SRR & CVR GOVT. DEGREE COLLEGE
(Autonomous)

PHONE NO : 0866-2430060
FAX NO : 0866-2441092

RAAC : B+ (III Cycle with CGPA : 2.60) - Estd: 1937
ISO 9001 - 2015 Certified
Institution is ranked by NIRF in 151 - 200 Band at NIRF - 2019

WEBSITE : www.srrcvr.org
EMAIL : srrandcvr@gmail.com

BOARD OF STUDIES MEETING

(2021-2022)

30th November 2021

SRI RAJA RANGYYA APPARAO & CHUNDURU VENKATA REDDI GOVT. DEGREE COLLEGE • VIJAYAWADA •

DEPARTMENT OF MICROBIOLOGY

Programme Code: 313 & 309

SRR & CVR Govt. Degree College (A), Machavaram, Vijayawada

DEPARTMENT OF MICROBIOLOGY

Constitution of the 6th Board of Studies for the Academic Year 2021-22

The Board of Studies Meeting for Microbiology Subject for the Academic Year 2021-22 is conducted on 30th November 2021 with Mrs. D. Jyothi, Lecturer in Charge Microbiology along with following members.

S.No	Name of BOS Members		Signature
1	Mrs. D. Jyothi Lecturer in Charge Microbiology SRR & CVR Government Degree College(A), Vijayawada	**Chairperson**	D. Jyothi
2	Dr. P. Veera Bramhachari Professor in Biotechnology Krishna University Machilipatnam Andhra Pradesh	**University Nominee**	
3	Dr. K. Sucharitha Lecturer in Microbiology GDC Women (A), Guntur.	**Subject Expert**	
4	Dr. A. Padmavathi, Head of the Department Department of Microbiology Ch.S.D.St.Theresa's College For Women (A) Eluru, West Godavari (Dist.)	**Subject Expert**	
5	Sri. K. Premanand Hindustan Coco Cola Beverages Pvt. Ltd Atmakuru, Mangalagiri Guntur (Dist.)	**Research Organization/Industry**	
6	Dr. K. Aruna Lecturer in Microbiology SRR & CVR Govt. College (A), Vijayawada	**Member**	
7	Mr. B. Viswas MSc Genomic Sciences Central University of Kerala Kasargod, Kerala	**Alumni**	
10	Mr. Rameshwar Reddy III BSc MBC	**Student Representatives**	V. Rameshwar Reddy
	Kum. Rajaya Lakshmi II BSc MBC		

SRR & CVR Govt. Degree College (A), Vijayawada

DEPARTMENT OF MICROBIOLOGY

AGENDA FOR THE BOARD OF STUDIES MEETING 2021-22

Dated: 30th November 2021

The members, Board of Studies, Department of Microbiology will discuss the syllabus in CBCS pattern, additional inputs, model question papers, Co-curricular activities, list of examiners and blue prints. The agenda includes.

1. Proposal for implementation of Course structure of II BSc Microbiology prescribed by APSHE through affiliating University "Krishna University, Machilipatnam.

2. Implementation of syllabi for newly introduced Courses in Semester III & IV under CBCS with Learning Outcomes for the academic year 2021-22 onwards through affiliating University from this Academic Year 2021-22.
3. Implementation of revised syllabus (in previous year BOS meeting) for Semester I &II
4. Up gradation of syllabus for the Semesters V & VI (III BSc) for the academic year 2021-22.
5. Model question papers, Blue Print & Panel of Paper Setter
6. Additional inputs in the Curriculum
7. Proposal to implement Action Plan 2021-22
8. Value added Courses & Study Projects
9. Proposal for Community Service/Extension Activities for the benefit of the Society.
10. Proposal for Internship for seven to ten days to Degree final year students
11. Feed back on Curriculum design and development from Students, Alumni, Teachers, Parents and industry
12. Any other proposal with the permission of the chair.

SRR & CVR Govt. Degree College (A), Vijayawada

DEPARTMENT OF MICROBIOLOGY

6th BOARD OF STUDIES MEETING 2021-22

Dated: 30th November 2021

MINUTES

The Minutes of 6nd Board of Studies meeting in Microbiology which was convened on 30th November 2021 at 11.00 AM at Department of Microbiology to discuss and approved the up gradation of the syllabus, System of examination pattern, Model question papers, Academic Activates of Department, Additional inputs in the Curriculum, Study Projects and Value added/ Certificate Courses under Chairmanship of Mrs. D. Jyothi, In- Charge of the department is as follows:

Agenda 1: To consider and approve the Course structure of II BSc Microbiology prescribed by APSHE through affiliating University

Proposal: The Chairperson BOS UG BSc Microbiology Mrs. D. Jyothi, proposed Course structure is placed before the BOS committee to approve.

Discussion: University Nominee Dr. P. Veera Bramhachari and the Members of 6th BOS go through the Course titles, Credits of Courses and framework of the Courses in Semesters III and IV of II B.Sc Microbiology.

Resolution: It is resolved to approve the Courses and Credits

Agenda 2: To consider and approve syllabi for newly introduced Courses in Semester III & IV under CBCS with Learning Outcomes- for the academic year 2021-22 onwards.

Proposal : The proposed syllabi for the courses in Semester III and Semester IV are placed before the participants for approval.

Discussion: The University Nominee Dr. P. Veera Bramhachari and subject experts proposed some changes in some topics after long and fruitful discussion.

Resolution 2: It is resolved to introduce syllabus for semester – III and semester – IV along with practicals

SEM III – Molecular biology and Microbial Genetics

SEM IV –Medical Microbiology and Immunology

SEM IV- Industrial Microbiology

Agenda 3: To consider and approve the implementation of revised syllabus (in previous year BOS meeting) for Semester I &II for the admitted batch 2021-22. Proposal for shifting of a topic in Semester I unit 4 to Semester II Unit –I.

Proposal: The proposed revised syllabus with shifting of a topic bacterial growth is placed before the BOS committee to approve

Discussion: University Nominee and subject experts agreed to implement revised syllabus.

Resolution: It is resolved to implement the revised syllabus for Semester I & II for admitted batch 2021-22 and shift a topic bacterial growth in Semester I, unit 4 to Semester II, Unit – I due to lack of connectivity.

Agenda 4: Up gradation of syllabus for the Semesters V & VI (III BSc) for the academic year 2021-22.

Discussion: The University Nominee Dr. P. Veera Bramhachari and subject experts proposed some changes in some topics after long and fruitful discussion.

Resolution: It is resolved to follow the Krishna University old Syllabus for 2019-20 admitted batch. Up gradation of the syllabus making it skill oriented with quantifiable programme specific outcomes with following additions.

i. Course: MB 5324-6: **Food and Industrial Microbiology** in unit I the topic How to clean vegetables/raw food during COVID-19 pandemic is added.

ii. Course MB 8324 A1: **Microbial Diagnosis in Health Clinics** in unit IV the topic study of RT PCR is added.

Agenda 5: To consider and approve Model question papers, Blue print & Panel of paper setters

Proposal: The proposed Model question papers, Blue print & Panel of Paper Setters is placed before the BOS committee to approve.

Discussion: University Nominee and Model question papers, Blue print & Panel of Paper Setters

Resolution: Resolved to adopt the model question paper in Section-A having answer 5 short questions carries 4 marks out of 10 and 5 essay questions with internal choice from each unit and each question carries 08 marks and prepared blue print. Listed out the names of paper setters and examiners.

Agenda 6: To consider and approve additional inputs in the curriculum

Resolution: It is resolved to add the following additional inputs in the Curriculum

III BSc (CBMB) SEM-V Determination of quality of different water samples by MPN method and Mushroom cultivation

Agenda 7: To consider and approve Action Plan 2021-22

Resolution: It is resolved conduct academic activities like Student Seminars, quizzes and field trips

Agenda 8: To consider and approve Value added Course

Resolution: It is resolved to conduct Value added Courses

Agenda 9: Proposal for Community Service/Extension Activities for the benefit of the Society.
Resolution: It is resolved to participate the students in Community Service/Extension Activities for the benefit of the Society

Agenda 10: Proposal for Internship for seven to ten days for Degree final year students
Resolution: It is resolved to visit any Research Organization or Industry related to Microbiology as a part of the curriculum

Agenda11: Feedback on Curriculum design and development from Students, Alumni, Teachers, Parents and industry
Resolution: It is resolved to take Feedback on Curriculum design and development from Students, Alumni, Teacher, Parent and industry at the end of the semester.

S.No	Name of BOS Members	Composition	Signature
1	Mrs. D. Jyothi	Chairperson	D. Jyothi
2	Dr. P. Veera Bramhachari	University Nominee	
3	Dr. K. Sucharitha	Subject Expert	
4	Dr. A. Padmavathi	Subject Expert	
5	Sri. K. Premanand	Research Organization/Industry	
6	Dr. Kopuri . Aruna	Member	
7	Mr. B. Viswas	Alumni	
8	Mr. Rameshwar Reddy III BSc MBC	Student Representatives	V. Rameshwar Reddy
	Kum.Rajaya Lakshmi II BSc MBC		

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WEBSITE : www.srcvr.org
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BOARD OF STUDIES MEETING

(2021-2022)

30th November 2021

I & II B.Sc Microbiology

(With Effect from Admitted Batch 2020-2021)

DEPARTMENT OF MICROBIOLOGY

Programme Code: 313 & 309

PREFACE

SRR & CVR Govt. Degree College (A), Vijayawada, is one of the prestigious educational institutions, located in Vijayawada in Krishna District, Andhra Pradesh. Vijayawada is a place of historical and cultural significance and importance. In the same way SRR & CVR Govt. Degree College, has also acquired its significance and prominence in and around Vijayawada by molding the lives of many students to become great personalities. This college is named after late Sri Raja Rangayyappa Rao and late Sri Chunduru Venkata Reddy, who have been great and noble donors of the city Vijayawada, by whose generosity the college has reached and attained such and this elevated status by way of shaping the lives of many generations of students making them worthy citizens of the country. This college has acquired great standards academically by the contributions of great teachers as well because in the history of any educational institution its teachers play a vital role. The college was established in 1937. It offers 27 undergraduate and 10 post graduate academic programmers with 86 regular faculty members. The college has total strength of around 2,800 students. which includes 1550 boys and 650 girl students at present. The institution was accredited with grade B+ with C.G.P.A 2.6 during 2017 by NAAC and the college was ranked by NIRF in 101-150 band at NIRF-2020

The Department of Microbiology was established in the Academic Year 1998-99 when restructured courses were first established in selected Government Colleges. Now Department has offering UG programme Microbiology with allied subjects Biochemistry and Chemistry has sanctioned strength of 30 students. At present the Microbiology laboratory is fully equipped with instruments such as microscopes, laminar air flow, oven, incubator, refrigerator, and sufficient glassware. The department is fully furnished. The department has its own library with books in microbiology both of Indian and foreign authors. A new job oriented restructured UG programme B.Sc MBF (Microbiology, Biochemistry & Food Technology) has introduced in the year 2017-2018 with intake of the students is 30 every year. The Department is giving importance to the student centric & skill oriented programmes.

Duration of the B.Sc Microbiology (MBC & MBF) Programme (313 & 309): 3/4 years

DETAILS OF COURSE TITLES & CREDITS

SEM	Course Code	Title of the Course	Course type (T/L)	Hrs./ Week (Science: 4+2)	Credits (Science: 4+2)	Max. Marks Internal	Max. Marks Sem-end Exam	Total Marks
I	MB N-1324	INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	T	4	4	40	60	100
	MB N - 1324 P	INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	L	2	2	25	25	50
II	MB N - 2324	MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY	T	4	4	40	60	100
	MB N - 2324 P	MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY	L	2	2	25	25	50
III		MOLECULAR BIOLOGY AND MICROBIAL GENETICS	T	4	4	40	60	100
		MOLECULAR BIOLOGY AND MICROBIAL GENETICS	L	2	2	25	25	50
IV		MEDICAL MICROBIOLOGY AND IMMUNOLOGY	T	4	4	40	60	100
		MEDICAL MICROBIOLOGY AND IMMUNOLOGY	L	2	2	25	25	50
		INDUSTRIAL MICROBIOLOGY	T	4	4	40	60	100
		INDUSTRIAL MICROBIOLOGY	L	2	2	25	25	50
V								

Note: *Course type code: T: Theory, L: Lab

SRR &CVR GOVT DEGREE COLLEGE (A) VIJAYAWADA: 520004
KRISHNA DISTRICT: ANDHRA PRADESH

DEPARTMENT OF MICROBIOLOGY

B.Sc Microbiology (MBC &MBF) Programme Objectives and Outcomes

Aim and objectives of UG program BSc Microbiology:

The programme BSc Microbiology introduces students to the vast array of microbes *VIZ* bacteria, archaea, viruses, fungi and protozoa around us, their diversity and applications. The programme has a strong practical emphasis, providing students with the basic laboratory skills required for a career in either applied or research microbiology.

Programme outcome

Graduates will acquire adequate knowledge and basic laboratory skills required for career in either applied or research microbiology

Programme specific outcomes

Microbiology students who graduate with a Bachelor of Science with Microbiology will

PSO1: Acquire knowledge on fundamentals of Microbiology, expertise in pure culture techniques & preservation of cultures and understand microbial physiology and biochemistry

PSO2: Gain insight into the various aspects of Microbial Genetics and r DNA technology.

PSO3: Grasp the fundamental concepts of immunity, immune response and epidemiology of microbial diseases. Demonstrate on collection and handling of laboratory specimens.

PSO4: Understand the role of microbes in nutrient recycling, sustainable agriculture culture, Microbial spoilage of food, principles of food preservation and Microbial production of Industrial products.

PSO5: Realize the application-oriented aspects of Microbiology and significance of Intellectual Property Rights

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA
B.Sc MICROBIOLGY (CBSC) SYLLABUS

BSc	MICROBIOLOGY (Semester: I)	Credits: 4
MB N-1324	INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	Hrs/Wk: 4

Aim and objectives of Course

To understand History & Development of Microbiology, Microscopy, staining and sterilization techniques, Ultra-structure of cell, Different methods of microbial characterization

To study nature of viruses, viral classification, cultivation of viruses and Type study of TMV & HIV

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Students will be able to illustrate the contributions made by the prominent Scientists for development of Microbiology

CO2: Students will able to differentiate a large number of bacteria by their salient characteristics

CO3: Perform pure culture techniques and techniques for preservation and maintenance of stock cultures

CO4: Understand Principles of Microscopy, handling and uses of microscopes

CO5: Analyse various techniques used for Sterilization and Disinfection techniques.

UNIT-I: History of Microbiology & Place of Microorganisms in the living world

No. of hours: 12

History of Microbiology in the context of contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky.
Importance and applications of microbiology
Classification of microorganisms Whittaker's five kingdom concept, Bergey's Manual of Systematic Bacteriology.

UNIT-II: Prokaryotic microorganisms & Viruses **No. of hours: 12**

Ultra-structure of Prokaryotic cell- Cell Wall, Cell Membrane, Cytoplasm, Nucleoid, Plasmid, Inclusion Bodies, Flagella Pili, Capsule, Endospore
General characteristics of Bacteria (Size, shape, arrangement, reproduction)
General characteristics of Rickettsia, Mycoplasmas, Cyanobacteria, Archaea
General characteristics of viruses, Cultivation of Viruses (in brief)
Morphology, Structure and replication of TMV and Lambda Bacteriophage

UNIT-III: Eukaryotic microorganisms **No. of hours: 12**

Fungi - Habitat, nutrition, vegetative structure and modes of reproduction; outline classification

Algae - Habitat, thallus organization, photosynthetic pigments, storage forms of food, reproduction and economic importance of algae. SCP.

Protozoa – Habitat, cell structure, nutrition, locomotion, excretion, reproduction, encystment, outline classification

UNIT-IV: Isolation and Culture of Bacteria and Fungi No. of hours: 12

Growth media- Natural, synthetic and semi synthetic media. Selective, Enrichment, and Differential media
Pure culture techniques - dilution-plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator.
Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.

UNIT-V: Principles of Microscopy, Sterilization and Disinfection No. of hours: 12

Principles of microscopy - Bright field and Electron microscopy (SEM and TEM).

Staining Techniques - Simple and Differential staining techniques (Gram staining, Spore staining).

Sterilization and disinfection techniques –
Physical methods - autoclave, hot- air oven, pressure cooker, laminar air flow, filter sterilization, Radiation methods - UV rays, Gamma rays.
Chemical methods - alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites.

MB N-1324 P: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

TOTAL HOURS: 30 **CREDITS: 2**

1. Microbiology Good Laboratory Practices and Biosafety.
2. Preparation of culture media for cultivation of bacteria- Nutrient broth & Nutrient agar
3. Preparation of culture media for cultivation of fungi – Sabourauds agar
4. Sterilization of medium using Autoclave
5. Sterilization of glassware using Hot Air Oven
6. Light compound microscope and its handling
7. Microscopic observation of bacteria (Gram +ve bacilli and cocci, Gram -ve bacilli), Algae and Fungi.
8. Simple staining
9. Gram's staining
10. Hanging-drop method& temporary wet mount (TWM) for observation of living microrganisms.
11. Isolation of pure cultures of bacteria by serial dilution and Streak/Spread/Pour Plate Method.
12. Preservation of bacterial cultures by Serial subculturing & Slant Preparation with mineral oil overlay.
13. Observation of electron micrographs of bacterial cells

Recommended Text Books &Reference books:

Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). Microbiology. 5th Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi.

Dube, R.C. and Maheswari, D.K. (2000) General Microbiology. S Chand, New Delhi. Edition), Himalaya Publishing House, Mumbai.
Power, C.B. and Daginawala, H.F. (1986). General Microbiology Vol I & II

Prescott, M.J., Harley, J.P. and Klein, D.A. (2012). Microbiology. 5th Edition, WCB McGrawHill, New York.

Reddy, S.M. and Reddy, S.R. (1998). Microbiology Practical Manual, 3 rd Edition, Sri Padmavathi Publications, Hyderabad.

Singh, R.P. (2007). General Microbiology. Kalyani Publishers, New Delhi.

Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). General Microbiology, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.

Microbiology Edited by Prescott
Jaya Babu (2006). Practical Manual on Microbial Metabolisms and General Microbiology. Kalyani Publishers, New Delhi.

Gopal Reddy *et al.*, Laboratory Experiments in Microbiology

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA
B.Sc MICROBIOLGY (CBSC) SYLLABUS

BSc	MICROBIOLOGY (Semester: II)	Credits: 4
MB N-2324	MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY	Total hours:50

Aim and objectives of Course

To understand different bio molecular, bacterial nutrition, bacterial growth and metabolism

Learning outcomes of Course (COs)

Up on completion of this course students should able to:

CO1: Students able to describe the nutritional forms of bacteria and bacterial growth kinetics and methods to measure bacterial growth

CO2: Students will understand bacterial respiration, metabolism, photosynthesis and fermentations

CO3: Knowledge on classification of carbohydrates as structural and storage components, Classification of lipids and amino acids

CO4: Students will able to understand structure and functions of nucleic acids

CO5: Students will able to understand enzyme catalysis and kinetics

UNIT-I: **No.ofhours:10**

Microbial nutrition: Classification of micro organisms based on nutrients (carbon, nitrogen, other energy and electron sources). Autotrophs, heterotrophs, mixotrophs, Phototrophs (Photosynthetic pigments).

Microbial growth: Principles of growth, Kinetics of growth, measurement of growth: (Direct methods: viable plate counts, membrane filtration). Indirect methods(Metabolic activity – measurements of DNA, Protein, Microscopic counts,) electronic counters, most probable number; Batch and continuous. Synchronous and Diauxic growth,

UNIT-II: **No. of hours: 10**

Aerobic respiration - Glycolysis, ED path way, TCA cycle, Electron transport, oxidative and substrate level phosphorylation. Glyoxylate cycle, hexose monophosphate (HMP) shunt, gluconeogenesis.

Anaerobic respiration Fermentation, Biochemical mechanisms of lacticacid, ethanol, and butanol fermentations. Nitrate and sulphate respiration. Outlines of oxygenic and anoxy genic photosynthesis in bacteria.

UNIT – III: **No. of hours: 10**

General characters, outline classification of Carbohydrates (Mono, Di and Polysaccharides), Lipids- General characters–Triglycerides, phospholipids, glycolipids and waxes.

General charecters, classification, structure and function of amino acids, Characterization of proteins and classification (primary, secondary, tertiary and quaternary)

UNIT – IV: **No. of hours: 10**

Nucleic acid types, base composition, nucieosides, nucleotides, Structure and functions of DNA (Types of DNA i.e. B, C, D and Z) and RNA (types i.e. m-RNA, r-RNA, t-RNA),

UNIT- V **No. of hours: 10**

Properties and classification of Enzymes, Kinetics (Michaelis – Menten equation), Factors effecting on enzyme activity (P^H, tempareture, concentration) catalised reactions (Lock &Key, Induced Fit). Co-enzymes and Co-factors.

MB N-2324 P: MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY

TOTAL HOURS: 38 **CREDITS: 2**

1. 1 Qualitative Analysis of Carbohydrates.
2. Qualitative Analysis of Aminoacids.
3. Colorimetric estimation DNA by diphenylamine method.
4. Estimation of RNA by Orcinol method.
5. Colorimetric estimation of proteins by Biuret / Lowry method.
6. Estimation of reducing sugar-Anthrone method.
7. Demonstration of Alcoholic fermentation.
8. Assay of amylase activity
9. Effect of temperature / pH on enzyme activity

11. Demonstration of immobilization of enzyme activity(Virtual Demo)

SUGGESTED READING:

Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company

Caldwell, D.R. (1995). Microbial Physiology and Metabolism, W.C. Brown Publications, Iowa, USA.

Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). Principles of Biochemistry, 2 nd Edition, CBS Publishers and Distributors, New Delhi.

Sashidhara Rao, B. and Deshpande, V. (2007). Experimental Biochemistry: A student Companion. I.K. International Pvt. Ltd.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA
B.Sc MICROBIOLGY (CBSC) SYLLABUS

BSc	MICROBIOLOGY (Semester: III)	Credits: 4
MB N- 3324	MOLECULAR BIOLOGY AND MICROBIAL GENETICS	Total hours:48

Aim and objectives of Course

To understand DNA, RNA, Protein structure and synthesis. DNA damage, mutations and repair. Gene transfer methods.

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Understand the structure and functions of DNA, RNA, plasmids, transposons and bacterial replication.
CO2: Students will understand various mutations
CO3: Develop knowledge on genetic code and recombination in bacteria
CO4: Students acquire basic concepts of gene expression
CO5: Get knowledge on regulation of gene expression in prokaryotes

UNIT- I **No. of hours: 8**

DNA and RNA as genetic material. Structure and organization of prokaryotic DNA. Watson and Crick model of DNA. Extra chromosomal genetic elements - Plasmids and transposons. Replication of DNA - Semi conservative mechanism, Enzymes involved in replication.

UNIT- II **No. of hours: 10**

Mutations - spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions.

Mutagens - Physical and Chemical mutagens. Outlines of DNA damage and repair mechanisms.

UNIT- III **No. of hours: 10**

Modern concept of gene Cistron, Recon and Muton. One gene one enzyme and one gene one polypeptide hypotheses.

Types of RNA and their functions, poly and mono cistronic m-RNA.

Genetic code –genetic code, the decoding system, codon- anticodon interaction.

Structure of ribosomes.

Bacterial recombination – Bacterial transformation, Bacterial conjugation, Transduction– Generalized and specialized transductions.

UNIT- IV **No. of hours: 10**

Transcription: Introduction- Basic features of RNA synthesis, *E.coli* RNA polymerase, processing of tRNA and rRNA and m-RNA.

Transcription in Eukaryotes, Eukaryotic rRNA genes, formation of eukaryotic tRNA molecules, RNA Polymerases of eukaryotes.

Translation: Outline of Translation in eukaryotes. Complex Translation units, Inhibitors and Modifiers of protein synthesis..

UNIT- V **No. of hours: 8**

Gene regulation- structural, constitutive, regulatory and clustered genes. Regulation of gene expression in bacteria - operon concepts - Negative and positive control of the Lac Operon,

trp operon.

Recommended Text Books &Reference books:

- Freifelder, D. (1990). Microbial Genetics. Narosa Publishing House, New Delhi. Freifelder, D. (1997). Essentials of Molecular Biology. Narosa Publishing House, New Delhi.
- Glick, B.P. and Pasternack, J. (1998). Molecular Biotechnology, ASM Press, Washington D.C., USA.
- Lewin, B. (2000). Genes VIII. Oxford University Press, England.
- Maloy, S.R., Cronan, J.E. and Freifelder, D. (1994). Microbial Genetics, Jones and Bartlett Publishers, London.
- Ram Reddy, S., Venkateshwarlu, K. and Krishna Reddy, V. (2007) A text Book of Molecular Biotechnology. Himalaya Publishers, Hyderabad.
- Sinnot E.W., L.C. Dunn and T. Dobzhansky. (1958). Principles of Genetics. 5 th Edition. McGraw Hill, New York.
- Smith, J.E. (1996). Biotechnology, Cambridge University Press.
- Snyder, L. and Champness, W. (1997). Molecular Genetics of Bacteria. ASM press,
- Strickberger, M.W. (1967). Genetics. Oxford & IBH, New Delhi.
- Verma, P.S. and Agarwal, V.K. (2004). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co. Ltd., New Delhi.

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SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA
B.Sc MICROBIOLGY (CBSC) SYLLABUS

BSc	MICROBIOLOGY (Semester: IV)	Credits: 4
MB N- 4324	MEDICAL MICROBIOLOGY AND IMMUNOLOGY	Total hours:48

Aim and objectives of Course

To study types of immunity, immune organs, cells, antibodies and antigen-antibody interactions.

To learn diagnostic and pathogenesis of various diseases. Antimicrobial defense and different toxins and vaccines.

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Students will demonstrate on collection, handling and processing of laboratory specimens

CO2: Develop information on epidemiology, treatment and control of infectious diseases

CO3: Student can safeguard him& society and can work diagnostics and hospitals.

CO4: Explain No-specific body defense and the immune response

CO5: Understand structure and properties of Antigen and antibodies

UNIT- I: **No. of hours: 8**

Normal flora of human body. Host pathogen interactions: infection, invasion, pathogen, pathogenicity, virulence and opportunistic infection. General account on nosocomial infection. General principles of diagnostic microbiology- collection, transport and processing of clinical samples. General methods of laboratory diagnosis - cultural, biochemical, serological and molecular methods.

UNIT- II: **No. of hours: 10**

General account on microbial diseases -causative agent, pathogenesis, epidemiology, diagnosis, prevention and control**.**

Bacterial diseases - Tuberculosis and Typhoid

Fungal diseases – Candidiasis and Aspergillosis

Protozoal diseases – Malaria and Filaria

Viral Diseases - Hepatitis- A & C and AIDS.

UNIT- III: **No. of hours: 10**

Description and pathology of diseases caused by hemoflagellates; *Leishmania donavani and Trypanosoma gambiense.*

Principles of chemotherapy, Antibacterial drugs – Penicillin, Anti fungal drugs – Nystatin, Anti viralagents – Robovirin, Drug resistance in bacteria.

UNIT- IV: **No. of hours: 10**

Types of immunity - innate and acquired; active and passive; humoral and cell-mediated immunity.

Primary and secondary organs of immune system - Thymus, Bursa fabricus, bone marrow, spleen and lymph nodes.

Cells of immune system – structure and functions of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

UNIT – V: **No. of hours: 10**

Antigens - types, chemical nature, antigenic determinants, haptens. Factors affecting antigenicity.

Antibodies - basic structure, types, properties and functions of immunoglobulins.

Types of antigen-antibody reactions - Agglutinations, Precipitation, Neutralization, complement fixation, blood groups.

Labeled antibody based techniques - ELISA, RIA and Immuno fluroscence.

Polyclonal and monoclonal antibodies - production and applications.(Hybridoma technology)

Concept of Hypersensitivity and Autoimmunity.

MB N-4324 P: MEDICAL MICROBIOLOGY AND IMMUNOLOGY

TOTAL HOURS: 48 **CREDITS: 2**

1. Identification of human blood groups.
2. Separate serum from the blood sample (demonstration).
3. Estimation of blood haemoglobin.
4. Total Leukocyte Count of the given blood sample.
5. Differential Leukocyte Count of the given blood sample.
6. Immunodiffusion by Ouchterlony method.
7. Identify bacteria - *E. coli*, *Pseudomonas*, *Staphylococcus*, *Bacillus*, using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease production and catalase tests
8. Isolation of bacterial flora of skin by swab method.
9. Antibacterial sensitivity by Kirby-Bauer method
10. Study symptoms of the diseases with the help of photographs: Anthrax,

Polio, Herpes, chicken pox, HPV warts, Dermatomycoses (ring worms)

11. Study of various stages of malarial parasite in RBCs using permanent mounts.

Recommended Text Books &Reference books:

- Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.
- Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
- Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley-Blackwell Scientific Publication, Oxford.
- Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
- Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
- Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Microbiology. 4th edition. Elsevier Publication.
- Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA
B.Sc MICROBIOLGY (CBSC) SYLLABUS

BSc	MICROBIOLOGY (Semester: IV)	Credits: 4
MB N	INDUSTRIAL MICROBIOLOGY	Total hours 39

Aim and objectives of Course

To provide knowledge on important microbes and the metabolic products in various industries.

Learning outcomes of Course

Up on completion of the course students able to

CO1: Summarize the importance of microbes used in industries and understand Screening methods and techniques involved in strain improvement

CO2: Demonstrate the different types of fermenters and fermentation media

CO3: Understand role of microbes in various industries like pharmaceutical, bioleaching and textiles.

CO4: Discuss various growth parameters required for industrial products

CO5: Self-reliance in the industrial application of Microbiology in life and industry and entrepreneurship can be established with the gained knowledge.

UNIT – I **No. of hours: 7**

Microorganisms of industrial importance –History,introduction and general charecters of yeasts (*Saccharomyces cerevisiae*), moulds (*Aspergillus niger*) bacteria (*E.coli*), actinomycetes (*Streptomyces griseus*). Industrially important Primary and secondary microbial metabolites. Screening techniques. Techniques involved in strain improvement.

UNIT – II **No.of hours: 10**

Fermentation and fermenter: concept and discovery of fermentation. Fermenter: its parts and function. Types of fermenter – batch, continuous and fed batch.

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.

Basic concepts of Design of fermenter.

Ingredients of Fermentation media.

Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

UNIT – III **No.of hours: 8**

Therapeutic enzymes, Production of therapeutic enzymes. Enzymes used in detergents, textiles and leather industries. Production of amylases and Proteases. Role of microorganisms in bioleaching and textile industry.

UNIT – IV No.of hours: 7

Industrial microorganisms: cell growth, microbial growth kinetics, factors affecting growth, basic nutrition, principles of production media, components of media, chemical composition of media.

Bioreactors: basic structure of bioreactor, types of bioreactors, kinetics and methodology of batch and continuous bioreactors. Sterilization of bioreactors: fibrous filter sterilization. Aeration and agitation: agitation in shake flask and tube rollers.

UNIT – V **No.of hour: 7**

Microbial production and applications of Industrial products: Citric acid, Ethanol, Penicillin, Glutamic acid, and vitamin B12.

INDUSTRIAL MICROBIOLOGY

TOTALHOURS:36 **CREDITS:2**

1. Production of ethanol
2. Estimation of ethanol
3. Isolation of amylase producing microorganisms from soil
4. Production of amylase from bacteria and fungi
5. Assay of amylase
6. Demonstration of fermenter
7. Production of wine from grapes
8. Growth curve and kinetics of any two industrially important microorganisms.
9. Microbial fermentation for the production and estimation of ethanol from grapes
10. Microbial fermentation for the production and estimation of citric acid

Recommended Text Books &Reference books:

- Atlas RM and Bartha R. (2000). **Microbial Ecology: Fundamentals & Applications.** 4th edition. Benjamin/Cummings Science Publishing, USA
- Barton LL & Northup DE (2011). **Microbial Ecology**. 1st edition, Wiley Blackwell, USA
- Campbell RE. (1983). **Microbial Ecology**. Blackwell Scientific Publication, Oxford, England.
- Coyne MS. (2001). **Soil Microbiology: An Exploratory Approach.** Delmar Thomson Learning.
- Lynch JM &Hobbie JE. (1988). **Microorganisms in Action: Concepts & Application in Microbial Ecology.** Blackwell Scientific Publication, U.K.
- Madigan MT, Martinko JM and Parker J. (2014). **Brock Biology of Microorganisms**. 14th edition. Pearson/ Benjamin Cummings
- Maier RM, Pepper IL and Gerba CP. (2009). **Environmental Microbiology**. 2nd edition, Academic Press

- Martin A. (1977). **An Introduction to Soil Microbiology**. 2nd edition. John Wiley & Sons Inc. New York & London. Adams MR and Moss MO. (1995). **Food Microbiology**. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.
- Banwart JM. (1987). **Basic Food Microbiology**. 1st edition. CBS Publishers and Distributors, Delhi, India.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA

Practical Examination pattern for Semester End Examinations

Practical examination in Department of MICROBIOLOGY is held before end of semester exams twice in a year to test practical skills among the students.

Total marks allotted for practical are **50** marks which are divided as 25 for internal and 25 for external for the duration of **two** hours in each semester

The division of marks is as follows

External

Major Experiment	Minor Experiment	To identify the instrument to give the working principle	Record	Viva-Voce
8 Marks	4 Marks	2 X 2 ½ =5 Marks	5Marks	3Marks

Internal

Record	Project viva	Continuous assessment
10 Marks	10 Marks	5 Marks

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA

Student Evaluation Policy and Procedure

1. EVALUATION POLICY AND PROCEDURE

Students are evaluated for 100 marks in each course. These 100 Marks are spitted into Continuous Internal Assessment (CIA) and Semester End Evaluation (SEE). 40 marks are allocated to CIA and 60 marks for SEE.

CONTINUOUS INTERNAL ASSESSMENT (CIA) FOR 40 MARKS

Out of a maximum of 100 marks in each theory paper, 40 marks shall normally be allotted for continuous internal assessment. The Assessment shall be made by the teacher handling that paper in the manner prescribed here under. Where the same paper is handled by two or more teachers, the Head of the Department shall decide upon the teacher, who shall make the internal assessment or fix the proportion of the marks among the teachers for the internal assessment of the students.

Out of these 40 marks, 10 marks are allotted to Continuous Internal Exams. Two Continuous Internal exams are conducted for 20 marks in each exam and the average of these two exams scale down to 10 marks shall be deemed as the marks obtained by the student in Continuous Internal Exams.

Out of these 40 marks, 10 marks are allotted to Assignments. Two assignments are given to the students during the course. 5 marks are allotted for each assignment and total of these two assignments are included in Continuous Internal Assessment.

Out of these 40 marks, 10 marks are allotted to Project Work/ Group Discussion. Students will be assigned student study project for 10 Marks under CIA. Then the student has to submit a project report under the supervision of Faculty Member. These 10 marks may also be assigned to group discussion also. Student will be evaluated here based on his/her way of expression, conceptual strength, attitude, listening -understanding skills and level of participation in the discussion.

Out of these 40 marks, 5 marks are allotted to Student Seminar and 5 marks for Viva-Voce. Each Student may give student seminar to the peer team. This student seminar will carry 5 marks. Here feedback will be collected on 5 points scale from the participants in the student seminar [or] Viva- Voce will be conducted by the concerned subject faculty for 5marks.

The summarized continuous internal assessment is

1. Average of Two Continuous Internal exams	**-**	**10 Marks**
2. Total of Two Assignments	**-**	**10 Marks**
3. Project Work/Group Discussion	**-**	**10 Marks**

4. Student Seminar - 5 Marks
5. Feedback/Viva-Voce - 5 Marks

1.2 CIA IN PROJECT WORK AND COMPREHENSIVESEMINAR

Each student has to conduct Industry/Laboratory oriented Research work in his/her interested area and has to prepare Project Report by using either primary data or secondary data. This is different from student study project. It is research oriented Industrial/laboratory project conducted under the supervision of Faculty Member of the department. The students have to submit the project work report to the supervision of Faculty at the end of VI Semester End Evaluation process. After submitting project work report, the students have to give Comprehensive Seminar by explaining their research in the industry/Lab. Project Work carries 40 Marks and Comprehensive Seminar carries 10 Marks.

Every student is required, to take every test for Continuous internal Assessment, unless he/she is permitted by the Principal to write at a later date on valid reasons, before the test is conducted. In case where permission is not obtained, the decision of the Principal to hold or not to hold separate examination for such candidate is final.

Permission to write Internal Assessment test at the end of corresponding Semester – end exams may be given on medical grounds and other valid grounds. For such candidates, test/s is/are conducted by the faculty member concerned in consultation with the Head of the Department with a different question paper.

The Student has to get minimum 40 per cent (16 Marks) marks in the Continuous Internal Assessment to complete the Course Paper.

Suggestive Question paper pattern for CIA/SEE (Based on Bloom Taxonomy)

Though the faculty concerned is empowered to adopt their own pattern for question paper, a general and suggestive model for question paper is given below based on Blooms Taxonomy.

S. No	Learning Objective	Percentage of Marks
1	Memory based (Remember)	10
2	Understand (Comprehension)	10
3	Application	15
4	Analysis	15
5	Evaluation	25
6	Creativity	25
Total		**100**

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FAX NO : 0866-2441092
NAAC : B+ (III Cycle with CGPA : 2.60) - Estd: 1937
ISO 9001 - 2015 Certified
Institution is ranked by NIRF in 151 - 200 band at NIRF - 2019
WEBSITE : www.srrcvr.org
EMAIL : srrandcvr@gmail.com

BOARD OF STUDIES MEETING

(2021-2022)

30th November 2021

III B.Sc Microbiology (Admitted Batch 2019-2020)

DEPARTMENT OF MICROBIOLOGY

Programme Code: 313

SRR & CVR GOVT.DEGREE COLLEGE (A) VIJAYAWADA

B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER- V

SYLLABUS APPORVED THROUGH BOS 2021-22 DT: 30-11-21

MB-5324-5: ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: The student will have fundamental concepts in soil microbiology and soil water and aero microbial diversity and microbial interactions
CO2: Basic concepts in treatment of drinking water.
CO3: Understands the role of microorganisms in treatment of solid and liquid waste.
CO4: The student will acquire knowledge on application of microorganisms in agro – environmental fields.
CO5: Get fundamental concepts in principles of plant disease control

TOTAL HOURS: 36 **CREDITS: 3**

UNIT - I **No. of hours: 8**

Terrestrial Environment: Soil profile and soil microflora
Aquatic Environment: Microflora of fresh water and marine habitats
Atmosphere: Aeromicroflora and dispersal of microbes

UNIT – II **No. of hours: 8**

Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus).
Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique. Microbial interactions – mutualism, commensalism, antagonism, competition, parasitism, predation.

UNIT – III **No. of hours: 6**

Outlines of Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill).
Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.

UNIT – IV **No. of hours: 7**

Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, *Azospirillum, Azotobacter, Frankia*, phosphate-solubilizers and Cyanobacteria.
Outlines of biological nitrogen fixation (symbiotic, non-symbiotic).
Biofertilizers - *Rhizobium*.

UNIT – V **No. of hours: 7**

Concept of disease in plants. Symptoms of plant diseases caused by fungi, bacteria, and viruses. Plant diseases - groundnut rust, Citrus canker and tomato leaf curl.
Principles of plant disease control.

Additional input:

Determination quality of different water sample by MPN method

MB-5324-5P: ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

TOTAL HOURS: 36 **CREDITS: 2**

1. Preparation of soil extract agar and any one culture media for algal growth
2. Isolation of microbes (bacteria and fungi) from soil.
3. Study of air micro flora by petriplate exposure method.
4. Microbiological Analysis of potable water Standard Plate Count
5. Determination of Dissolved Oxygen (DO) of water samples.
6. Isolation of *Rhizobium* from root nodules.
7. Isolation of actinomycetes on I.S.P. media (International Streptomyces project media)
8. Observation of photo micrographs of plant diseases of local importance - Citrus canker, Tikka disease of Groundnut, Bhendi yellow vein mosaic, Rusts, Smuts, Powdery mildews, Tomato leaf curl.

SUGGESTED READINGS

Atlas RM and Bartha R. (2000). **Microbial Ecology: Fundamentals & Applications.** 4th edition. Benjamin/Cummings Science Publishing, USA

Barton LL & Northup DE (2011). **Microbial Ecology**. 1st edition, Wiley Blackwell, USA

Campbell RE. (1983). **Microbial Ecology**. Blackwell Scientific Publication, Oxford, England.

Coyne MS. (2001). **Soil Microbiology: An Exploratory Approach.** Delmar Thomson Learning.

Lynch JM & Hobbie JE. (1988). **Microorganisms in Action: Concepts & Application in Microbial Ecology.** Blackwell Scientific Publication, U.K.

Madigan MT, Martinko JM and Parker J. (2014). **Brock Biology of Microorganisms**. 14th edition. Pearson/ Benjamin Cummings

Maier RM, Pepper IL and Gerba CP. (2009). **Environmental Microbiology**. 2nd edition, Academic Press

Martin A. (1977). **An Introduction to Soil Microbiology**. 2nd edition. John Wiley & Sons Inc. New York & London.

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B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER- V

SYLLABUS APPORVED THROUGH BOS 2021-22 DT: 30-11-21

MB-5324-6: FOOD AND INDUSTRIAL MICROBIOLOGY

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Demonstrate with the wide diversity of microbes and their potential for use in industrial microbiology

CO2: Able to understand principles of food preservation

CO3: Understand Screening methods and techniques involved in strain improvement

CO4: Get basic information design of fermentor, fermentation processes and down streaming

CO5: Self-reliance in the industrial application of Microbiology in life and industry and entrepreneurship can be established with the gained knowledge.

TOTAL HOURS: 36 **CREDITS: 3**

UNIT- I **No. of hours: 8**

Intrinsic and extrinsic parameters that affect microbial growth in food
How to clean vegetables/raw food during COVID-19 pandemic.
Microbial spoilage of food - fruits, vegetables, milk, meat, egg, bread and canned foods
Food intoxication (botulism).
Food-borne diseases (salmonellosis) and their detection.

UNIT – II **No. of hours: 7**

Principles of food preservation - Physical and chemical methods.
Fermented Dairy foods – cheese and yogurt.
Microorganisms as food – SCP, edible mushrooms (white button, oyster and paddy straw). Probiotics and their benefits.

UNIT – III No. of hours: 6

Microorganisms of industrial importance – yeasts,(Saccharomyces cerevisiae) moulds,(Aspergillus niger)

Bacteria(E.coli), actinomycetes (Streptomycin griseus).
Outlines of Isolation and Screening and strain improvement of industrially-important microorganisms.

UNIT – IV **No. of hours: 8**

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.
Basic concepts of Design of fermenter.
Ingredients of Fermentation media
Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

UNIT – V **No. of hours: 7**

Microbial production of Industrial products - Citric acid, Ethanol, amylases, penicillin, glutamic acid and vitamin B12.

Additional inputs: Mushroom cultivation

MB-5324-6P: FOOD AND INDUSTRIAL MICROBIOLOGY

TOTAL HOURS: 36 **CREDITS: 2**

1. Isolation of bacteria and fungi from spoiled bread/fruits/vegetables
2. Preparation of Yogurt/Dahi
3. Determination of the microbiological quality of milk sample by MBRT
4. Isolation of antagonistic microorganisms by crowded plate technique
5. Design of Fermenter
6. Microbial fermentation for the production and estimation of ethanol from Grapes.
7. Microbial fermentation for the production and estimation of citric acid.

SUGGESTED READING

Adams MR and Moss MO. (1995). **Food Microbiology**. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.

Banwart JM. (1987). **Basic Food Microbiology**. 1st edition. CBS Publishers and Distributors, Delhi, India.

Casida LE. (1991). **Industrial Microbiology**. 1st edition. Wiley Eastern Limited.

Crueger W and Crueger A. (2000). **Biotechnology: A textbook of Industrial Microbiology**. 2nd Edition. Panima Publishing Company, New Delhi

Frazier WC and Westhoff DC. (1992). **Food Microbiology**. 3rd edition. Tata McGraw-Hill Publishing Company Ltd, New Delhi, India.

Jay JM, Loessner MJ and Golden DA. (2005). **Modern Food Microbiology**. 7th edition, CBS Publishers and Distributors, Delhi, India

Patel AH. (1996). **Industrial Microbiology** .1st Edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India
Stanbury PF, Whitaker A and Hall SJ. (2006). **Principles of Fermentation Technology.** 2nd edition.

SRR & CVR GOVT.DEGREE COLLEGE (A) VIJAYAWADA

B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER- VI

SYLLABUS APPORVED THROUGH BOS 2021-22 DT: 30-11-21

MB -7324 A : MICROBIAL BIOTECHNOLOGY

Aim and objectives of Course

To study applications of microbial biotechnology

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Students should be able to demonstrate with the wide diversity of microbes and their potential use in medicine, agriculture and industry.

CO2: Students will understand the production of recombinant vaccines

CO3: Students will get knowledge on microbial transformation of steroids and sterols

CO4: Students will understand the production methodology for bioethanol and biodiesel

CO5: Students will get outlines of intellectual property rights.

TOTAL HOURS: 36 **CREDITS: 3**

UNIT- I **No. of Hours: 8**

Microbial biotechnology: Scope and its applications in human therapeutics, agriculture (Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology.

Genetically engineered microbes for industrial application: Bacteria and yeast

UNIT- II **No. of Hours: 7**

Recombinant microbial production processes in pharmaceutical industries - Streptokinase, recombinant vaccines (Hepatitis B vaccine).

Over view of production and applications of Microbial polysaccharides, Bioplastics and Microbial biosensors

UNIT- III **No. of Hours: 10**

Microbial based transformation of steroids and sterols.

Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute.

Immobilization methods and their application: Whole cell immobilization

UNIT- IV **No. of Hours: 7**

Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and algal biomass.

Biogas production: Methane and hydrogen production using microbial culture. Microorganisms in bioremediation. Degradation of xenobiotics.

Mineral recovery, removal of heavy metals from aqueous effluents.

UNIT- V **No. of Hours: 4**

Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks

MB-7324 A P: MICROBIAL BIOTECHNOLOGY

TOTAL HOURS: 36 **CREDITS: 2**

1. Yeast cell immobilization in calcium alginate gels
2. Enzyme immobilization by sodium alginate method
3. Pigment production from fungi (*Trichoderma* / *Aspergillus* / *Penicillium*)
4. Isolation of xylanase or lipase producing bacteria
5. Study of algal Single Cell Proteins

SUGGESTED READING

Crueger W, Crueger A (1990) Biotechnology: **A text Book of Industrial Microbiology** 2nd edition Sinauer associates, Inc.

Demain, A. L and Davies, J. E. (1999). **Manual of Industrial Microbiology and Biotechnology**, 2nd Edition, ASM Press.

Glazer AN and Nikaido H (2007) **Microbial Biotechnology**, 2nd edition, Cambridge University Press

Glick BR, Pasternak JJ, and Patten CL (2010) **Molecular Biotechnology** 4th edition, ASM Press

Gupta PK (2009) **Elements of Biotechnology** 2nd edition, Rastogi Publications

Prescott, Harley and Klein's **Microbiology** by Willey JM, Sherwood LM, Woolverton CJ (2014), 9th edition, Mc Graw Hill Publishers.

Ratledge, C and Kristiansen, B. (2001). **Basic Biotechnology**, 2nd Edition, Cambridge University Press.

Stanbury PF, Whitaker A, Hall SJ (1995) **Principles of Fermentation Technology** 2nd edition., Elsevier Science

Swartz, J. R. (2001). **Advances in Escherichia coli production of therapeutic proteins. Current Opinion in Biotechnology**, 12, 195–201.

SRR & CVR GOVT.DEGREE COLLEGE (A) VIJAYAWADA

B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER- VI

SYLLABUS APPORVED THROUGH BOS 2021-22 DT: 30-11-21

MB-8324 A2: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

Aim and objectives of Course

To study quality control in food and pharmaceutical industries.

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Develop skills on disinfection of instruments and equipment's in laboratory and Hospitals.

CO2: To understand the techniques like MPN and direct microscopic methods

CO3: Students will get basic principles in serological techniques

CO4: Students will perform Enrichment culture technique and detection of specific microorganisms

CO5: Students will understand concepts Hazard analysis of critical control point (HACCP)

TOTAL HOURS: 36 **CREDITS: 3**

UNIT – I **No. of Hours: 8**

Good laboratory practices - Good microbiological practices.
Biosafety cabinets – Working of biosafety cabinets, using protective clothing, specification for BSL-1, BSL-2, BSL-3.
Discarding biohazardous waste – Methodology of Disinfection, Autoclaving & Incineration

UNIT – II **No. of Hours: 8**

Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, Biochemical and immunological methods: Limulus lysate test for endotoxin, gel diffusion, sterility testing for pharmaceutical products

UNIT – III **No. of Hours: 8**

Molecular methods – Nucleic acid probes, PCR based detection, biosensors.

UNIT – IV **No. of Hours: 8**

Enrichment culture technique, Detection of specific microorganisms - on XLD agar, *Salmonella Shigella* Agar, Manitol salt agar, EMB agar, McConkey Agar, Saboraud Agar
Ascertaining microbial quality of milk by MBRT, Rapid detection methods of microbiological quality of milk at milk collection centres (COB, 10 min Resazurin assay).

UNIT – V **No. of Hours: 4**

Hazard analysis of critical control point (HACCP) - Principles, flow diagrams, limitationsMicrobial Standards for Different Foods and Water – BIS standards for common foods and drinking water.

MB-8324 A2 P: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

TOTAL HOURS: 36 **CREDITS: 2**

1. Microbiological laboratory safety- General rules & Regulations.

2. Sterility tests for Instruments – Autoclave & Hot Air Oven

3. Disinfection of selected instruments & Equipments

4. Sterility of Air and its relationship to Laboratory & Hospital sepsis.

5. Sterility testing of Microbiological media

6. Sterility testing of any one Pharmaceutical product

7. Standard qualitative analysis of water.

8.Microbiological analysis of homogenized food samples by direct microscopic count

SUGGESTED READING

Baird RM, Hodges NA and Denyer SP (2005) Handbook of Microbiological Quality control in Pharmaceutical and Medical Devices, Taylor and Francis Inc.

Garg N, Garg KL and Mukerji KG (2010) Laboratory Manual of Food Microbiology I K International Publishing House Pvt. Ltd.

Harrigan WF (1998) Laboratory Methods in Food Microbiology, 3rd ed. Academic Press

Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer

Laboratory Exercises in Microbiology, George.A.Wistreich & Max.D.Lechtman, 3 rd Ed, Glencoe press, London.

Manual of diagnostic microbiology, Dr.B.J.Wadher & Dr.G.L.Bhoosreddy, Firs.Ed., Himalaya publishing house, Nagpur.

Microbiology - A laboratory manual, Cappuccino & Sherman , 6 th Ed, Pearson Education

Pharmaceutical Microbiology – Purohit

Pharmaceutical Microbiology – W.B. Hugo

SRR & CVR GOVT.DEGREE COLLEGE (A) VIJAYAWADA

B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER- VI

SYLLABUS APPORVED THROUGH BOS 2021-22 DT: 30-11-21

MB-8324 A3: BIOFERTILIZERS AND BIOPESTICIDES

Learning outcomes of Course (COs)

Up on completion of the course students able to

CO1: Develop knowledge and skills on mass multiplication and field application of bio fertilizers and bio pesticides.

CO2: To get knowledge on mass multiplication and field application of *Azatobacter*, and *Azospirellum*

CO3: To get knowledge on mass multiplication and field application of phosphate solubilizing microbes

CO4: To get knowledge on mycorrhizae

CO5: To understand the concept of bio insecticides

TOTAL HOURS: 36 **CREDITS: 3**

UNIT – I **No of Hours: 10**

General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers.

Symbiotic N_2 fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants

Frankia from non-legumes and characterization.

Cyanobacteria from *Azolla*, characterization, mass multiplication, Role in rice cultivation, Crop response, field application.

UNIT – II **No of Hours: 6**

Free living *Azospirillum*, *Azotobacter* - isolation, characteristics, mass inoculum production and field application.

UNIT – III **No of Hours: 6**

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application

UNIT – IV **No of Hours: 7**

Importance of mycorrizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ecto mycorrhizae and VAM.

UNIT – V **No of Hours: 7**

General account of microbes used as bioinsecticides and their advantages over synthetic pesticides. *Bacillus thuringiensis* - production, Field applications.

Viruses – NPV cultivation and field applications.

MB-8324 A3P: BIOFERTILIZERS AND BIOPESTICIDES

TOTAL HOURS: 36 **CREDITS: 2**

1. Isolation of *Rhizobium* from root nodules.

3. Isolation of phosphate solubilizers from soil

4. Staining and observation of VAM

3. A visit to biofertilizer production unit.

SUGGESTED READINGS

Agarwal SK (2005) **Advanced Environmental Biotechnology**, APH publication.

Kannaiyan, S. (2003). **Bioetchnology of Biofertilizers,** CHIPS, Texas.

Mahendra K. Rai (2005). **Hand book of Microbial biofertilizers**, The Haworth Press, Inc. New York.

Reddy, S.M. et. al. (2002). **Bioinoculants for sustainable agriculture and forestry**, Scientific Publishers.

Saleem F and Shakoori AR (2012) **Development of Bioinsecticide,** Lap Lambert Academic Publishing GmbH KG

Subba Rao N.S (1995) **Soil microorganisms and plant growth** Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.