

D.B.F. Dayanand College of Arts and Science, Solapur

Name of Department: - Microbiology

Program Outcome [B.Sc. I – Microbiology]

- Historical development of microbiology
- Scope of microbiology
- Beneficial and harmful effects of microorganisms
- Diversity in types of microorganisms
- General characters of different microorganism
- Principles of microscopy and use of it to observe and study microbes
- Different staining techniques, Sterilization Techniques, Cultivation techniques of microorganisms, Methods of Pure culture, Maintenance and preservation of pure cultures
- Basic Biochemistry, Microbial Metabolism, Microbial Nutrition and Growth
- Applied branches of microbiology such as water microbiology, sewage microbiology, milk microbiology, medical microbiology

Program Outcome [B.Sc. II – Microbiology]

- Ultra structure and Functions different organelle of bacterial cell
- Bacterial Growth, Effect of Environmental factors on Bacterial growth, Metabolism
- Virology
- Structure of nucleic acids & Replication of Bacterial DNA
- Gene, Genetic code and Transcription, Plasmids
- Bacterial Mutation
- Immunity
- Antigen and Antibody
- Clinical Microbiology
- Pathogenecity, Microbial Diseases
- scope of Industrial microbiology, Fermentation Media, Screening, Inoculum Development and Scale Up, Microbiological assays, Specific fermentations

Program Outcome [B.Sc. III – Microbiology]

- Classification of Viruses, Reproduction of bacterial and animal viruses, Plant Viruses, Techniques in Virology
- Soil microorganisms, types and their role in elemental cycle
- Composting and Biodegradation, Plant diseases Applications of Biotechnology in Agriculture
- Adaptive Immunity, Monoclonal antibodies, Major Histocompatibility complex, Complement system, Immunological disorders
- ABO blood group system, Rh blood group system, Blood transfusion reaction and its complications

- Food Microbiology, Dairy Microbiology, Industrial production of Streptomycin, Lysin, rDNA products, Production of alcoholic beverages, Downstream processing and quality control
- Basic concepts of microbial genetics, Effect of mutation in bacteria, Genetic engineering and Protein engineering, Techniques in molecular biology, Bioinformatics
- Enzyme, Enzyme kinetics and regulation, Extraction, purification and assay of enzymes
- Bioenergetics, Biosynthesis of Nucleotides, Protein, Peptidoglycan
- Air microbiology, Marine microbiology and Fresh water ecosystem, Extremophiles, Geomicrobiology,
- Environmental impact assessment and Industrial Waste Management
- Clinical Bacteriology, Mycology, Parasitology, Virology, Chemotherapy

Laboratory Skills: Microbiology students would master the following laboratory skills

- work with standard lab safety protocols and procedures.
- work effectively in a team environment.
- document and maintain a record of all lab activities.
- Document and report on experimental protocols, results and conclusions
- review procedures and put them into your own words.
- maintain an aseptic environment.
- understand and use a bright field microscope.
- preparation of and viewing samples for microscopy,
- use appropriate methods to identify microorganisms,
- estimate the number of microorganisms in a sample,
- use common lab equipment.
- Develop competency in the simple, Gram staining and special staining procedure
- prepare culture media, isolate and culture bacteria and fungi
- understand the environmental effects on bacterial growth.
- Develop competence in bacterial and fungal identification.
- Conduct the basic research with the microorganisms and perform the diagnostic procedures required in food, milk, industrial and pharmaceutical industries

Program Outcome [M.Sc. Microbiology]

- Instill the intellectual skills to analyze the molecules using advance biophysical techniques such as HPLC, GC, AAS, PCR etc.
- Perform the quantitative/ qualitative analysis of Biomolecules and understand various biochemical pathways
- Acquire knowledge and understanding the concepts of Microbial genetics, Molecular biology, Immunology, Enzymology.
- Explore the scientific literature effectively and use computational tools such as bio-statistical and bioinformatics
- Role of micro organisms in eco system and impact created by microbes in agricultural development.

- Implement the knowledge in industry with regard to scale up, production, scale down and quality control of the various microbial products
- Conduct the basic research related to industry-environmental issues and use of agricultural for sustainable products
- Students will communicate scientific concepts, experimental results and Analytical arguments clearly and concisely, both verbally and in writing.
- Relationship between human disease and micro organisms, pathogenicity, laboratory diagnosis and treatment method.
- basic knowledge about the micro organisms, Microbial Physiology

D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: - Microbiology

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem I		
COURSE NUMBER (PAPER NUMBER) : PAPER –I		
TITLE OF COURSE (NAME OF PAPER) :- Introduction to Microbiology and Microbial diversity		
COURSE CONTENT	OBJECTIVES	OUTCOME
UNIT–I: History of Development of Microbiology	To know the historical events occur for the development of advance Microbiology. To know the various contributions in development of Microbiology by the scientists	Students will come to know or familiar the history of microbiology and various contributions by the scientists
UNIT –II: Diversity of microbial world	To know the microbial diversity and identify through morphological , cultural characterization and biochemical characterization	Students will be able to identify microorganisms through morphological, cultural and biochemical characterization.
UNIT III: General characters of different groups of microorganisms –Cellular & acellular.	To study general characters of various groups of microorganisms cellular as well as acellular.	Students will come to know to general characters of various groups of microorganisms cellular as well as acellular
UNIT – IV: An overview of Scope of Microbiology	To know the various branches of Microbiology. To know the beneficial and harmful roles of various microorganisms.	Students will be able to know various branches of Microbiology and beneficial and harmful roles of microorganisms

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COURSE OUTCOME

Name of Department _____Microbiology_____

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem I		
COURSE NUMBER (PAPER NUMBER) : II		
TITLE OF COURSE (NAME OF PAPER) Microbial techniques		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit 1:Microscopy	To understand the Principle and applications of Microscope	Students will use microscope efficiently
Unit 2: Staining techniques	To aware of various types of stains. To provide an intensive and in depth learning about various staining methods	Students will apply the theoretical knowledgeto perform different staining methods to stain bacteria & study different organelle of bacteria
Unit 3:sterilization techniques	To study various terms related to sterilization techniques	students will : <ul style="list-style-type: none">• be acquainted with various sterilization techniques• Use various methods to control microbes.
Unit 4:Cultivation techniques of microorganisms	To train the students to prepare culture media & cultivate various types of microorganisms To know the preservation techniques for maintenance of pure culture	Students will be able to cultivate various microorganisms & also will be able to maintain pure cultures of microorganisms

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Name of Department ____Microbiology_____

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc		
NAME OF SUBJECT : Microbiology		
SEMESTER II		
COURSE NUMBER (PAPER NUMBER) : PAPER III		
TITLE OF COURSE (NAME OF PAPER) (Microbial Biochemistry and Physiology)		
COURSE CONTENT	OBJECTIVES	OUTCOME
UNIT-I Basic Biochemistry	To understand the structure and applications of various macromolecules like carbohydrates, proteins lipids, DNA and RNA	Students will use knowledge in day today life
UNIT-II-Microbial Enzymes	To understand the structure mechanism of action and applications of various enzymes	Students will apply the knowledge in studying living system and role of enzymes
UNIT- III - Microbial Metabolism:-	To study basic concepts of metabolism	The students will know about how organisms use c source for their growth
UNIT- IV - Microbial Nutrition and Growth	To make aware the students to prepare culture media role of nutrient and nutritional classification pure culture	Students will be able to cultivate various microorganisms & also will be able to grow microorganisms using knowledge of nutritional requirements

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Name of Department _____Microbiology_____

B.A. / B.Sc. / M.A. / M.Sc. : B. Sc		
NAME OF SUBJECT : Microbiology		
SEMESTER II		
COURSE NUMBER (PAPER NUMBER) : PAPER IV		
TITLE OF COURSE (NAME OF PAPER) (Applied Microbiology)		
COURSE CONTENT	OBJECTIVES	OUTCOME
UNIT-I - WATER MICROBIOLOGY	To understand the microbial flora of water, causes of water pollution, examination of water and control of pollution.	Students will use knowledge in day today life. They can do the microbial examination of water. And water potability
UNIT-II- SEWAGE MICROBIOLOGY	To understand the composition, types, microbial flora, parameters for strength of sewage like B.O.D and C.O.D, significance of sewage treatment	Students will apply the knowledge in studying role of microorganisms in treatment of sewage & its significance. Dangerous effects of discharge of sewage in natural streams.
UNIT- III - MILK MICROBIOLOGY	To study basic concepts of milk, milk composition, contamination of milk, microbiological examination , preservation of milk, Pasteurization etc.	The students will know about role of organisms in contamination of milk, use of various methods of Pasteurization of milk so as to preserve the milk. They can use knowledge in day to day life
UNIT- IV - MEDICAL MICROBIOLOGY	To make aware the students about medical terminologies, in general basic information of infection, disease, cause, spread, types, prevention and control	Students will be enriched in knowledge about harmful activities of microorganisms using knowledge and using this they will come to know about pathogens, types of diseases spread control , vaccination.

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Name of Department _____Microbiology_____

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem III		
COURSE NUMBER (PAPER NUMBER) : Paper V		
TITLE OF COURSE (NAME OF PAPER) Cytology and Physiology of Microorganisms		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I : Ultra structure and Functions	To understand the structure of and functions of bacterial cell organelles	Students will know about fundamental structure of organelles of bacteria
Unit II: Bacterial Growth	To understand the growth pattern of bacteria.	Students will know the growth of bacteria & apply the theoretical knowledge to various aspects.
Unit III: Effect of Environmental factors on Bacterial growth	To study the effects of various environmental factors on bacterial growth	students will apply knowledge in studying effects of various environmental factors on bacterial growth
Unit IV: Metabolism	To understand the metabolism students to prepare culture media & cultivate various types of microorganisms	Students will be able to describe metabolism of glucose , modes of ATP generation by various methods
Unit V Virology	To study basic structure of viruses and their cultivation.	Students will know about structure of viruses and their cultivation

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B.A. / B.Sc. / M.A. / M.Sc. : B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem III		
COURSE NUMBER (PAPER NUMBER) : Paper-VI		
TITLE OF COURSE (NAME OF PAPER) :- : Bacterial Genetics		
COURSE CONTENT	OBJECTIVES	OUTCOME
UNIT-I: Structure of nucleic acids & Replication of Bacterial DNA	To understand the detail structure of nucleic acids. To learn the concept of bacterial DNA replication	Students will be able to know or familiar the structure of DNA and the concept of bacterial DNA replication
UNIT -II: Gene, Genetic code and Transcription	To study or learn the concept of Gene, Genetic code and Transcription	Students will be able to learn or understand the concept of Gene, Genetic code and Transcription.
UNIT III: Bacterial Mutation	To study or learn the concept of bacterial mutation through mutagenesis by different mutagens	Students will be able to know the concept of bacterial mutation
UNIT – IV: Plasmids	To understand the basic concept of covalently closed circular DNA To know various functions of plasmids and transformation	Students will be able to know the concept of Plasmids
Unit – V : Bacterial Recombination	To study or learn the concept of bacterial recombination	Students will be able to know the concept of bacterial recombination

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B.A. / B.Sc. / M.A. / M.Sc.: B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI IV		
COURSE NUMBER (PAPER NUMBER) VII		
TITLE OF COURSE (NAME OF PAPER) Immunology & medical microbiology		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit 1:Immunity	To understand the concept of immunity & its mechanism To study the structure & function of cells and organs of immune system	students will be aware of immunity & Concept related to cells and organs related to immune system
Unit II:Antigen & antibody	To understand meaning of antigen and antibody also types To study various types of antigen antibody reactions	students will be able to know how to diagnose the microbial diseases by using antigen antibody reactions
Unit III:Clinical microbiology	To understand the concept of clinical microbiology To study the different types of clinical samples ,how to collect clinical samples To understand the methods of diagnosis of microbial diseases	students will be able to collect clinical samples & use them for diagnosis of various microbial diseases by using various methods
Unit IV:pathogenicity	To understand the concept of pathogenicity	students will be aware of Pathogenicity mechanism
Unit V:Microbial diseases	To study some bacterial fungal & viral diseases	students will gain Knowledge and Understanding of some bacterial fungal & viral diseases

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NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem IV		
COURSE NUMBER (PAPER NUMBER) : Paper VIII		
TITLE OF COURSE (NAME OF PAPER) :- : Industrial Microbiology – I		
COURSE CONTENT	OBJECTIVES	OUTCOME
UNIT–I: Industrial Microbiology	To understand the concept of industrial production through the process of fermentation by the involvement of various microorganisms	Students will be able know the concept of industrial microbiology
UNIT –II: Fermentation Media	To learn or know the procedure or sources for the preparation of media are available for the production of various industrial products through fermentation	Students will be able to know the concept of media used for the production of various fermented products
UNIT III: Screening, Inoculum Development and Scale Up	To study or train to the students about screening, Inoculum development and scale up in industrial microbiology	Students will be able to know the concept of Screening, Inoculum Development and scale up
UNIT – IV: Microbiological assays	To study or determine the compound sensitivity towards the microorganisms through microbiological assay	Students will be able to know the concept of Microbiological assay
Unit – V : Specific fermentations	To understand the concept of specific fermentations for different industrial products	Students will be able to know the concept of specific fermentations.

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NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem V		
COURSE NUMBER (PAPER NUMBER) : DSE – 1- A: Paper MIC IX: Virology		
TITLE OF COURSE (NAME OF PAPER) : Virology		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I: Introduction and Classification of Viruses	To understand the General properties and structure of virus. To acquire knowledge of Viroids and Prions To understand Viral classification on the basis of LHT system and as per international committee	Students will get knowledge of General properties and structure of virus. And also acquire knowledge of Viroids and Prions. Students will come to know the present status and schemes of classification of viruses
Unit II: Reproduction of bacterial viruses	To impart the knowledge of productive cycle of T ₄ phage - Lytic cycle and Temperate phages and lysogeny of λ phages	Students will be able to understand the productive cycle of phage reproduction as well as the nonproductive i.e. lysogenic cycle of temperate phages
Unit IV: Plant Viruses	To study Viral plant Diseases - TMV, CaMV Prevention and Control of Plant Viral Diseases	students will understand nature of TMV and CaMV and diseases caused by them and prevention and control of plant diseases
Unit V Techniques in Virology	To train the students to Isolation, cultivation, Purification and Enumeration of viruses To know One step growth experiment	Students will be able to learn the methods used for cultivation, purification and enumeration of viruses

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NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem V		
COURSE NUMBER (PAPER NUMBER) : X		
TITLE OF COURSE (NAME OF PAPER) Agricultural Microbiology		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I : Introduction to Soil Microbiology	To understand the soil ,structure, ecosystem and m.orgs in soil and applications of	Students will about the importance of soil in with respect to m.orgs
Unit II: Role of microorganisms in elemental cycle	To aware of various types of elements required by living system and their transformation.	Students will apply the theoretical knowledge to study elemental transformations.
Unit III: Composting and Biodegradation	To study various composting methods and role of microorganisms in composting.	students can apply knowledge of composting in preparation compost in help to society in solving the problem of solid waste management
Unit IV: Plant pathology	To study the harmful activities like plant diseases caused by organisms , their symptoms, control.	Students will be able to identify plant diseases. And help in control of diseases and make aware the farmers about them.
Unit V Applications of Biotechnology in Agriculture	To study role of various types of microorganisms in biotechnology and agriculture	Students can apply knowledge to get rid of problems in the society

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B.A. / B.Sc. / M.A. / M.Sc.: B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI V		
COURSE NUMBER (PAPER NUMBER) DSE-3-A paper MIC-XI		
TITLE OF COURSE (NAME OF PAPER) Immunology		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit 1:Immune response	To inculcate knowledge in human immune response towards micro organisms	Students will gain knowledge in human immune response towards micro organisms
Unit II:Major Histocompatibility complex	To study structure and function of MHC	Students will acquire knowledge about structure and function of MHC
Unit III:Complement system	To study properties of complement and activation pathways and its biological effects	Study will understand concept of complement activation pathway and biological effects
Unit IV:Immunological disorders	To study concept of allergy types and its pathogenesis To study autoimmunity	Study will understand concept of allergy and its pathogenesis, autoimmunity
Unit V:Immunohaematology	To study ABO and Rh blood groups blood transfusion reaction	Students will gain knowledge of ABO and Rh blood groups and blood transfusion reactions

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NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem V		
COURSE NUMBER (PAPER NUMBER) : SEC – 1 : Paper MIC – XII		
TITLE OF COURSE (NAME OF PAPER) :- Industrial Microbiology – I		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I :-Food Microbiology	To study of various microorganisms in the food substrate and food spoilages., and the concepts of food preservations for long term of food storage and fermented food production	Students will come to know food spoilages, concepts of food preservations for long term of food storage and fermented foods.
Unit –II: Dairy Microbiology	To know milk spoilages by microorganisms and production of various fermented dairy products	Students will be able to know microbial action in milk spoilages and production of dairy fermented products.
Unit III: Industrial production.	To study various industrial products through fermentation process by desired microorganisms.	Students will be able to know to the production of various fermented products.
Unit – IV: Production of alcoholic beverages	To study of production of alcoholic beverages such as wine and beer and post fermentation of spoilages of wine.	Students will be able to know production of wine and beer and concept of wine spoilages.
Unit-V:-Downstream processing and quality control	To study or learn the concepts of downstream and quality control processes in fermentation industry	Students will be able know or learn the various downstream and quality control processes in fermentation industry.

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B.A. / B.Sc. / M.A. / M.Sc. : B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem VI		
COURSE NUMBER (PAPER NUMBER) : DSE – 2 – B: Paper MIC - XIV		
TITLE OF COURSE (NAME OF PAPER) :- Microbial Biochemistry		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I :- Enzyme, Enzyme kinetics and regulation	To obtain a general knowledge about how enzymes work To study of enzyme kinetics and its regulations in biochemical reactions	Students will be able to know or learn the concepts of enzymes, enzyme kinetics and regulation of enzymes in biochemical reactions
Unit –II: Extraction, purification and assay of enzymes	To study of extraction processes of enzyme and understand the quality of enzyme through purification and assay	Students will be able to know extraction processes, purification and assay of enzymes
Unit III: Assimilation of: Carbon, Nitrogen and Sulphur	To study the metabolic reactions of microorganisms for assimilation of carbon, nitrogen and sulphur	Students will be able to know the concepts of metabolic reactions of microorganisms.
Unit – IV: Bioenergetics	To study how living organisms acquire and transform energy in order to perform biological work and metabolic pathways	Students will be able to know or learn the concepts of bioenergetics and metabolic pathways.
Unit-V:- Biosynthesis of: Nucleotides, Protein and Peptidoglycan	To study or learn the concepts of biosynthesis of Nucleotides, Protein and Peptidoglycan	Students will be able know or learn the concepts of biosynthesis

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Name of Department _____Microbiology_____

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem VI		
COURSE NUMBER (PAPER NUMBER) : DSE – 1 – B:PaperMIC - XIII		
TITLE OF COURSE (NAME OF PAPER) : Microbial Genetics		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I: Basic concepts of microbial genetics	To understand the A) Structural organization of <i>Escherichia coli</i> chromosome, folded fiber model B) Replication of DNA: Enzymes and mechanisms of replication C) Transcription: RNA polymerase enzyme, process and post transcriptional modification D) Operon concept – Lac Operon	Students will get knowledge of Structural organization of <i>E. coli</i> chromosome, Replication of DNA: Enzymes involved and mechanisms of replication, Transcription process and post transcriptional modification and Operon concept – Lac Operon
Unit II: Effect of mutation in bacteria	To provide knowledge of Effect of mutation on translation, Effect of mutation on phenotypes, Time course of phenotypic expression, Selection, detection and Isolation of mutants & Genetic Complementation: Cis.Trans Test	Students will understand Effect of mutation on translation, Effect of mutation on phenotypes, Time course of phenotypic expression, detection and Isolation of mutants & Genetic Complementation
Unit III:	-	-
Unit IV : Techniques in molecular biology	To train the students to about Electrophoresis of DNA, DNA sequencing – Sanger Dideoxy method, DNA finger printing-method and applications	Students will be able to understand technique of Electrophoresis of DNA, DNA sequencing , DNA finger printing-method and applications

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Name of Department: - Microbiology

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem VI		
COURSE NUMBER (PAPER NUMBER) : DSE – 2 – B: Paper MIC - XIV		
TITLE OF COURSE (NAME OF PAPER) :- Microbial Biochemistry		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I :- Enzyme, Enzyme kinetics and regulation	To obtain a general knowledge about how enzymes work To study of enzyme kinetics and its regulations in biochemical reactions	Students will be able to know or learn the concepts of enzymes, enzyme kinetics and regulation of enzymes in biochemical reactions
Unit –II: Extraction, purification and assay of enzymes	To study of extraction processes of enzyme and understand the quality of enzyme through purification and assay	Students will be able to know extraction processes, purification and assay of enzymes
Unit III: Assimilation of: Carbon, Nitrogen and Sulphur	To study the metabolic reactions of microorganisms for assimilation of carbon, nitrogen and sulphur	Students will be able to know the concepts of metabolic reactions of microorganisms.
Unit – IV: Bioenergetics	To study how living organisms acquire and transform energy in order to perform biological work and metabolic pathways	Students will be able to know or learn the concepts of bioenergetics and metabolic pathways.
Unit-V:- Biosynthesis of: Nucleotides, Protein and Peptidoglycan	To study or learn the concepts of biosynthesis of Nucleotides, Protein and Peptidoglycan	Students will be able know or learn the concepts of biosynthesis

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Name of Department _____Microbiology_____

B.A. / B.Sc. / M.A. / M.Sc. : B.Sc		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI : Sem V		
COURSE NUMBER (PAPER NUMBER) : XV		
TITLE OF COURSE (NAME OF PAPER) Environmental Microbiology		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I : Air microbiology	To understand the environment , microorganisms in air , its pollution and its control.	Students will know about microorganisms in air , their role and pollution studies.
Unit II: Marine microbiology and Fresh water ecosystem	To aware about study of Water ecosystem To provide an intensive and in depth learning about various Fresh & marine water bodies	Students will apply the theoretical knowledge to study water ecosystem and apply various methods to control pollution
Unit III: Extremophiles	To study various extremophilic organisms , characters and their role	students will get more knowledge about diversity of microflora in the extreme environments.
Unit IV: Environmental impact assessment and Industrial Waste Management	To understand the effects of pollutants from industrial wastes on water bodies to the students.	Students will be able to think about impact of waste water and apply the knowledge in removal of pollution awarded of pollution control
Unit V Geomicrobiology	To study various techniques for extraction of metals and oil recovery from low grade ores oil wells respectively	Students may enriched with knowledge of various aspects environmental microorganisms.

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Name of Department Microbiology

B.A. / B.Sc. / M.A. / M.Sc.: B.Sc.		
NAME OF SUBJECT : Microbiology		
SEM I / II / III / IV / V / VI VI		
COURSE NUMBER (PAPER NUMBER) DSE-3-paper MIC-XVI		
TITLE OF COURSE (NAME OF PAPER) Clinical microbiology-I		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit 1: Clinical bacteriology	To inculcate knowledge in relationship between human disease and bacterial pathogens, their pathogenicity, laboratory diagnosis and treatment methods	Students will acquire knowledge about etiology, epidemiology, pathogenesis, laboratory diagnosis, prophylaxis of bacterial diseases
Unit II: Clinical mycology	To inculcate knowledge in relationship between human disease and fungal pathogens, their pathogenicity, laboratory diagnosis and treatment methods	Students will acquire knowledge about etiology, epidemiology, pathogenesis, laboratory diagnosis, prophylaxis of fungal diseases
Unit III: Clinical parasitology	To inculcate knowledge in relationship between human disease and protozoal pathogens, their pathogenicity, laboratory diagnosis and treatment methods	Students will acquire knowledge about etiology, epidemiology, pathogenesis, laboratory diagnosis, prophylaxis of protozoal diseases
Unit IV: Clinical virology	To inculcate knowledge in relationship between human disease and viral pathogens, their pathogenicity, laboratory diagnosis and treatment methods	Students will acquire knowledge about etiology, epidemiology, pathogenesis, laboratory diagnosis, prophylaxis of viral diseases
Unit V: chemotherapy	To study drugs antibiotics their mechanism of action, drug resistance	Students will gain the knowledge of drugs antibiotics their mechanism of action and drug resistance

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