Credits-03

D.K. GOVT. COLLEGE FOR WOMEN (A), SPSR NELLORE.
CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)
I Semester / MICROBIOLOGY Core Course -1, 2020-21
INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY
Theory syllabus
(Total hours of teaching –60@ 04Hrs /Week)

Learning Outcomes:

On successful completion of this course, the students will be able to:

- Explain origin of microbes on the earth.
- Analyze the differences between prokaryotes and eukaryotes of nature
- Acquire awareness about Importance and applications of microbiology.
- Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- Classify fungi, Actinomycetes, Algae and Mycoplasma based on their structure, reproduction and life cycles.
- Evaluate the Microbial cultures

UNIT-I **No. of hours: 12**

1. History and mile stones in microbiology.
2. Contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky.
3. Importance and applications of microbiology.
4. Classification of microorganisms- Whittaker's five kingdom concept, Bergey's Manual of systematic Bacteriology.

UNIT-II **No. of hours: 12**

1. Ultra structure of Prokaryotic cell- Variant components and invariant components.
2. General characteristics and outline classification of Bacteria, Cyanobacteria, Protozoa and viruses.
3. General characteristics and outline classification Actinomycetes, Mycoplasma. Fungi, Algae
4. Economic importance of algae and fungi. SCP.

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

1. Methods of sterilization:- Physical methods – Dry heat, moist heat, radiation methods,
2. Chemical methods- Alcohol and phenol methods and their application.

3. Microbial cultures:- Concept of pure culture, Methods of pure culture isolation, single cell isolation,
4. Preservation of microbial cultures: overlaying cultures with mineral oils, lyophilization, and cultures storage at low temperature.

UNIT-IV

No. of hours:12

1. Staining Techniques - Simple and Differential staining techniques.
2. Principles of microscopy - Bright field and Electron microscopy (SEM and TEM).
3. Nutritional types of bacteria (Microbiological media)-Natural and synthetic basal, complex, enrichment, selective, differential,
4. Maintenance and transport media.

UNIT-V

No. of hours: 12

1. Microbial growth: Principles of growth, Batch and continuous growth, Synchronous culture, Diauxic growth,
2. Methods of measuring growth: Direct methods: viable plate counts, membrane filtration.
3. Indirect methods: Microscopic counts, electronic counters, most probable number
4. Metabolic activity – measurements of DNA, Protein,

Credits-03

D.K. GOVT. COLLEGE FOR WOMEN (A), SPSR NELLORE.
CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)
II Semester / MICROBIOLOGY Core Course -2, 2020-21
MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY
Theory syllabus
(Total hours of teaching –60@ 04Hrs /Week)

Learning Outcomes:

On successful completion of this course, the students will be able to:

- Explain Classification of Carbohydrates, Lipids and Amino acids
- Analyze Protein sequencing
- Acquire awareness about 1Properties and classification of Enzymes.
- Illustrate diversity in structure, function and their properties of DNA, RNA
- Evaluate the oxidative and substrate level phosphorylation

UNIT-I **No. of hours: 12**

1. Carbohydrates – Classification and function– mono, di, oligo and polysaccharides.
2. Lipids – classification and function – free fatty acids, triglycerides, phospholipids,
3. Aminoacids –classification, structure and function.

UNIT-II **No. of hours: 12**

1. Proteins–Structural levels of proteins– primary, secondary, tertiary and quaternary,
2. denaturation of proteins and Hydrolysis of proteins.
3. Outlines of Protein sequencing using various methods.

UNIT – III **No. of hours: 12**

1. Properties and classification of Enzymes. Coenzymes and Cofactors.
2. Factors affecting catalytic activity.
3. Inhibition of enzyme activity- competitive, non competitive, uncompetitive and allosteric.

UNIT – IV **No. of hours: 12**

1. Nucleic acids–structure, function and their properties of DNA, RNA:-.Chemical structure and base composition of nucleic acids, Chargaff's rules, Watson Crick Model (B-DNA),
2. deviations from Watson-Crick model, other forms of DNA (A- and Z-DNA),
3. Structural characteristics of RNA. Types of RNA.

UNIT – V **No. of hours: 12**

1. Aerobic respiration - Glycolysis, HMP path way, ED path way, TCA cycle, Electron transport, oxidative and substrate level phosphorylation.
2. Anaerobic respiration Fermentation, Biochemical mechanisms of lactic acid, ethanol, butanol and citricacid fermentations. Nitrate and sulphate respiration.
3. Outlines of oxygenic and anoxy genic photosynthesis in bacteria.

D.K. GOVT. COLLEGE FOR WOMEN (A), NELLORE.
CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch
Practical syllabus of Microbiology Core Course –2/ Semester –II, 2020-21
MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY
(Total hours of laboratory exercises 30Hrs. @ 02Hrs./Week)

Course Outcomes:

On successful completion of this practical course, student shall be able to;

- Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears.
- Qualitative Analysis of Carbohydrates
- To learn Estimation of Biochemical reactions
- To learn Demonstration of immobilization of enzyme activity.

Practical syllabus

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. Estimation of sugar by titration method–Benedict's method.
8. Determination of pKa and pI values of amino acids.
9. Assay of amylase activity
10. Effect of temperature / pH on enzyme activity
11. Demonstration of immobilization of enzyme activity.

1. Colorimeter
2. Spectrophotometer
3.

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.

V .S. UNIVERSITY SYLLABUS
w.e.f. 2015-16 (Revised in April, 2016)
II B. Sc - SEMESTER –III: MICROBIOLOGY THEORY, PAPER –III
MBT- 301 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

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

Nucleic acids – DNA and RNA- Structure and organization of prokaryotic DNA.- Extrachromosomal 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

Concept of gene – Concept of gene – Traditional and Muton, Recon and Cistron- Modern - gene one enzyme and one gene one polypeptide hypotheses - Types of RNA and their functions - Genetic code- Structure of ribosomes

UNIT-IV

Types of genes – structural, constitutive, regulatory - Protein synthesis – Transcription and translation - Regulation of gene expression in bacteria – *lac* operon

Restriction endonucleases, DNA polymerases and ligases.

UNIT-V

Basic principles of genetic engineering- Restriction endonucleases, DNA polymerases and ligases - Vectors – PBR 322, PUC 101. Polymerase chain reaction. Genomic and cDNA libraries - Outlines of gene cloning methods - General account on application of genetic engineering in industry, agriculture and medicine

Credits-03

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
II B. Sc - SEMESTER –III: MICROBIOLOGY THEORY SYLLABUS, 2020-21.
Paper-III : MICROBIAL GENETICS AND MOLECULAR BIOLOGY
Total hours of teaching 60hrs @ 4 hrs per week

Learning Outcomes:
On successful completion of this course,the students will be able to:

1. Acquire and know about the Nucleic acids
2. Understand the DNA damage and repair mechanisms
3. Acquire and the importance of Regulation of gene expression in bacteria
4. Understand the Genetic code

UNIT-I **No. of hours: 12**

1. Nucleic acids – DNA
2. Structure and organization of prokaryotic DNA
3. Extrachromosomal genetic elements – Plasmids and transposons.
4. Replication of DNA – Semi conservative mechanism, Enzymes involved in replication.

UNIT-II **No. of hours: 12**

1. Mutations - spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions.
2. Mutagens - Physical and Chemical mutagens.
3. Outlines of DNA damage and repair mechanisms.
4. Genetic recombination in bacteria-Conjugation, Transformation and Transduction.

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

1. Concept of gene – Traditional and Modern - Muton, Recon and Cistron. One gene one
2. enzyme and one gene polypeptide hypotheses.
3. Types of RNA and their functions.
4. Genetic code. Structure of ribosomes.

UNIT-IV **No. of hours: 12**

1. Types of genes – structural, constitutive, regulatory.
2. Protein synthesis – Transcription and translation.
3. Regulation of gene expression in bacteria – lac operon.

No. of hours: 12

UNIT-V

1. Basic principles of genetic engineering.
2. Restriction endonucleases, DNA polymerases and ligases.
3. Vectors – PBR 322, PUC 101. Polymerase chain reaction.Genomic and cDNA libraries.
4. Outlines of gene cloning methods.
5. General account on application of genetic engineering in industry, agriculture and medicine.

V .S. UNIVERSITY SYLLABUS
w.e.f. 2015-16 (Revised in April, 2016)
II B. Sc - SEMESTER –IV: MICROBIOLOGY THEORY, PAPER –IV
IMMUNOLOGY AND MEDICAL MICROBIOLOGY

UNIT-I

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. - B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

UNIT-II

Antigens – types, chemical nature, antigenic determinants, haptens. Factors affecting antigenicity. immunoglobulin – 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 Immunofluroscence. Polyclonal and monoclonal antibodies – production and applications – MBA concept of hypersensitivity and Autoimmunity.

UNIT-III

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 laborat ory diagnosis - cultural, biochemical, serological and molecular methods

No. of hours: 8

UNIT-IV

Antibacterial Agents- Penicillin, Streptomycin and Tetracycline- Antifungal agents – Amphotericin B, Griseofulvin- Antiviral substances - Amantadine and Acyclovir- Tests for antimicrobial susceptibility- Brief account on antibiotic resistance in bacteria - Methicillin-resistant Staphylococcus aureus (MRSA)-Vaccines – Natural and recombinant.

UNIT-V

General account of microbial diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention and treatment - Bacterial diseases – Tuberculosis and Typhoid - Fungal diseases – Candidiasis- Protozoal diseases – Malaria-Viral Diseases - Hepatitis- B and AIDS

Credits-03

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
II B. Sc - SEMESTER –IV: MICROBIOLOGY THEORY SYLLABUS, 2020-21.
Paper-IV : IMMUNOLOGY AND MEDICAL MICROBIOLOGY
Total hours of teaching 60hrs @ 4 hrs per week

Learning Outcomes:

On successful completion of this course the students will be able to:

1. Acquire and know about the immunity
2. Understand the antigen-antibody reactions
3. Acquire and the importance of General methods of laboratory diagnosis
4. Understand the Vaccines

No. of hours: 12

UNIT-I

1. Types of immunity – innate and acquired; active and passive; humoral and cell-mediated immunity.
2. Primary and secondary organs of immune system – thymus, bursa fabricus, bone marrow, spleen and lymph nodes.
3. Cells of immune system. - B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

No. of hours: 12

UNIT-II

1. Antigens – types, chemical nature, antigenic determinants. Factors affecting antigenicity.
2. Immunoglobulin – basic structure, types, properties and functions of immunoglobulins.
3. Types of antigen-antibody reactions - Agglutinations, Precipitation, Neutralization, complement fixation.
4. Labeled antibody based techniques – ELISA, RIA and Immunofluroscence.
5. Polyclonal and monoclonal antibodies – production and applications – MBA, Concept of hypersensitivity and Autoimmunity.

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

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

UNIT-IV

No. of hours: 12

1. Antibacterial Agents- Penicillin,Rifamycin and Tetracycline.
2. Antifungal agents – Amphotericin B, Griseofulvin
3. Antiviral substances-Amantadine and Acyclovir, Tests for antimicrobial susceptibility.
4. Brief account on antibiotic resistance in bacteria - Methicillin-resistant Staphylococcus aureus (MRSA), MD Tuberculosis.
5. Vaccines – Natural and recombinant.

UNIT-V

No. of hours: 12

1. General account of microbial diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention and treatment
2. Bacterial diseases – Tuberculosis and Typhoid
3. Fungal diseases – Candidiasis.
4. Protozoal diseases – Malaria.
5. Viral diseases - Hepatitis- B and AIDS, H1N1, Ebola.

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
II B. Sc MICROBIOLOGY SEMESTRE- IV, 2020-21
Paper–IV: PRACTICAL SYLLABUS
PAPER-IV: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

Total hours of laboratory Exercises 30 hrs @ 2 per week

1. Identification of human blood groups.
2. Separation of serum from the blood sample (demonstration).
3. Estimation of blood haemoglobin in sahli method
4. Total RBC Count of the given blood sample using haemocytometer.
5. Differential Leukocyte Count of the given blood sample.
6. Immunodiffusion by Ouchterlony double diffusion 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. Identifiation of diseases bosed on the symtoms.
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.

SUGGESTED TEST BOOKS.

1. Immunology by Nandinishetty .
2. Text book of Microbiology by R Anantanarayana.

SUGGESTED READING

Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.

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

V .S. UNIVERSITY SYLLABUS
w.e.f. 2015-16 (Revised in April, 2016)
III B. Sc - SEMESTER –V: MICROBIOLOGY THEORY, PAPER –V
MBT- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

UNIT – I

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

Extreme Habitats : Extremophiles : Microbes thriving at high & low temperatures , PH, high hydrostatic & osmotic pressures , salinity,& low nutrient levels.

UNIT –II

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 , antagonism , competition, parasitism, predation.

UNIT – III

Outlines of solid waste management : Sources and types of solid wastw , Methods of solid waste disposal (composting and 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

Plant Growth Promoting Microorganisms- Mycorhizae, Rhizobia, Azospiritham. Azotobacter Frankia, phosphate – solubilizers and Cynobacteria.

Outlines of biologicl nitrogen fixation (symbiotic, non-symbiotic).

UNIT-V

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.

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
III B. Sc - SEMESTER –V: MICROBIOLOGY THEORY SYLLABUS, 2020-21.
Paper-V : ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY
Total hours of teaching 60hrs @ 4 hrs per week

Learning Outcomes:
On successful completion of this course the students will be able to:

1. Acquire and know about the Microflora
2. Understand the Microbial interaction
3. Acquire and the importance of Liquid waste management
4. Understand the plant disease control

UNIT-I **No. of hours:12**

1. Terrestrial Environment: Soil profile and soil Microflora
2. Aquatic Environment : Microflora of fresh water and marine habitats
3. Atmosphere: Aeromicroflora and dispersal of microbes
4. Extreme Habitats, Extremophiles: temperature,pH,Pressures Salinity.

UNIT- II **No. of hours:12**

1. Role of Microorganism in nutrient cycling(Carbon,nitrogen,phosphorus).
2. Treatment and safety of drinking (potable) water, methods to detect portability of water samples:(a)Standard qualitative procedure: presumptive test /MPN test, confirmed test and Completed tests for feacal coliforms (b) Membrane filter techniques,
3. Microbial interaction: Mutualism, commensalism, antagonism, competition, parasitism, predation.

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

1. Outline of Solid waste management: Sources and types of Solid waste,Methods of solid waste disposal(composting and sanitary landfills)
2. Liquid waste management: composition and strength of Sewage(BOD and COD), primary ,secondary,(oxidation ponds, trickling filters, activated sludge process and septic tank)and tertiary sewage treatment

UNIT- IV **No.of hours:12**

1. Plant Growth Promoting Microorganism-Mycorrhizae,Rhizobia,Azospirillum Azotobacter,Frankia.
2. Phasphate-solubilizers and cyanobacteria.
3. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic)
4. Biofertilisers- Rhizobium

UNIT- V

No. of hours:12

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

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
III B. Sc MICROBIOLOGY SEMESTRE- V, 2020-21
Paper–V: PRACTICAL SYLLABUS
ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

Total hours of laboratory Exercises 30 hrs @ 2 per week

1. Analysis of soil – PH, Moisture content and water holding capacity.
2. Isolation of microbes (bacteria and fungi) from soil.
3. Study of air flora by petriplate exposure method.
4. Analysis of potable water: SPC, Presumptive, confirmed and completed test, determination of coli form count in water by MPN.
5. Determination of Biological Oxygen Demand (BOD) of waste samples.
6. Isolation of Rhizobium from root nodules.
7. Staining and observation of vesicular Mycorrhizal (VAM) fungi.
8. Observation 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 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 Microbilogy : 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 & Hobbie 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.

Okafor, N (2011) Environmental Microbilogy of Aquatic & Waste systems.1st edition, Springer, New York.

Singh A, Kuhad, RC & Ward OP (2009) Advances in Applied Bioremediation. Volume 17,Springer verlag, Berlin Hedeilberg

Stolp H (1988).Microbial Ecology : Organisms Habitats Activities.Cambridge University Press,Cambridge, England.

Subba Rao NS (1999) Soil Microbiology 4th edition ,Oxford & IBH Publishing Co.New Delhi.

Willey JM, Sherwood LM, and Woolverton CJ (2013) Prescott's Microbiology . 9th edition .McGraw Hill Higher Edition.

V .S. UNIVERSITY SYLLABUS
w.e.f. 2015-16 (Revised in April, 2016)
III B. Sc - SEMESTER –V: MICROBIOLOGY THEORY, PAPER –VI
FOOD AND INSUSTRIAL MICROBIOLOGY

UNIT-I

Intrinsic and extrinsic parameters that affect microbial growth in food

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

Principles of 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

Microorganisms of industrial importance – yeasts, moulds, bacteria, actinomycetes- Isolation and Screening of industrially – important microorganisms.

UNIT-IV

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

Ingredients of Fermentation media- Downstream processing-filtration, centrifugation, cell disruption, solvent extraction.

UNIT-V

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

GOVT COLLEGE FOR WOMEN (A), NELLORE.
III B. Sc - SEMESTER –V: MICROBIOLOGY THEORY SYLLABUS, 2020-21.
Paper-VI : FOOD AND INDUSTRIAL MICROBIOLOGY
Total hours of teaching 60hrs @ 4 hrs per week

Learning Outcomes:
On successful completion of this course,the students will be able to:

1. Acquire and know about the Food infection
2. Understand the Microbes as food
3. Acquire and the importance of Microbial production of industrial products
4. Understand the industrially-important microorganisms.

UNIT-I

No. of hours: 12

Intrinsic and extrinsic parameters that effects microbial growth in food

Microbial spoilage of food-fruits, vegetables, milk, meat and canned foods

Food infection(salmonellosis) and Food intoxication (Botulism)

UNIT-II

No.of hours:12

Principles of food preservation-physical and chemical methods.

Fermented and dairy foods-cheese and yogurt.

Microbes as food-SCP, edible mushrooms (white button, oyster and paddy starw). probiotics and their benefits.

UNIT-III

No.of hours :12

Microorganisms of industrial importance-yeasts, (Saccharomyces cerevisiae)

Moulds, (Aspergillus niger) Bacteria(E.coli), actinomycets(streptomyces griseus).

Isolation and screening and Outline of strain improvement of industrially-important microorganisms.

UNIT-IV

No.of hours : 12

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

Basic concepts of Design of fermentor.

Ingredients of fermentation media

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

Credits-03

D. K. GOVT COLLEGE FOR WOMEN (A), NELLORE.
III B. Sc - SEMESTER –V: MICROBIOLOGY THEORY SYLLABUS, 2020-21.
Paper-VI : FOOD AND INDUSTRIAL MICROBIOLOGY
Total hours of teaching 60hrs @ 4 hrs per week

Learning Outcomes:
On successful completion of this course,the students will be able to:

1. Acquire and know about the Food infection
2. Understand the Microbes as food
3. Acquire and the importance of Microbial production of industrial products
4. Understand the industrially-important microorganisms.

UNIT-I **No. of hours: 12**

Intrinsic and extrinsic parameters that effects microbial growth in food

Microbial spoilage of food-fruits, vegetables, milk, meat and canned foods

Food infection(salmonellosis) and Food intoxication (Botulism)

UNIT-II **No.of hours:12**

Principles of food preservation-physical and chemical methods.

Fermented and dairy foods-cheese and yogurt.

Microbes as food-SCP, edible mushrooms (white button, oyster and paddy starw). probiotics and their benefits.

UNIT-III

No.of hours :12

Microorganisms of industrial importance-yeasts, (Saccharomyces cerevisiae)

Moulds, (Aspergillus niger) Bacteria(E.coli), actinomycets(streptomyces griseus).

Isolation and screening and Outline of strain improvement of industrially-important microorganisms.

UNIT-IV

No.of hours : 12

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

Basic concepts of Design of fermentor.

Ingredients of fermentation media

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

V .S. UNIVERSITY SYLLABUS
w.e.f. 2015-16 (Revised in April, 2016)
III B. Sc - SEMESTER –VI: MICROBIOLOGY THEORY, PAPER –VII C
INSTRUMENTATION AND BIOTECHNIUUES
TOTAL HOURS: 36 **CREDITS: 3**

UNIT-1 **No. of Hours: 12**

Bright field and dark field microbiology. Fluorescence Microscopy, Phase contrast Microscopy, Confocal Microscopy and Micrometry.

UNIT-II **No. of Hours: 12**

Principles and applications of paper chromatography (including Descending and 2-D), Column packing and fraction collection. Gel Filtration chromatography, ion- exchange chromatography. GLC and HPLC.

UNIT-III **No. of Hours: 12**

Principle and applications of native polyacrylamide gel electrophoresis, SDS-polyacrylamide gel electrophoresis, 2D gel electrophoresis and Isoelectric focusing.

UNIT-IV **No. of Hours: 12**

Principle and applications of study of absorption spectra of bimolecular, Analysis of bimolecular using UV and visible range. Turbidometry.

UNIT-V **No. of Hours:12**

Preparative and analytical centrifugation, fixed angle and swinging bucket rotors, RCF and sedimentation coefficient, differential centrifugation, density, gradient centrifugation and ultracentrifugation..

Credits-03

D. K. GOVT. COLLEGE FOR WOMEN (A), NELLORE.
III B. Sc - SEMESTER –VI: MICROBIOLOGY ELECTIVE THEORY SYLLABUS, 2020-21.
Paper-VII C : INSTUMENTATION AND BIOTECHNIQUES
Total hours of teaching 60hrs @ 4 hrs per week

Learning Outcomes:
On successful completion of this course,the students will be able to:

1. Acquire and know about the different types of microscopes
2. Understand the HPLC mechanisms
3. Understand the Principle of centrifugation

UNIT –I **No. of Hours :12**

Bright field and dark field Microscopy,Fluorescence Microscopy,UV Microscopy,

Phase contrast Microscopy, and Micrometry

UNIT –II **No. of Hours :12**

Principles and applications of Paper chromatography column packing and fraction collection. Concept of Gel filtration chromatography, ion-exchange chromatography.GLC and HPLC.

UNIT –III **No. of Hours :12**

Principles and applications of native polyacrylamide gel electrophoresis,SDS- polyacrylamide gel electrophoresis,2D gel electrophoresis and isoelectronic focusing.

UNIT –IV **No. of Hours :12**

Principles and applications of study of absorption and Emission Spectra of biomolecules.

Analysis of biomolecular using UV – Vis spectrophotometry, Centrifugation. Turbidometry.

UNIT –V **No. of Hours :12**

Principle of centrifugation, RCF and sedimentation coefficient, fixed angle and swinging bucket rotors. Preparative and analytical centrifugation, density gradient centrifugation and ultracentrifugation.

Credits-03

D.K.GOVT.COLLEGE FOR WOMEN (A) .NELLORE.
III B. Sc - MICROBIOLOGY SYLLABUS, SEMESTER- VI, 2020-21.
CLUSTER ELECTIVE, Paper VIII-1 A
DIAGNOSTIC MICROBIOLOGY
Total hours of teaching 60hrs @ 3hrs per week

UNIT-I **No. of Hours: 12**

Causative agent and symptoms of bacterial, viral, fungal and protozoan diseases of various human body systems: nervous (meningitis, encephalitis, cryptococcosis, trypanosomiasis) respiratory (tuberculosis,
influenza, histoplasmosis, toxoplasmosis), gastrointestinal (typhoid. Hepatitis, candidiasis, amoebiasis),
urogential systems (Nongonococcal urethritis, genital herpes, candidiasis Trichomoniasis). Disease associated
clinical samples for diagnosis.

UNIT-II **No .of Hours: 12**

Collection of clinical samples (oral cavity, throat, skin, blood, CSF, urine and faeces) and precautions required.

Method of transport of clinical samples to laboratory and storage.

UNIT-III **No of Hours: 12**

Examination of sample by staining-Gram stain. Ziehl-Neelson Staining for tuberculosis, Giemsa-stained thin blood film for malaria.

Preparation and use of culture media- Blood agar, Chocolate agar, Lowenstein-Jensen medium, Mac Conkey agar. Distinct colony properties of various bacterial Pathogens.

UNIT-IV **No. of Hours:126**

Diagnosis of Typhoid, Dengue, HIV and Swine flu using Serological Methods- Agglutination, ELISA,

Immunofluroscence, Nucleic acid based methods- PCR, Nucleic acid probes.

UNIT- V **No. of Hours:12**

Importance of determination of sensitivity/resistance of bacteria using disc diffusion method, Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method.

. Collection, transport and processing of clinical specimens (Blood, Urine, Stool and putum). Receipts,

abeling, recording and dispatching clinical specimens.

. Isolation of bacteria in pure culture and Antibiotic sensitivity.

. Identification of common bacteria (Staphylococcus, Streptococcus, E. coli by studying heir

morphology, cultural characters, Biochemical reactions, agglutination and other tests.

4. Maintenance and preservation of stock culture.

SUGGESTED READINGS

1. Ananthanarayan R and Paniker CKJ (2009) Text book of Microbiology, 8 th edition. Universities Press

Private Limited.

2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner. T.A. (2013) Jawetz. Melnick and

Adelberg's Medical Microbiology 26 th edition Mc Graw Hill Publication.

3. Collee JG, Fraser, AG, Marmion BP Simmons A (2007)Mackie and McCartney Practical Medical

Microbiology, 14 th edition, Elsevier.vc

4. Randhawa, VS, Mehta G and Sharma KB (2009) Practicals and Viva in Medical Microbiology 2 nd edition,

Elsevier India Pvt Ltd.

5. Title P (2013) Bailey's and Scott's Diagnostic Microbiology..13 th edition ,, Mosby

D.K.GOVT.COLLEGE FOR WOMEN (A) .NELLORE.
III B. Sc – MICROBIOLOGY PRACTICAL SYLLABUS,
SEMESTER- VI, 2020-21.
Paper – VIII-1 A,
DIAGNOSTIC MICROBIOLOGY

Total hours of teaching 30hrs @ 2hrs per week

1. Collection, transport and processing of clinical specimens (Blood, Urine, Stool and Sputum). Receipts,

Labeling, recording and dispatching clinical specimens.

2. Isolation of bacteria in pure culture and Antibiotic sensitivity.

3. Identification of common bacteria (Staphylococcus, Streptococcus, E. coli by studying their

morphology, cultural characters, Biochemical reactions, agglutination and other tests.

4. Maintenance and preservation of stock culture.

SUGGESTED READINGS

1. Ananthanarayan R and Paniker CKJ (2009) Text book of Microbiology, 8 th edition. Universities Press

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Credits-03

D.K.GOVT.COLLEGE FOR WOMEN (A) .NELLORE.
III B. Sc - MICROBIOLOGY SYLLABUS SEMESTER- VI, 2020-21.
Paper VIII, CLUSTER ELECTIVE, Paper VIII-1 B
MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

Total hours of teaching 60hrs @ 3hrs per week

UNIT-I **No. of Hours:12**

Good laboratory practices- Good morphological 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:12**

Culture and microscopic methods – Standard plate count, most probable numbers, direct microscopic counts, Biochemical and immunological methods: Litmus lysate test for endotoxin, gel diffusion, sterility testing for pharmaceutical products

UNIT-III **No .of Hours:12**

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

UNIT-IV **No. of Hours:12**

Enrichment culture techniques for detection of specific microorganisms – on XLD agar, Salmonella Shigella agar, Mannitol salt agar, EMB agar, Mac Conkey agar, Saboraud agar. Ascertaining microbial quality of milk by MBRT. Rapid detection methods of microbiological quality of milk at milk collection centers (COB, 10min reassuring assay).

UNIT-V **No. of hours:12**

Hazard analysis of critical point (HACCP)- principles, flow diagrams, limitations. Microbial standards for different foods and water-BIS standards for common foods and drinking water. QC&QA, warehousing, sample testing in pharma industry.

D.K.GOVT.COLLEGE FOR WOMEN (A) .NELLORE.
III B. Sc – MICROBIOLOGY PRACTICAL SYLLABUS,
SEMESTER- VI, 2020-21.
Paper – VIII-1 B,
MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

Total hours of teaching 30hrs @ 2hrs per week

1. Microbilogical 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 pharmaceutical products n- antibiotics, vaccines & fluids
7. Standard qualitative analysis of water – membrane filter method
8. Analysis of food samples for mycotoxins.

SUGGESTED READING

1. Baird RM, Hodges NA and denyer SP (2005) Handbook of Microbiological Quality Control in Pharmaceutical and Medical Devices, Taylor and Francis Inc.
2. Garg N, Garg KL and Mukerji KG (2010) Laboratory Manual of Food Microbiology I K International Publishing House Pvt. Ltd.
3. Harrigan WF (1998) Laboratory Methods in Food Microbiology 3rd edition. Academic Press.
4. Pharmaceutical Microbiology- Purohit.
5. Pharmaceutical Microbiology-W.B. Hugo.

Credits-03

D.K.GOVT.COLLEGE FOR WOMEN (A) .NELLORE.
III B. Sc - MICROBIOLOGY SYLLABUS SEMESTER- VI, 2020-21.
Paper VIII, CLUSTER ELECTIVE,
Paper VIII-1 C : BIOINFORMATICS
Total hours of teaching 60hrs @ 3hrs per week

UNIT-I **No. of Hours: 12**

RDBMS-Definition of relational database

Mode of data transfer (FTP, SFTP, SCP), advantage of encrypted data transfer

UNIT-II **No .of Hours: 12**

Bioinformatics- Its Definitions, Introduction, History. Bioinformatics- Objectives, Applications, Its need, Scope, Careers. Bioinformatics scenario in India & the rest of the world. Sequences used in Bioinformatics-DNA, protein, RNA. Dawn of sequencing. Brief understanding of DNA, Protein, and RNA molecules.

UNIT-III **No .of Hours:12**

Local and Global Sequence alignment, pair wise and multiple sequence alignment. Scoring alignment, scoring matrices. Types of phylogenetic trees, Different approaches of phylogenetic tree construction- UPGMA, Neighbor joining, Maximum Parsomony, Maximum likelihood.

UNIT-IV **No .of Hours:12**

Local and Global Sequence alignment, pair wise and multiple sequence alignment. Scoring alignment, scoring matrices. Types of phylogenetic trees, Different approaches of phylogenetic tree construction- UPGMA, Neighbor joining, Maximum Parsomony, Maximum likelihood.

UNIT-V **No .of Hours:12**

Diversity of Genomes: Viral, Prokaryotic & eukaryotic genomes Genome, transcriptome, proteome, 2-D Gel electrophoresis, Maldi Toff spectroscopy Major features of completed genomes: F.Coli, S.Cerevisiae , Human Hierarchy of protein structure – primary, secondary and tertiary structures , modeling Structural Classes, Motifs, Folds andDomains.
Protein structure prediction in presence and absence of structure template.

D.K.GOVT.COLLEGE FOR WOMEN (A) .NELLORE.
III B. Sc – MICROBIOLOGY PRACTICAL SYLLABUS,
SEMESTER- VI, 2020-21.
Paper – VIII-1 C, BIOINFORMATICS

Total hours of teaching 30hrs @ 2hrs per week

1. Introduction to different operating systems-UNIX, LINUX, and Windows.
2. Introduction to bioinformatics databases (any three): NCBJ.
3. Sequence retrieval using BLAST.
4. Sequence alignment & phylogenetic analysis using clustal W & phylip.
5. Picking out a given gene from genomes using Gensacnor other softwares (promoter region identification, repeat in genome, ORf prediction). Gene finding tools (Glimmer, GENSCAN), Primer designing, Genscan/Genetool.
6. Protein structure prediction: primary structure analysis, secondary structure prediction using psi-pred, homology modeling using Swiss model.
7. Prediction of different features of a functional gene

SUGGESTED READINGS

1. Andreas (2004) Bioinformatics- A practical guide to the analysis of genes & protein 2nd ED Baxevanis and Francis Ouellette.
2. Christian Crumlish The internet (1999). BPB Publications.
3. K. Mani & N. Vijayaraj Bioinformatics for the beginners
4. Lesk M.A.(2008) Introduction to Bioinformatics Oxford publication,3rd International Student Edition
5. Pennington & Dunn (2002) proteomics; Viva book publishers, New Delhi.
6. Preeti (2007) Foundations of Computing, 4th edition. BPB Publications.