. Value- Education - General Awareness	SS	2	3	50	-	50
	IV	SBC- I	Environmental Microbiology	2	3	3	25	75	100
	V	EC	NSS / Sports / Games	-	-	-	-	-	-
III	I	L-III	Tamil/ Hindi/ French/Malayalam	6	4	3	25	75	100
	II	E-III	English-III	6	4	3	25	75	100
	III	M-IV	Bioinstrumentation–Methods and Analysis	5	4	3	25	75	100
	III	MP-II	Major practical II - Lab in Microbial Biochemistry & Microbial Growth	4	4	6	40	60	100
	III	A-II	Biostatistics	5	4	3	25	75	100
	IV	SBC- II	Cell Biology	2	3	3	25	75	100
	IV	NML	BT / AT / NME	2	2	3	50	-	50
	V	EC	NSS / Sports / Games	-	-	-	-	-	-

Semester	Part	Type	Title of the paper	Hours of Instructions/Week	Credits	Duration of Examination in Hours	Marks		
							CIA	EOS	Total
IV	I	L-IV	Tamil/ Hindi/ French/Malayalam	6	4	3	25	75	100
	II	E-IV	English –IV	6	4	3	25	75	100
	III	MP-III	Major Practical III- Lab in Microbial Physiology	4	4	6	40	60	100
	III	AP-II	Biostatistics Practical	5	4	3	40	60	100
	III	EL-I	a. Industrial Microbiology / b. Public Health and Hygiene	5	4	3	25	75	100
	IV	SBC-III	Aptitude Skills	2	3	3	100	-	100
	IV	NML	BT / AT / NME	2	2	3	50	-	50
	V	EC	NSS/SPORTS/GAMES	-	1	-	100	-	100
V	III	M- V	Molecular biology and Microbial Genetics	7	4	3	25	75	100
	III	M-VI	Genetic Engineering	7	4	3	25	75	100
	III	M- VII	Medical Microbiology	6	4	3	25	75	100
	III	MP-IV	Major practical IV - Lab in Applied Microbiology	6	4	9	40	60	100
	III	EL-II	Elective-EDC: Microbes-Health & Disease **Annexure – I****	2	3	3	25	75	100
	IV	SBC- IV	Clinical Microbiology	2	3	2	25	75	100
VI	III	M- VIII	Immunology	7	4	3	25	75	100
	III	M- IX	Virology	7	4	3	25	75	100
	III	M- X	Food & Dairy Microbiology	5	4	3	25	75	100
	III	MP- V	Major practical V - Lab in Medical Microbiology & Immunology	6	4	9	40	60	100
	III	EL-III	Project- Report - Viva Voce**	5	4	3	40	60	100
			TOTAL		**140**				**3700**
I-V		ES	**Extra credits (i) Employability Skills**	-	3	-	-	-	-
V		ALCTA	Tissue Culture (Self Study)	-	4	-	-	-	Grade

L-Language **E-** English **M-**Major Paper **MP-**Major Practical
A- Allied Paper **AP-**Allied Practical **EC-**Extra Curricular Activities **SBC-** Skill Based Elective
NML- Non Major Language **NME-** Non Major Elective **EL-**Elective
***EDC-** Extra Disciplinary Course **ALCTA –** Advanced Learners Course in Thrust Areas
NML – Non Major Language - **BT**$^{\#}$ – CIA only, **AT**$^{\wedge}$ **& NME**$^{\wedge}$ – EOS only;
Elective- I: a. Industrial Microbiology / b. Public Health and Hygiene
Elective- II (EDC): Microbes-Health & Disease
Elective- III: * Project: Report-Viva Voce marks 80:20 respectively will be jointly assessed based on 40:60 ratio application.
**Vide Annexure - I

SEMESTER –I
MAJOR PAPER I – FOUNDATIONS IN MICROBIOLOGY

OBJECTIVES:

To provide a general idea on micro-organisms and techniques in microbial study.

PEDAGOGY:

The teaching methodology is through Black Board, OHP, Chart and demonstrations

Total Lecture Hrs: 60

UNIT – I **Lecture Hrs: 12**

Introduction – Definition, scope and history of microbiology. Difference between the prokaryotic and eukaryotic microorganisms. **Classification of microorganisms** – general principles and nomenclature – Haeckel's three kingdom concept, Whittaker's five kingdom concept.

UNIT – II **Lecture Hrs: 12**

Microscopy & Staining-Principles and applications of simple, compound, bright field, dark field, phase contrast, fluorescent and electron Microscopy. Principles of staining: Nature of dyes, types of staining – simple, differential, negative and spore staining, hanging drop technique.

UNIT – III **Lecture Hrs: 12**

Sterilization: Principles and methods – physical (moist heat, dry heat, filtration, pasteurization, tyndallization, radiations) and chemical (alcohols, aldehydes, phenols, halogens and hypochlorites).

UNIT – IV **Lecture Hrs: 12**

Culture Techniques and Preservation - types of media – based on composition, consistency, special purposes – selective, differential, enrichment, enriched, transport, indicator medium and media for cultivation of anaerobes.

UNIT - V **Lecture Hrs: 12**

Pure culture techniques- Enumeration of bacteria (pour, streak plate, spread plate). Measurement of Microbial growth. Maintenance and preservation of cultures. Culture collection centers.

TEXT BOOKS:

1. Prescott, L.M., Harley,J.P. and C.A.Klein.(2007).Microbiology 7th edition Wm, C.Brown publishers.
2. Michael.J.Pelczar,Jr., E.C.S.Chan., and R.Kreig(2009) 7thedition Microbiology-Mc Graw-Inc.,Newyork Hill

REFERENCES:

1. Nester.E.W. Anderson.D.G., Roberts, Jr.C.E. Pearsall N.N., and Nester .M.T (2001) Microbiology – A Human perspectives. 3rd edition.Mc Graw-Hill company.Newyork.
2. Salle.A.J (2007) Fundamental principles of bacteriology.7th edition .Tata Mc Graw-Hill publishing company Ltd.
3. Stanier R.Y.,Ingraham J.L, WheelisH.H.andPainter P.R. (2007) General microbiology. 6th edition. Engle Woodcliff N.J.Prentice Hall.
4. Robert.F.Boyd (2009) General microbiology. Times Mirror/Mosby College publishing, Toronto.

SEMESTER I

MAJOR PAPER II: MICROBIAL DIVERSITY

OBJECTIVES:

To understand the diversity of microbes and their classification based on hierarchical arrangement.

PEDAGOGY:

The teaching methodology is through Black Board, OHP, Slides and Models

Total Lecture Hrs: 60

UNIT I **Lecture Hrs: 12**

Microbial Taxonomy:

General introduction and overview- microbial evolution & diversity, Taxonomic ranks. **Classification systems**- phylogenetic and phenetic classification, Numerical taxonomy and dendrogram. Major characteristics used in taxonomy – classical and molecular characteristics.

UNIT II **Lecture Hrs: 12**

Bacteria and Actinomycetes:

Bergey's manual of systematic bacteriology, gram negative and gram positive bacteria. General properties and classification of actinomycetes.

UNIT III **Lecture Hrs: 12**

Fungi and molds:

General characteristics of fungi, distribution, importance, nutrition, metabolism, reproduction, characteristics of fungal division - Zygomycota, Ascomycota, Basidiomycota, Molds-slime & water molds. Economic Importance of fungi and lichens. Life cycle of yeast cell.

UNIT IV **Lecture Hrs: 12**

Archaea, Eubacteria, Photosynthetic bacteria & Viruses:

A comparison of Archaeobacteria and Eubacteria - General characteristics of each group. Photosynthetic oxygenic bacteria – cyanobacteria, an-oxygenic sulfur and non-sulfur bacteria. Archaeobacteria- salient features and classification. General properties of viruses, principles of virus taxonomy.

UNIT V **Lecture Hrs: 12**

Protozoa and algae:

General characteristics of protozoa, classification, representative types. General characteristics and ultrastructure of algae, economic importance of algae, characteristics of algal division - Chlorophyta, Euglenophyta, Chrysophyta, Phaeophyta, Rhodophyta, Pyrrophyta.

TEXT BOOKS:

1. Prescott, L.M., J.P.Harley and C.A.Klein.(2007). Microbiology 7th edition Wm, C.Brown publishers.
2. Michael.J.Pelczar,Jr., E.C.S.Chan., and R.Kreig (2009) 7th edition Microbiology Mc Graw-Inc.,Newyork Hill Publishers.

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1. Stanier R.Y.Ingraham J.L WheelisH.H.and Painter P.R (2007) General microbiology. 6th edition. Engle Woodcliff N.J.Prentice Hall.
2. Alexopoulos,C.J.,Mims,C.W., Blackwell.Introductory Mycology 4th edtion.John wiley and sons inc.,.

SEMESTER II
MAJOR PAPER III - MICROBIAL PHYSIOLOGY

OBJECTIVE:

To understand the major pathways in the microbial metabolism using basic microbial models.

PEDAGOGY:

The teaching methodology is through Black Board, Slides, Models, Animations and demonstrations

Total Lecture Hrs: 90

UNIT I **Lecture Hrs: 19**

Nutrition- nutritional requirements of microorganisms, autotrophs, heterotrophs, phototrophs, chemotrophs, copiotrophs, oligotrophs. Transport of nutrients – passive, facilitated diffusion, active transport, group translocation and siderophores.

UNIT II **Lecture Hrs: 18**

Microbial Growth- different phases of growth, growth curve, determination of generation time, growth kinetics, batch, continuous and synchronous growth. Factors influencing microbial growth – temperature, pH, oxygen, pressure, salt concentration, nutrients.

UNIT III **Lecture Hrs: 19**

Microbial Metabolism- Aerobic respiration –EMP, HMP, ED, TCA cycle, Electron transport chain. Anaerobic respiration – CO_2 as Electron acceptor. Fermentation- Alcoholic, Homolactic and Heterolactic fermentation. Bacterial enzymes – classification, properties, Apoenzyme, Coenzymes, Cofactors and Isozymes.

UNIT IV **Lecture Hrs: 17**

Sporulation in Bacillus species, Biosynthesis of Purines and Pyrimidines, Biosynthesis of Cell walls of Gram positive and Gram negative bacteria.

UNIT V **Lecture Hrs: 17**

Photosynthesis – Photosynthetic light reaction- Cyanobacteria, Purple sulfur, Green sulfur and Purple non-sulfur bacteria -Cyclic and Non cyclic Photophosphorylation. Carbon dioxide fixation- Calvin Benson cycle , Reductive TCA cycle. Bioluminescence.

TEXT BOOKS:

1. Prescott, L.M., J.P.Harley and C.A.Klein.(2007).Microbiology 7th edition Wm, C.Brown publishers.
2. Moat Foster,(1988) Microbial physiology, John Wiley and sons.

REFERENCES:

1. Atlas, R.M.2007. Principles of Microbiology. Second edition. WCB Mcgraw Hill.
2. David White, (2009).The physiology and biochemistry of prokaryotes, Oxford University press,Inc.
3. Daniel R Caldwell, Microbial physiology and metabolism, WMC Brown publishers.

SEMESTER I & II
MAJOR PRACTICAL I
LAB IN MICROBIOLOGICAL TECHNIQUES

OBJECTIVE:

To develop the practical skills in basic microbiological techniques.

PEDAGOGY:

The teaching methodology is through black board Instructions, OHP, Demonstration, Guidance for the performance and interpretation of results.

Total Practical Hrs: 75+75

1. Laboratory precautions.
2. Preparation of cleaning solutions
3. Culture media preparation – Nutrient Broth, Nutrient Agar, Plates, Slants & Soft Agar.
4. Pure culture techniques – pour plate, spread plate and Streak plate.
5. Isolation and enumeration of Bacteria from soil. *(Pour plate and spread plate*)
6. Isolation and enumeration of Actinomycetes from soil.
7. Isolation and enumeration of Fungi from soil
8. Cultural characteristics of microorganisms – colony morphology on nutrient agar plate, agar slant and nutrient broth.
9. Staining of bacteria
    a) Smear preparation
    b) Simple staining,
    c) Gram staining.
    c) Capsule staining - positive,
    Capsule staining - negative,
    d) Spore Staining
    e) AFB Staining
    f) Fungi- Lacto-phenol cotton blue mount
10. Motility test – Hanging drop and soft agar inoculation.
11. Observation of representative forms of algae and fungi.
12. Anaerobic cultivation- Wrights tube method.

LABORATORY MANUALS:

1. Microbiology: A Laboratory Manual, 2007.(6th Edition) by James G. Cappuccino and Natalie Sherman
2. Lab manual in Microbiology by Dr.N.Kannan, 2000. Palani paramount publications.
3. Gunasekaran, P 1996. Lab manual in Microbiology, 1st Edition, New Age international (P) Limited Publishers, New Delhi.
4. Aneja K.R 200. Experiments in Microbiology, plant pathology, Tissue Culture & Mushroom Production Technology, 3rd edition, New Age international (P) Limited Publishers, New Delhi.

SEMESTER II

APPLIED BIOCHEMISTRY PRACTICAL

OBJECTIVE:

To give basic knowlwdge about the various biomolecules essential for living organisms
To give wide knowledge about the metabolic pathways of human system

UNIT I **Lecture Hrs: 12**

Buffers-Definition, buffer system in blood. Carbohydrates-Monosaccharides, disaccharides, polysaccharides, storage polysaccharides. Carbohydrate metabolism- Glycolysis, TCA cycle, disorders of carbohydrate metabolism.

UNIT II **Lecture Hrs: 12**

Aminoacids-Introduction, classification, peptide bond. Proteins-introduction, structure of proteins, denaturation and renaturation of proteins, protein metabolism.

UNIT III **Lecture Hrs: 12**

Lipids- introduction, simple lipids-physical and chemical properties.Compound lipids, derived lipids.Lipoproteins-introduction and types of lipoproteins. Steroids-cholesterol.Fatty acids-introduction, types. Lipid metabolism- oxidation of fatty acids, disorders of lipoprotein metabolism.Ketone bodies- ketogenesis and ketolysis.

UNIT IV **Lecture Hrs: 12**

Nucleic acids- introduction, constituents of nucleic acids- purines and pyrimidines. DNA-DNA double Helix, types, denaturation and renaturation. RNA- structure, types. Information pathway-central dogma of life, DNA replication, transcription, translation

UNIT V **Lecture Hrs: 12**

Enzymes-introduction. Active site- introduction, mode of action. Immunology- introduction and immune response

TEXT BOOKS:

1. Fundamentals of Biochemistry | Edition:1 | S. Chand & Company Ltd, New Delhi. | J.L.JAIN.(2005)
2. Essentials of Biochemistry. | Edition:14 | Lange Medical Publishers. U. SATHYANARAYANA.(2005)
3. Principles of Biochemistry. | Edition:4 | Cox Publishers. | LEHNINGER..(2004
4. Enzymes - Biochemistry, Biotechnology, Clinical chemistry. | Edition:1 | East-West Press Pvt Ltd. | TREVOR PALMER..(2004)

REFERENCE BOOKS:

1. Text book of Medical Biochemistry. | Edition:5 | Jaypee Brothers Medical Publishers (P) Ltd, Delhi. | CHATTERJEE AND RANASHINDE..(2002)

2. Fundamentals of Biochemistry. | Edition:6 | New Central Book Agency (P) Ltd, Calcutta. | DR. A.C. DEB.(1996)

ENVIRONMENTAL MICROBIOLOGY
SKILL BASED COURSE – I

Total Lecture Hrs: 30

UNIT –I Environment and Ecosystems **Lecture Hrs: 06**
Definitions, biotic and abiotic environment. Composition and structure of environment. Concept of biosphere, communities and ecosystems. Ecosystem characteristics, structure and function. Food chains, food webs and trophic structures. Ecological pyramids.

UNIT II – Interaction within microbial population **Lecture Hrs: 06**
Positive and negative interaction. Synergism, mutualism, predation, parasitism.

UNIT –III Biogeochemical cycles **Lecture Hrs: 06**
Phosphorous cycle. Nitrogen cycle-fixation of molecular nitrogen, ammonification, nitrification, nitrate reduction and denitrification. Carbon transfer through foodwebs, microbial degradation of polysaccharides.

UNIT – IV Interaction between microorganism and plants **Lecture Hrs: 06**
The rhizosphere. Mycorrhizae-ectomycorrhizae, endomycorrhizae. Nitrogen fixation in nodules-nitrogen fixation in nonleguminous plants. Interaction with aerial plant structure.

UNIT –V Water pollution and its control **Lecture Hrs: 06**
Sources of water pollution, measurement of water pollution. Eutrophication- Definition causes of eutrophication, effects of eutrophication, qualitative characteristics and properties of eutrophic lakes, measurement of degree of eutrophication, cultural eutrophication.

Text Books

1. Atlas, R.M. and M.Bartha 2000. Microbial Ecology- Fundamental & Applications. 3rd edition. Redwood City CA. Benjamin/Cumming Science Publishing Co., New Delhi.
2. Joseph C. Deniel, 1996, Environmental aspects of microbiology, British Sun Publication, Chennai

References

1. Josdand, S.N. 1995. Environmental Biotechnology. Himalaya Publishing House, Bombay.
2. Maier, R.M. I.L. Pepper & C.P. Gerba. 2000. Environmental Microbiology. 1st edition. Academic Press. New York.
3. Mitchell, R. 1992. Introduction to environmental Microbiology; Prentice Hall. Inc. Englewood Clifs- New Jersey.
4. Pelzar, M.J & M.Reid 2003. Microbiology. 5th edition. Tata Mc Graw-Hill. New York.

SEMESTER III
MAJOR PAPER IV- BIOINSTRUMENTATION-METHODS AND ANALYSIS

OBJECTIVE:

To acquire the knowledge on principles & applications of bioinstruments.

PEDAGOGY:

The teaching methodology is through Black Board, OHP, Slides, Animations and Demonstrations

Total Lecture Hrs: 75

UNIT I **Lecture Hrs: 15**

Introduction:

pH meter- Buffer solutions, pH indicators, Conductivity meter. Biosensor- Principle, types and applications. Hot air oven, Autoclave , Arnold sterilizer , Incubator, BOD incubator, Laminar air flow.

UNIT II **Lecture Hrs :15**

Microscopy:

Light microscopy, phase contrast microscopy, Dark field microscopy, Inverted fluorescent Microscopy, Electron Microscopy- SEM & TEM. Sample Preparation- Fluorescent techniques.

UNIT III **Lecture Hrs :15**

Colorimetry & Spectrophotometry:

Colorimetry - Principles, Instrumentation and Applications– Beer Lambert's law and deviation – Analysis – Qualitative and Quantitative. Spectrophotometry: -UV – VIS and IR, Spectroscopy, Flame photometry.

UNIT IV **Lecture Hrs :15**

Centrifugation:

Centrifuges-Basic principles, types of centrifuges- benchtop, high speed, continuous flow and ultracentrifuges- Preparative and Analytical. Separation methods-Differential and Density gradient centrifugation-Applications.

UNIT V **Lecture Hrs :15**

Chromatography & Electrophoresis:

Chromatography: Principles, Instrumentation, Types and Applications – Paper, TLC, HPLC, GC, Ion-exchange, Column ,Gel permeation, Affinity Chromatography. Electrophoresis- SDS PAGE and Agarose gel electrophoresis, 2D electrophoresis.

TEXT BOOKS

1. David T Plummer,An introduction to practical biochemistry,(1998) 3th Edition
2. Wilson, K & J. Walker, 2006. Principles & Techniques of Biochemistry and Molecular biology, 6th edition, Cambridge University Press, India.
3. Prescott, L.M., Harley,J.P. and C.A.Klein.(2007).Microbiology 7th edition Wm, C.Brown publishers

REFERENCES

3. Sharma, B.K. Instrumental methods of chemical analysis, (2004). 24th Edition.
4. Skoog and Leary, Principles of instrumental analysis, 4th Edition, Harcourt Brace college publishers.

SEMESTER III

MAJOR PRACTICAL II

LAB IN BIOCHEMISTRY & MICROBIAL GROWTH

OBJECTIVE:

To develop the practical skills in basic techniques in microbial growth & separation of microbial metabolites.

PEDAGOGY:

The teaching methodology is through black board Instructions, OHP Demonstration, Guidance for the performance and interpretation of results.

Total Practical hours: 60

1. Protein estimation- Lowry *et a*l
2. Protein Estimation- Brad Ford
3. Extraction of Pigments - Algae
4. Paper Chromatography-Pigments
5. Thin Layer Chromatography
6. Electrophoresis- AGE & PAGE
7. Measurement of Microbial Growth- Viable count , Direct count and Turbidity Methods- Determination of Generation Time
8. Effect of temperature & salt concentration on growth of Microorganisms
9. Micrometry
10. Water Quality Analysis- MPN Technique

LABORATORY MANUALS:

1. Microbiology: A Laboratory Manual, 2007.(6th Edition) by James G. Cappuccino and Natalie Sherman
2. Lab manual in Microbiology by Dr.N.Kannan, 2000. Palani paramount publications.
3. Gunasekaran, P 1996. Lab manual in Microbiology, 1st Edition, New Age international (P) Limited Publishers, New Delhi.
4. Aneja K.R 200. Experiments in Microbiology, plant pathology, Tissue Culture & Mushroom Production Technology, 3rd edition, New Age international (P) Limited Publishers, New Delhi.
5. S.Sadasivam,A.Manickam , Biochemical Methods.New Age International Publishers Revised 2nd Edition

SEMESTER -III
BIOSTATISTICS

OBJECTIVES:

On successful completion of this course the students should gain knowledge about the Biology oriented statistics.

PEDAGOGY:

Oral, BlackBoard Method

Total hours: 75

UNIT – I **Lecture hour: 15**

Meaning and Definition of Statistics- Classification and tabulation. Primary and Secondary data- Diagrammatic and Graphical presentation.

UNIT –II **Lecture hour: 15**

Concept of sampling and non sampling distribution. Types of sampling-simple random-stratified random-linear systematic and cluster samplying-sampling and non samplying errors.

UNIT – III **Lecture hour: 15**

Measures of central tendency – Mean, Median, Mode (Direct Method only). Measures of dispersion – range – quartile deviation — standard deviation .

UNIT – IV **Lecture hour: 15**

Related variables – Correlation-definition-scatter diagram –Karl Pearson's coefficient of correlation-rank correlation. Regression-definition-Regression Equation of Y on X-Regression Equation of X on Y

UNIT – V **Lecture hour: 15**

Concept of probability, rules of probability – addition and multiplication theorem (Statement only). (Simple problems) Binomial, Poisson and Normal distributions – Definition – (Simple problems) Test based on 't', Chi – square and F distribution.

TEXT BOOK :

S.P. Gupta (2001) Statistical methods, sultan chand & sons, New Delhi

PRACTICAL

Problems may be taken as relevant to all the units in the syllabi.

REFERENCE BOOKS:

1. Daniel W.W. (1995) Bio-Statistics A foundation for Analysis in health Sciences 6th edition John Wiley.
2. Pillai R.S.N. and Bhagavathi V. (2001) Statistics Theory and Practice, S. Chand & Co. Ltd. New Delhi.

SEMESTER –III
SKILL BASED COURSE-II- CELL BIOLOGY

OBJECTIVE:

To provide a basic knowledge on structure and functions of prokaryotic & eukaryotic cell and their functional components.

PEDAGOGY:

The teaching methodology is through black board, OHP, chart, models, animations and demonstrations

Total Lecture Hrs: 30

UNIT I **Lecture Hrs: 06**

Introduction & Procaryotic cell structure:

Cell biology-Historical review, cell theory, protoplasmic theory, organismal theory. Cell envelope – cell membrane, cell wall, slime layer and capsule. Extracellular filamentous appendages – Flagella and Pili. Internal structures – Mesosomes and inclusion bodies.

UNIT II **Lecture Hrs: 06**

Eukaryotic cell structures:

Plasma membrane- Chemical composition, Structure - lamellar model, micellar model, fluid mosaic model and functions. Cell wall- Chemical nature, structure and functions. Cytoplasmic vacuolar system.

UNIT III **Lecture Hrs: 06**

Eukaryotic cell organelles:

Endoplasmic reticulum- Morphology, types-agranular and granular ER. Mitochondria- Structure and functions. Golgi Complex- Structure and functions. Microbodies - Peroxisomes and Glyoxysomes.

UNIT IV **Lecture Hrs: 06**

Cell division & structures:

Ribosomes – Ultrastructure, chemical composition and types. Lysosomes- Polymorphism and functions. Plastids- Ultrastructure, types and functions. Nucleus- Ultrastructure. Chromosome – Giant and lampbrush chromosomes and functions. Cell division- Mitosis and Meiosis.

UNIT V **Lecture Hrs: 06**

Differential cell surface & movement:

Cilia and flagella-Distinguishing features, structure, movement and functions. Centrioles and basal bodies- Structure, chemical composition and functions. Differentiation of cell surface- microvilli, desmosomes, gap junctions, tight junctions, basement membrane and plasmodesmata.

TEXT BOOK

1. V.K Agarwal and P.S. Verma.1986. Cytology. Sixth Edition. S.Chand & Company Pvt Ltd, New Delhi.
2. Prescott, L.M., Harley,J.P. and C.A.Klein.(2007).Microbiology 7th edition Wm, C.Brown publishers.

REFERENCES

1. Cooper, G.M. 2000. The cell - A Molecular approach, Second edition, ASM Press, Washington.
2. Alberts,B., D.Bray, J.Lewis, M.Raff, K. Roberts and J.D. Watson.1989. Molecular Biology of the Cell. Second edition. Garland Publishing, New York.
3. Ariel.G. Loewy, Philip siekevitz, John R. Menninger & Jonathan A. N. Gallant, 1991: Cell structure and function. Third edition. Saunders College publishing, London.

SEMESTER – III

NON MAJOR ELECTIVE – 1 - HUMAN RIGHTS, SOCIAL JUSTICE AND SOCIAL WORK

OBJECTIVES

- To motivate to take positive and peaceful action in support of human rights & aid for observance of human rights and freedoms by state and local authorities
- To highlight how human rights abuses impact us all, and how we can do something about it for restoration of violated human rights and freedoms
- Development of interregional and international cooperation in the field of human rights; - Legal education in sphere of human rights and freedoms, forms and methods of its protection.

PADEGOGY

The method is by adaptation of chalk & talk, LCD

Total Lecture Hours: 30

UNIT I **Lecture Hours: 06**

Human rights –Meaning, concept - classification of rights- Moral rights – Legal rights- Civil rights- political rights- Human rights and Issues of social justice..

UNIT II **Lecture Hours: 06**

Human rights concern- The UN Declaration of Human rights- Fundamental rights and Duties under the Indian Constitution- Directive principles of State Policy(DPSP).

UNIT III **Lecture Hours: 06**

Human rights of Emerging Sectors- Children's rights- Refugees-Indigenous people- Contemporary issues in Human rights – Female infanticide, child labour ,bonded labour. Dalit and Human rights.

UNIT IV **Lecture Hours: 06**

Women rights – Problems of women- child marriage, rape, torture, dowry, wage disparities in agricultural and Industrial sectors, gender bias- Empowerment of women. Role of Government and Nongovernmental organization in solving women problems.

UNIT V **Lecture Hours: 06**

Role of social work(Voluntary organization) in relation to Human rights. National Human rights commission, State human rights commission, Human rights court- Public Interest Litigation(PIL), Legal Aid, lok adalats, role of advocacy, role of social action..

References:

1. Biswal Tafan 2003 Social work and Human rights: New Delhi: Rawat Hobhouse L.T 1922 Elements of social justice, London: Allen and Unwin.
2. Jagannadhan .V. 1978 Administration and social Change, New Delhi. Uppal. Malhotra . M. (ed) 1992) Anthropology of development, Mittal publications, New Delhi,
3. Paramahamsa V.P.K. 1984 Rural transformation: Readings, Hyderabad: National Institute of Rural Development, Richard B Brandt (Ed) 1962 Social justice, Prentice - hall, Inc, N J 1962
4. Sivagami Paramasivam 998 Human rights – A study, Salem: Sriram Computer prints and offset.
5. Varma 1980 Reservation, India, Law and the Constitution,Allahabad: Chugh.

SEMESTER IV

MAJOR PRACTICAL III

LAB IN MICROBIAL PHYSIOLOGY

Total Practical hours: 60

OBJECTIVE:

To understand the metabolic process of microbes using standard techniques in quality control.

PEDAGOGY:

The teaching methodology is through black board Instructions, OHP Demonstration, Guidance for the performance and interpretation of results .

.Physiological Characterization-

1. Catalase Test
2. OxidaseTest
3. Carbohydrate Fermentation tests
4. Triple sugar Iron agar test
5. H_2S Production Test
6. Indole production test
7. Methyl Red test
8. Voges Proskauer test
9. Citrate utilization Test
10. Urease Test
11. Nitrate Reduction Test
12. Starch Hydrolysis
13. Gelatin liquefaction
14. Casein Hydrolysis Test.

LABORATORY MANUALS:

1. Microbiology: A Laboratory Manual, 2007.(6th Edition) by James G. Cappuccino and Natalie Sherman
2. Lab manual in Microbiology by Dr.N.Kannan, 2000. Palani paramount publications.
3. Gunasekaran, P 1996. Lab manual in Microbiology, 1st Edition, New Age international (P) Limited Publishers, New Delhi.
4. Aneja K.R 200. Experiments in Microbiology, plant pathology, Tissue Culture & Mushroom Production Technology, 3rd edition, New Age international (P) Limited Publishers, New Delhi.
5. S.Sadasivam,A.Manickam , Biochemical Methods. New Age International Publishers Revised 2nd Edition
6. Bailey & Scott's Diagnostic Microbiology, 12/e Ie(Hardcover - 2007) by Betty A Forbes, Daniel F Sahm Alice S Weissfeld

SEMESTER – IV
ALLIED PRACTICAL
BIOSTATISTICS -LAB

Practical hours: 75 Hrs

1. Preparation of mark statement
2. Graph – Simple, Multiple, Sub Divided, Line & Pie Diagrams
3. Finding Maximum, Minimum Range, Mean, Median, Mode, SD Variance and CV (Individual data)
4. Calculation of Mean, Median, Mode (Discrete data)
5. Calculation of Mean, Median, Mode (Continuous data)
6. Calculation of SD, Variance and CV (Discrete data)
7. Calculation of SD, Variance and CV (Continuous data)
8. Calculation of correlation by Cell Calculation
9. Calculation of Correlation by function method.
10. Calculation of rank correlation.
11. Calculation of regression equations by function method.
12. Finding trend values by linear function method.
13. Calculation of chi – Square test
14. Calculation of F – Test
15. Calculation of T – Test
16. Calculation of two sample mean test
17. Calculation of ANOVA one way Classification
18. Calculation of ANOVA two way classifications.

SEMESTER VI
ELECTIVE I – A. INDUSTRIAL MICROBIOLOGY

OBJECTIVE:

To understand the production process of different range of products using the microorganisms

PEDAGOGY:

The teaching methodology is through Black Board, OHP, Animations, and demonstrations.

Total Lecture Hrs: 75

UNIT I **Lecture Hrs: 15**

Introduction to fermentation process- the range of fermentation process. Industrially important strains – Screening methods – Primary and Secondary Screening – Strain development for improved yield – Mutation, Recombination and protoplasmic fusion. Preservation of cultures.

UNIT II **Lecture Hrs: 15**

Fermentation- Batch, continuous, solid and submerged state fermentation - Fermenter - Designing of Fermenter -Types of Fermenters – CSTR, Airlift, Cylindroconical & Tower Fermenter – Mode of operation- Temperature ,pH, oxygen supply, Stirring and Mixing control.

UNIT III **Lecture Hrs: 13**

Upstream Processing – Fermentation medium – Ideal Characteristics - Raw materials and components – Media formulation – Industrial sterilization – Development of inoculum for bacterial and Mycelial processes.

UNIT IV **Lecture Hrs: 16**

Downstream processing – Methods used for Disintegration of Microorganisms- Physical, chemical and biological methods. Removal of insolubles- Foam separation, Precipitation and Filtration – Concentration and Purification of the Product –Chromatography and Solvent extraction. Finishing of the product- Drying and crystallization.

UNIT V **Lecture Hrs: 16**

Production of Beverages – Beer and wine – Vitamin B12 and Riboflavin – Antibiotics – Penicillin and Streptomycin – Production of enzymes – Amylases and Proteases –Production of amino acids - Glutamic acid , Immobilization of cells and enzymes. SCP Production- Spirulina. Mushroom cultivation- Pleurotus species.

TEXT BOOKS:

1. Patel, A.H. 1996, Industrial Microbiology. Macmillan India limited, New Delhi
2. Stanbury P F and A Whitaker. 2005, Principles of Fermentation Technology, Pergamon Press, New York

REFERENCES:

1. Cruegar, W and A.Cruegar. 1990. Biotechnology: A Text book of Industrial Microbiology, 2nd edn., Sinauer Associates, Inc., Sunderland, Massachusetts.
2. Casida, L E J R 1996. Industrial Microbiology. New age International Publishers, New Delhi

SEMESTER VI
ELECTIVE I - B - PUBLIC HEALTH AND HYGIENE

OBJECTIVES:

To create awareness on health and hygienic concepts

PEDAGOGY:

The teaching methodology is through Black Board and demonstrations

Total Lecture Hrs: 75

UNIT I **Lecture Hrs: 14**

Concept of health- Definition of Health-Dimensions of health-Concept of well being-Spectrum of health-Determinants of health-Responsibility for health- Health and development-Indicators of health.

UNIT II **Lecture Hrs: 14**

Concept of infections – Definition, classification , sources and mode of transmission - Natural history of disease- Concept of disease control- population medicine- Hospital and community- Nosocomial infections and disease cycle.

UNIT III **Lecture Hrs: 15**

Epidemiology- Definition-Mortality rate and ratio- Standardization- Epidemiological methods-Epidemiology of communicable and non- communicable disease with examples and control of epidermis.

UNIT IV **Lecture Hrs: 16**

Environmental health- Water pollution and water borne infections , Water purification-Disinfection- Chlorination- Filtration- Disinfection of wells- Microbiological health-Bacteriological indicators, Air pollution - air borne infections, food borne infection.

UNIT V **Lecture Hrs: 16**

Health education and communication-New ideas and practices- Principles of health education- Communication in health education- Practice of health education- Health Planning and management- Health care of the community , Immunization schedule and Immunoprophylaxis.

TEXT BOOK

Park.K. 1997. Text Book of Preventive and Social medicine. 15th edition, Banarsidas Bhanot Publishers.

REFERENCE

Ananthanarayanan and Panikar Text book of microbiology -5th edition

SEMESTER IV
NON-MAJOR ELECTIVE – 2 - CONSTITUTION OF INDIA

OBJECTIVES

PEDAGOGY

The method is by adaptation of chalk & talk, LCD

Total Lecture Hours: 30

UNIT I **Lecture Hour: 06**

Making of Constitution - Constituent Assembly - Dr.Rajendra Prasath - Dr.B.R.Ambedkar - Salient features - Fundamental Rights.

UNIT II **Lecture Hour: 06**

Union Executive - President of India - Vice-President - Prime Minister - Cabinet - Functions

UNIT III **Lecture Hour: 06**

Union Legislature - Rajiya Sabha - Lok Sabha - Functions and Powers

UNIT IV **Lecture Hour: 06**

Union Judiciary - Supreme Court - Functions - Rule of law

UNIT V **Lecture Hour: 06**

State - Executive - Legislature - Judiciary

Reference:

1. Agharwal.R.C. - National Moment and Constitutional Development - New Delhi, 1977
2. Chapra B.R., Constitution of India, New Delhi, 1970
3. Rao B.V., Modern Indian Constitution, Hyderabad, 1975.
4. Nani Palkhivala - Constitution of India, New Delhi, 1970
5. Krishna Iyer, V.R., Law and Justice, New Delhi, 2009

SEMESTER V
MAJOR PAPER V
MOLECULAR BIOLOGY & MICROBIAL GENETICS

OBJECTIVE:

To understand concepts of Molecular Biology and Genetics

PEDAGOGY:

The teaching methodology is through Black Board, Chart, OHP, Animations, Models and demonstrations.

Total Lecture Hrs: 105

Lecture Hrs: 22

UNIT I

Prokaryotic nucleic acids- DNA as a Genetic material- Griffith experiment, Avery, Macleod, McCarty experiment and Blendor experiment. Structure of DNA- Watson and Crick model of double stranded DNA. Different forms of DNA. Replication – Meselson's and Stahl experiment. DNA replication- Mechanism. Enzymes involved in DNA replication. Models of DNA replication- D loop model and rolling circle replication.

UNIT II **Lecture Hrs: 20**

Structure of mRNA, rRNA, tRNA. Mechanism of transcription in prokaryotes- Structure and function of RNA polymerase. Initiation of transcription- role of Promoters, Open promoter complex formation, Elongation, Termination of Transcription- Rho dependent and Rho independent termination. Salient features of Genetic code. Wobble hypothesis.

UNIT III **Lecture Hrs: 22**

Translation in prokaryotes - Activation of amino acid, charging of t RNA, Initiation of translation- role of initiation factors, Elongation of translation- Positioning of second tRNA, peptide bond formation and translocation, and Termination mechanisms. Post-translational modifications. Operon concept- Lac operon- structural and functional genes, Repression and derepression. Trp Operon - Organization, Positive and Negative control.

UNIT IV **Lecture Hrs: 20**

Mutation- Molecular basis of gene mutation – Types of Mutation- Point mutation- silent mutation, neutral mutation, Missense mutation, and nonsense mutation. Reversion mutation. Suppressor mutation- Intragenic and intergenic suppressor mutation. Occurrence of mutation- spontaneous and induced mutation. Ames test for carcinogenicity. DNA repair mechanisms – Light dependent repair- photo reactivation repair. Light independent repair- Excision repair, recombination repair and SOS system.

UNIT V **Lecture Hrs: 21**

Genetic exchange - Transformation – Mechanism, Conjugation: F+, F- and Hfr cells, types of Hfr; conjugation between F^+ and F^-, Hfr and F^-, and F' and F^-. Linkage mapping- Interrupted mating experiment. Transduction – Generalized and Specialized transduction. Recombination- Holliday model of homologous recombination.

TEXT BOOKS

1. Robert H Tamarin. 2001. Principles of Genetics. 6th edition. Cm Brown Publishers, New York.
2. Freifelder .D 2010. Molecular Biology. Narosa Publishing House.New Delhi
3. Freifelder S 2010. Microbial Genetics. Jones and Bartlett. Boston

REFERENCES

1. Weaver, R.F.2007.Molecular biology, WCB McGraw Hill companies, Inc, New York
2. Klug W.S and Cummings .M.R 1996. Essentials of Genetics, Prentice Hall New Jersey
3. Eldon John Gardner, Michael J.Simmons,D.Peter Snustad, Principles of Genetics, 8th edition. John Wiley & sons Inc., New York.

SEMESTER V
MAJOR PAPER VI - GENETIC ENGINEERING

OBJECTIVE:

To understand the concepts of cloning and its applications in the field of genetic engineering.

PEDAGOGY:

The teaching methodology is through Black Board, Chart, OHP, Animations, Models and demonstrations.

Total Lecture Hrs: 105

UNIT I **Lecture Hrs: 22**

Introduction to gene manipulation- DNA modifying enzymes and their uses in Molecular Biology a) **Restriction enzymes** – nomenclature, classification and application b) DNA Polymerase & types c) Reverse Transcriptase d) Terminal Transferases e) T4 Polynucleotide kinases & Alkaline phosphatase f) DNA dependent RNA polymerases, g) DNA ligases h) **Nucleases**: - Bal 31, S1 nucleases, DNase I, Mungbean nucleases, Ribonucleases, EXO III. Thermostable DNA polymerases used in PCR.

UNIT II **Lecture Hrs: 20**

Cloning vectors and their applications: Plasmids, Phasmids, Phages, cosmids, transposons, Yeast vectors – Properties & General characteristics. Ti plasmids & animal vectors.

UNIT III **Lecture Hrs: 22**

Cloning Strategies- Restriction digestion a) Sticky end b) Blunt end c) Homopolymeric tailing d) Use of adapters & linkers. Construction of genomic libraries (shotgun cloning) Construction of cDNA libraries. Selection of recombinants a) Direct method,b) Indirect method

UNIT IV **Lecture Hrs: 21**

Preparation of radiolabelled, non-radiolabelled DNA & RNA probes. Southern/Northern/Western blot, dot blot. Screening of genomic libraries with oligo-probe & antibodies. DNA fingerprinting, footprinting, zoo blot, chromosome jumping, chromosome walking.

UNIT V **Lecture Hrs: 20**

Synthesis & Sequencing Techniques- Chemical synthesis of DNA – DNA sequencing techniques Maxim Gilbert and Sanger Coulson, primer walking, – Site directed mutagenesis

TEXTBOOKS:

1. Old. R W and Primrose, 1995 Principle of gene manipulation. 5th edition. Blackwell ScientificPublications.Boston.
2. T. A. Brown 1995, 5th edition An Introduction to gene cloning. Champman and Hall.

REFERENCES:

1. Winnecker, E D 1987 – From gene to clones. Introduction to gene technology VCH publications, FRG.
2. Glick B R and Pasternak J J 1994 Molecular Biotechnology. Principles and applications of recombinant DNA. ASM Press Washington, D C

SEMESTER V
MAJOR PAPER VII - MEDICAL MICROBIOLOGY

OBJECTIVE:

To understand the morphology, pathogenesis and diagnosis of microbial infections and their control

PEDAGOGY:

The teaching methodology is through Black Board, Chart, Slides, Animations, Models and demonstrations.

Total Lecture Hrs: 90

UNIT I **Lecture Hrs: 19**

Specimen collections – handling, transport. Infections – sources of infections – types of infections – methods of infections – definitions – Epidemic, Pandemic, Endemic diseases– Epidemiology of infectious diseases – infectious diseases cycle – Nosochomial infections.

UNIT II **Lecture Hrs: 19**

Morphology, cultural characteristics, antigenicity, pathogenesis, Clinical symptoms , laboratory diagnosis , Prevention and Treatment of diseases caused by –*Staphylococcus aureus, Streptococcus pyogenes, Corynebacterium diptheriae, Clostridium tetani, Bacillus anthracis Mycobacterium tuberculosis, Escherichia coli, Klebsiella pneumoniae , Salmonella typhi, Shigella ,Vibrio cholerae, Pseudomonas sp, Neisseria sp,.*

UNIT III **Lecture Hrs: 17**

Virology-Morphology, pathogenesis, clinical symptoms, laboratory diagnosis, Prevention and Treatment of viral diseases - Hepatitis, Rabies, Influenza, Mumps, polio, Measles, Rubella, Herpes, HIV.

UNIT IV **Lecture Hrs: 17**

Mycology-Etiology, Pathogenesis, Lab Diagnosis and Treatment of Superficial infections. Dermatophytes – Microsporun ,Trichophyton, Epidermophyton. Subcutaneous mycosis – Madura mycosis . Opportunistic fungal infections – *Candida albicans*, *Aspergillus*, *Mucor*.

UNIT V **Lecture Hrs: 18**

Parasitology & Antimicrobial Chemotheraphy. History, Morphology, Life cycle, Pathogenicity, Clinical features, Diagnosis, Treatment, Prevention and control of parasitic infections caused by- *Entamoeba histolytica, , Plasmodium falciparum, Trichomonas, Giardia, , Taenia solium, Trichuris trichura, Ascaris, Wuchereria bancrofti*.

Antibiotics and chemotherapeutic agents – Mechanism of action on cell wall, proteins and nucleic acid. Drug resistance. Antimicrobial susceptibility testing – Disc diffusion ,Kirby Bauer and stokes – MIC.

TEXTBOOKS:

1. Ananthanarayanan. R and C K Jayaram Panicker, 1994. 6th edition Text book of Microbilogy, Orient Longman.
2. Jayaram Panicker, C K 1993 3rd edition Text book for Medical Parasitology, Jaypee Brothers Medical Publishers (P) Ltd.

REFERENCES:

1. Mackie and Mc Cartney. 1994, Medical Microbiology.Vol I and II Churchill LIvingston.
2. Bailey and Scotts, 1994 Diagnostic Microbiology 9th edition Baron and Finegold, C V Moshby Publications.

SEMESTER V

MAJOR PRACTICAL IV

LAB IN APPLIED MICROBIOLOGY

OBJECTIVE:

To develop the students practical skill in basic techniques of Microbiology.

PEDAGOGY:

The teaching methodology is through Instructions, Demonstration and Guidance for the performance and interpretation of results.

Total Practical Hrs: 90

1. Isolation of Nucleic acids-DNA in Agarose Gel Electrophoresis
2. Isolation plasmid in agarose gel electrophoresis
3. Isolation of drug resistant/ auxotrophic mutants using UV.
4. Induction of lac operon – ONPG method.
5. Enzyme assay –Amylase
6. Enzyme assay –Protease.
7. Microbiological Analysis of Quality of milk-Methylene blue reduction test.
8. Microbial analysis of spoiled food – Bread and vegetables.
9. Direct microscopic examination of curd – observation of lactobacilli
10. Wine Production
11. Mushroom cultivation.
12. Isolation of. Phosphate solubilizers
13. Isolation of free living Nitrogen fixers- Azotobacter
14. Isolation of Symbiotic Nitrogen fixers- Rhizobium

LABORATORY MANUALS

1. Microbiology: A Laboratory Manual (6th Edition) by James G. Cappuccino and Natalie Sherman
2. Lab manual in Microbiology by Dr.N.Kannan, Palani paramount publications.
3. Biochemical Methods.S.Sadasivam,A.Manickam ,New Age International Publishers Revised 2nd Edition

SEMESTER V
ELECTIVE II-MICROBES –HEALTH AND DISEASE

OBJECTIVES:

To understand the role of microbes in disease transmission and their control

PEDAGOGY:

The teaching methodology is through black board, OHP, animations, and demonstrations.

Total Lecture Hrs: 30

Lecture Hrs: 06

UNIT I

Scope of Microbiology

Microbiology as a field of Biology, Germ Theory of Disease, Protection against Infection-Immunity. Groups of Microorganisms- Bacteria, Fungi, Viruses, Algae & Protozoa

UNIT II **Lecture Hrs: 05**

Normal flora of the Human body

Symbiotic Relationships between Microorganisms & hosts, Establishment of normal flora, Importance of normal flora, Changes in the normal flora

UNIT III **Lecture Hrs: 07**

Microorganisms & Human Host

Infection, pathogenicity & pathogens, virulence, infections & infctious diseases. Establishing the cause of an infectious disease, sources of infectious agent and their modes of transmission.

UNIT IV **Lecture Hrs: 06**

Microbes in the Environment

Nosocomial infections- Sources, Control and Prevention. Microorganisms in Soil, air, water, Drinking water treatment and Eutrophication.

UNIT V **Lecture Hrs: 06**

Treatment of Microbial Infections:

Antimicrobial Methods- Physical and Chemical, Chemotherapeutic methods, Antibiotics.

TEXY BOOK:

1. Nester.E.W. Anderson.D.G., Roberts, Jr.C.E. Pearsall N.N., and Nester .M.T (2001) Microbiology – A Human perspectives. 3rd edition.Mc Graw-Hill company.Newyork.
2. Michael.J.Pelczar,Jr., E.C.S.Chan., and R.Kreig(1993) 5th edition Microbiology Mc Graw-Inc.,Newyork Hill Publishers

REFERENCES:

1. Prescott, L.M., Harley,J.P. and C.A.Klein.(2007).Microbiology 7th edition Wm, C.Brown publishers.

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SEMESTER V
SKILL BASED COURSE IV
CLINICAL MICROBIOLOGY

OBJECTIVE:

To understand the clinical importance of microorganisms and their impact over the human health.

PEDAGOGY:

The teaching methodology is through Black Board, Chart, Slides, Models and demonstrations.

Total Lecture Hrs: 30

UNIT- I **Lecture Hrs: 06**

Normal Flora:

Role of Normal Flora, Distribution of normal microbiota- Skin, nasopharynx, orthopharynx, eye, mouth, ear, stomach, genitourinary tract.

UNIT- II **Lecture Hrs: 07**

Respiratory tract infections:

Streptococcus pneumonia, Tuberculosis, Whoopingcough, Viral Respiratory infections. Infections of middle ear and sinuses.

UNIT- III **Lecture Hrs: 06**

Diarrheal Disease-&STD

Infectious diarrhea & Gastroenteritis – Etiology, Pathogenesis, Lab diagnoses,. Sexually Transmitted Disease-Gonorrhea, Candidiasis, Trichomoniasis, Syphilis.

UNIT- IV **Lecture Hrs: 06**

Urinary tract infections-

Clinical features, Predisposing factors, Etiology, Clinical Manifestation and lab diagnosis

UNIT- V **Lecture Hrs: 05**

Pyogenic infections

Infections of Skin, subcutaneous tissues, infections of wound, Burns, Eye, Bacterial Meningitis, Viral Meningitis.

TEXT BOOK

1. Chakraborthy, P.1995. A text book of Microbiology, New central book agency Pvt. Ltd, Calcutta.
2. Nester.E.W. Anderson.D.G., Roberts, Jr.C.E. Pearsall N.N., and Nester .M.T (2001) Microbiology – A Human perspectives. 3rd edition.Mc Graw-Hill company.Newyork.

REFERENCES:

1. Jawetz, E: Melnic, J.K. and Adelberg, E.A 1998, Review of medical microbiology, Lange medical publications, USA
2. Prescott, L.M., Harley,J.P. and C.A.Klein.(2006).Microbiology 6th edition Wm, C.Brown publishers

SEMESTER V
ADVANCED LEARNERS COURSE IN THRUST AREAS (ALCTA)
PLANT TISSUE AND ANIMAL CELL CULTURE (SELF STUDY)

OBJECTIVE:

To provide a general idea about the Plant and Animal tissue culture and its applications.

UNIT I

Plant Tissue Culture- Definition, Historical events, basic requirements for Tissue culture lab, Culture media & their constituents, Preparation of Cell culture- Single Cell , Callus culture and Regeneration of plants.

UNIT II

Nucellus culture, Embryo culture, Meristem culture, Anther culture and Suspension culture. Methods for growth measurement. Applications of tissue culture- Micropropagation and Somaclonal variation.

UNIT III

Cell culture-Introduction, advantages & disadvantages-Cell types & its characters, differentiation-Growth of cells in culture-Importance of aseptic techniques. Culture media & culture conditions-Maintenance and storage of cell cultures.

UNIT IV

Preservation and characterization of cell lines :primary culture, subculture, and cell lines-Cloning and selection-Cell separation and characterization-Differentiation-Transformation and Immortalization-Contamination- Cryopreservation techniques.

UNIT V

Scaling up of animal cell culture: Cell quantification methods-Cell viability measurements-Growth kinetics-Scale up of suspension & monolayer cultures.

TEXT BOOK

1. Bhojwani, S.S., Razdan, M.K.: Plant Tissue Culture: Theory and Practice. Springer Netherlands.
2. R.Ian Frehney. Animal tissue Culture: A practical Approach. Fourth edition. R.I. John Wiley Publications.

REFERENCES:

1. P.K. Gupta, 2006. Elements of Biotechnology. First edition. Rastogi Publications. Meerut.

SEMESTER VI
MAJOR PAPER VIII
IMMUNOLOGY & IMMUNOTECHNOLOGY

OBJECTIVE:

To understand the protection mechanism of the body, bring about awareness of diagnostics and prophylaxis.

PEDAGOGY:

The teaching methodology is through Black Board, Slides, Animations, Models and demonstrations.

Total Lecture Hrs: 105

UNIT I **Lecture Hrs: 22**

History and scope of immunology. Clonal selection theory. Lymphoid cells, organs and tissues. Hematopoiesis. Types of immunity: Innate and acquired, active and passive. Cell mediated immunity and Humoral immunity. Phagocytosis.

UNIT II **Lecture Hrs: 20**

Immunoglobulins - structure, distribution and function. Antigenicity: Types, haptens, epitopes and adjuvants. Antigen-antibody interactions: forces, affinity, avidity, valency, kinetics, factors governing antigenicity. Monoclonal antibody Production and its applications. (Hybridoma technology).

UNIT III **Lecture Hrs: 21**

Quantitative study of Antigen-antibody reactions – agglutination, precipitation, Complement fixation, Immunofluoroscence, ELISA, Radioimmunoassay (RIA), Immunoelectrophoresis, Immunodiffusion, Western blotting.

UNIT IV **Lecture Hrs: 22**

Complement system: classical and alternate pathway. Hypersensitivity reaction. Autoimmunity and Autoimmune response diseases. Immunohaematology.

UNIT V **Lecture Hrs: 20**

Structure and functions of Class I and II Major Histocompatibility complex molecules. Transplantation immunology - Organ transplantation and HLA tissue typing. Introduction to autoimmune disorders and immunology of infectious diseases.

TEXTBOOKS:

1. Kuby J 1997. Immunology. W H Freeman, NY.
2. Tizard, I R. 1998. Immunology -An Introduction. 2nd Edition. W B Saunders. Philadelphia.

REFERENCES:

1. Roitt, IM 1991. Essentials of Immunology, 7th Edition Blackwell Scientific Publications.
2. Nandhini Shetti. 1993. Immunology. Introductory Text Book. New Age International Limited.

SEMESTER VI
MAJOR PAPER IX - VIROLOGY

OBJECTIVES:

To learn the aspects of viruses, its structure, replication and diseases caused by them.

PEDAGOGY:

The teaching methodology is through Black Board, Chart, Slides, Models and demonstrations.

Total Lecture Hrs: 105

UNIT I **Lecture Hrs: 22**

Introduction – History of Viruses, General properties of viruses The structure of viruses – virion size – general structural properties – helical capsids, icosahedral, capsid, Nucleic acids – viral envelopes and enzymes – virus classification –

UNIT II **Lecture Hrs: 21**

Cultivation of viruses – virus purification and assays. Separation and characterization of viral components and quantification of Viruses.

.**UNIT III** **Lecture Hrs: 20**

Bacterial Viruses – structure of bacteriophage, The Lytic life cycle (T-Even coliphages) – Lysogenic life cycle (*Escherchia coli* Phage Lambda) noninteractive lysogeny (M13).Single strandedvirus-ΦX174 and reproduction of RNS phages.

UNIT IV **Lecture Hrs: 21**

Plant Viruses, common plant viral diseases : TMV, Bunchy top of banana, satellite virus, Viroid – Double standed DNA virus – Assay methods.

UNIT V **Lecture Hrs: 21**

Animal viruses : Morphology, pathogenesis and laboratory diagnosis of Prions, Rinder pest, Blue tongue, Raniket dion, Foot and Mouth Disease. Oncogenic viruses (Papilloma virus). Antiviral agents.

TEXT BOOKS

1. Prescott, L.M., Harley,J.P. and C.A.Klein.(1993).Microbiology 2nd edition Wm, C.Brown publishers.
2. Biswass. S.B and Amita Biswass (2007). An introduction to Viruses 4th edition Vikas Publishers

REFERENCES:

1. Conrat HF, Kimball PC and Levy JA. (1988). Virology. II edition. Prentice Hall, Englewood Cliff, New Jersey.
2. Dimmock NJ, Primrose SB. (1994) Introduction to Modern Virology IV edition. Blackwell Scientific Publications, Oxford
3. Flint, S.J., Enquist, L.W., Krung, R. Racaniello, VR. And Skalka, A.M. (2000). Principles of Virology, Molecular Biology, pathogenesis and control, ASM Press, Washinton D.C.
4. Robert G. Welstar and Allan Garnoll. Encyclopaedia of Virology (1994). Vol. I, II & III Academic Press inc. San Diego, CA 92101. Ed.
5. Tom Parker, M., Leslie H. Collier. (1990). Topley & Wilson's Principles of Bacteriology, Virology and Immunity (VIII Edition)

SEMESTER VI
MAJOR PAPER X - FOOD & DAIRY MICROBIOLOGY

OBJECTIVE:

To understand the microorganisms associated with food and positive and negative role of food microorganisms.

PEDAGOGY:

The teaching methodology is through Black Board, OHP and demonstrations.

Total Lecture Hrs: 75

UNIT I **Lecture Hrs:16**

Food and Microorganisms – Important microorganisms in food (bacteria, mold & yeast) – factors affecting the growth of microorganisms in food- Intrinsic, extrinsic, Implicit and processing factors.

UNIT II **Lecture Hrs:16**

Principles of food preservation – general principles and application. Methods – Asepsis – maintenance of anaerobic condition – use of temperature (low and high). Drying, radiation and Chemical preservatives.

UNIT III **Lecture Hrs:14**

Spoilage of food- Fitness and unfitness of food for consumption- Causes of food spoilage- Classification of foods by spoilage- Spoilage of vegetables, fruits, eggs, milk and canned foods.

UNIT IV **Lecture Hrs: 12**

Food fermentation-Fermented vegetables- Production and Spoilage of Sauerkraut an4 Pickle – Fermented dairy products Production and Spoilage of Yoghurt and cheese. Bread Production and Microbial Spoilage

UNIT V **Lecture Hrs:15**

Food borne diseases – food poisoning and food borne infections – mycotoxin, Microbiological examination of food – Quality control In food microbiology units- GMP and HACCP.

TEXT BOOK:

1. Frazier. W C and D C Westhoff. 1978. Food Mirobiology. 5TH edition. Tata Macgraw Hill Publishing Co., New Delhi.

REFERENCES:

1 Jay. J M 1991. Modern Food Microbiology 4th edition. Van Nostraand Rainhokdd Co.

2. Adams. M R and M D Moss. 1995. Food Microbiology. New age International Limited.

SEMESTER VI

MAJOR PRACTICAL V

LAB IN MEDICAL MICROBIOLOGY & IMMUNOLOGY

OBJECTIVE:

To develop the students practical skill in basic techniques of Microbiology.

PEDAGOGY:

The teaching methodology is through Instructions, Demonstration, Guidance for the performance and interpretation of results.

Total Practical Hrs: 90

1. Antigen – Antibody reactions:
   a. Agglutination rxn.
      i. Blood grouping,
      ii. Widal test
      iii. RPR test.
      iv. ASO test.
   b. Precipitation – Ouchterlony's Double Immunodiffusion.
2. Processing of Clinical Specimen &Identification of Major Bacterial Pathogens
   a.*E.coli,*
   b.Klebsiella,
   c.Proteus,
   d.Salmonella,
   e.Pseudomonas,
   f.Staphylacoccus aureus,
   g.Streptococcus pyogens.
3. Identification of clinically important fungi – *Candida albicans.*
4. Antibiotic sensitivity test-Kirby - Bauer technique
5. Observation of parasites –
   a. Entamoeba histolytica
   b. Plasmodium sp.,
   c. Ascaris lumbricoides,
   d. Taenia solium
6. Isolation of coliphages.
7. Cultivation of animal viruses in Embryonated eggs- Demonstration.

LABORATORY MANUALS

1. Microbiology: A Laboratory Manual (6th Edition) by James G. Cappuccino and Natalie Sherman
2. Bailey & Scott's Diagnostic Microbiology, 12/e Ie(Hardcover - 2007) by Betty A Forbes, Daniel F Sahm Alice S Weissfeld
3. Lab manual in Microbiology by Dr.N.Kannan, Palani paramount publications.

SEMESTER VI
ELECTIVE III- PROJECT REPORT- VIVA VOCE

Total Project Hrs: 75

The candidate can perform & submit a project report relevant to the major elective papers, which will be evaluated by the internal and external examiners

ANNEXURE – I (2016 – UG)

RVS COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

SBE – VI -LIST OF EXTRA DISCIPLINARY COURSES (EDC) OFFERED BY THE DEPARTMENTS FOR UG – 2016 onwards

S. NO	Name of the Department	EDC (Extra Disciplinary Course)
01	Catering Science & Hotel Mgt.	Hospitality Management
02	Biochemistry	Health Management
03	Microbiology	Microbes - Health & Disease
04	Nutrition & Dietetics	Health and Life Style Disorders
05	BCA	Social Networking
06	B. Sc., (CS)	PC Hardware and Trouble Shooting
07	B. Sc., (IT)	Cyber Security
08	Electronics	Digital Computer Fundamentals
09	B. Com	Insurance and Risk Management
10	B. Com (CA)	Global Financial Markets
11	B.Com (IT)	E - Commerce
12	BBA	Entrepreneurship Development
13	BBA (CA)	Project Management
14	B.Sc., Maths with CA	Test For Reasoning And Quantitative Aptitude
15	BA English	Public Speaking