PROPOSED SYLLABUS (2019-20) for B.Sc Microbiology

Code: BS 104, DSC

B.Sc I year: I Semester Paper-I Theory

Paper Title: Introductory Microbiology **4HPW-credits: 4**

1st Credit: Introduction

Microbiology: Definition and scope. History of microbiology: Contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanoswky, Beijernik, Winogradsky and Alexander Fleming.

Microbiological Techniques: Sterilization and Disinfection - Physical methods (dry and moist heat), filtration, radiation. Chemical methods (alcohols, phenols, aldehydes, fumigants)

2nd Credit: Microscopy and Staining methods

Principles and applications of Microscopy-Bright field, Dark field, Phase-contrast, Fluorescent and Electron microscopy (SEM and TEM). Ocular and stage micrometry.

Principles and types of stains-Simple stain, Differential stain, Negative stain.

Structural stain: spore, capsule, flagella

3rd Credit: Classification, Isolation and Identification of Microorganisms

Classification of living organisms; Haeckel, Whittaker and Carl Woese systems. Differentiation of prokaryotes and eukaryotes. Classification and identification of bacteria as per the second edition of Bergey's manual of systematic bacteriology. Classification of protozoa, microalgae and fungi.

Growth media – synthetic, semi- synthetic, selective, enrichment and differential media. Isolation of Pure culture techniques - Enrichment culturing, Dilution plating, streak plate, spread plate, Micromanipulator. Preservation of Microbial cultures – Sub culturing, overlaying cultures with minerals oils, sand cultures, lyophilization, storage at low temperature.

4th Credit: Structure and General Characteristics of Microorganisms

General characteristics of prokaryotes: Bacteria, Archaea bacteria. Rickettsia, Mycoplasma, Cyanobacteria and Actinomycetes. Ultra structure of bacterial cell: cell wall, cell membrane, ribosomes, nucleoid, capsule, flagella, fimbriae, endospores & storage granules.

General characteristics of eukaryotes: protozoa, microalgae and fungi.

General characteristics and classification of virus. Morphology and structure of lambda bacteriophage (lytic and lysogeny), TMV and HIV.

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harly, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker,j. Broch Biology of Microorganism, 9th Edition, MacMillan Press, England.
4. Dube, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.

I-Semester Practical Paper-I

Introductory Microbiology 2HPW-Credits-1

5th Credit: Practicals

1. Compound microscope and its handling.
2. Sterilization techniques: Autoclave, Hot air oven and filtration
3. Calibration of microscope by ocular , stage micrometer and measurement of bacterial and fungal spores.
4. Simple and differential staining (Gram staining), Spore staining, capsule staining and flagellar staining.
5. Microscopic observation of bacteria (Gram positive bacilli and cocci, Gram negative bacilli), cyanobacteria (Nostoc, Spirulina), fungi (Saccharomyces, Rhizopus, Aspergillus, Penicillium)
6. Bacterial motility: hanging drop method
7. Preparation of culture media: Solid/Liquid.
8. Isolation of bacteria by serial dilution and pure cultures methods (streak, spread and pour plate techniques)
9. Preservation of microbial cultures- Slant, Stab, mineral oil overlay and glycerol stocks
10. Bacterial biochemical identification-IMViC test, carbohydrate fermentation test

References:

1. Experiments in Microbiology by K.R. Aneja.
2. Gopal Reddy.M., Reddy. M.N., Sai Gopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
3. Dubey, R.C. and Maheshwari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.

B.Sc I year: II Semester Paper-II Theory

Code: BS 204, DSC

Title: Microbial Physiology and Biochemistry **4HPW-credits-4**

1st Credit: Microbial nutrition and growth

Microbial Nutrition, Uptake of nutrients by cell. Nutritional groups of microorganisms – Autotrophs, Heterotrophs, Mixotrophs, Methylotrophs. Photosynthetic apparatus in prokaryotes.

Bacterial growth – Different phases of growth, factors influencing bacterial growth. Synchronous, Continuous, Biphasic Growth. Methods for measuring microbial growth – Direct Microscopic, Viable count, Turbidometry.

2nd Credit: Microbial metabolism

Bacterial photosynthesis: Outline of oxygenic and anoxygenic photosynthesis in bacteria. Microbial respiration – Aerobic: Glycolysis, HMP Pathway, ED Pathway , TCA Cycle and Anaplerotic reactions, Electron transport, Oxidative and Substrate level phosphorylation. Glyoxylate cycle, Anaerobic respiration (Nitrate and Sulphate).

3rd Credit: Biomolecules

Classification and characteristics of carbohydrates (Monosaccharides, disaccharides and polysaccharides). General characteristics of amino acids and proteins, fatty acids (saturated and unsaturated) and lipids (sphingo lipids, sterols and phospholipids). Structure of nitrogenous bases, nucleotides and nucleic acids.

Properties and Classification of enzymes. Biocatalysis – Induced fit and Lock & Key Model, Coenzymes, Co-factors. Factors effecting enzyme activity.

4th Credit: Biochemical techniques

Hydrogen ion concentration in biological fluids. pH measurement. Types of buffers and their uses in biological reactions. Principles and application of colorimetry and chromatography (paper and thin layer). Principles and applications of Electrophoretic techniques- Agarose gel electrophoresis and SDS PAGE

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harly, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker,j. Broch Biology of Microorganism, 9th Edition, MacMillan Press, England.
4. Dube, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.
5. Voet, D Biochemistry WCB. Mc GrawHill, Iowa.

6. N.J. Dimmock, A.J Easton, and K.N. Leppard. Introduction to Modern Virology. Blackwell Publishing.

II-Semester Practical Paper – II

Microbial Physiology and Biochemistry 2 HPW- CREDITS-1

5th Credit: Practicals

1. Setting up of Winogradsky's column
2. Cultivation of photosynthetic bacteria
3. Determination of viable count of bacteria
4. Turbidometric measurement of bacterial growth curve
5. Factors affecting bacterial growth – pH, temperature, salts
6. Qualitative tests for carbohydrates and amino acids
7. Determination of pH
8. Preparation of Buffers
9. Colorimetry - Principles, laws, determination of absorption maxima
10. Paper chromatography-separation of sugars/amino acids

References:

1. Experiments in Microbiology by K.R. Aneja.
2. Gopal Reddy.M., Reddy. M.N., Sai Gopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
3. Dubey, R.C. and Maheshwari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.
5. Mahy, B.W.J. and Kangro, H.O. Virology – Methods Manual Academic Press, USA.
6. Burleson et al Virology – A Laboratory Manual. Academic Press, USA.

Telangana State Council of Higher Education, Govt.of Telangana

PRAPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B.Sc. MICROBIOLOGY (2016-17)

FIRST YEAR - **SEMISTER-1**				
Code	Course Title	Course Type	HPW	Credits
BS101	Communication			
BS102	English			
BS103	Second Language			
BS104	**General Microbiology**	DSC-1A	4+2	5
BS105	Optional-II			
BS106	Optional-III			
SEMISTER-2				
BS201	Environmental studies			
BS202	English			
BS203	Second Language			
BS204	**General Microbiology-II**	DSC-1B	4+2	5
BS205	Optional-II			
BS206	Optional-III			
SECOND YEAR-SEMISTER-3				
BS301	A/B **HAEMATOLOGY**	SEC-1	2	2
BS302	English			
BS303	Second Language			
BS304	**Microbial Physiology and Enzymology**	DSC-1C	4+2	5
BS305	Optional-II			
BS306	Optional-III			
SEMISTER-4				
BS401	C/D-**FOOD ADULTERATION**	SEC-2	2	2
BS402	English			
BS403	Second Language			
BS404	**Microbial Genetics and Molecular biology**	DSC-1D	4+2	5
BS405	Optional-II			
BS406	Optional-III			
THERD YEAR-SEMISTER-5				
BS501	**Mushroom cultivation**	SEC-3	2	2
BS502	**Microbiology and Human health**	GE-1	2	2
BS503	***APPLIED MICROBIOLOGY***	DSC-1E	3+2	4
BS504	Optional-II			
BS505	Optional-III			
BS506	**A-IMMUNOLOGY**	DSE-1E	3+2	4

	B- PHARMACEUTICAL MICROBIOLOGY			
BS507	Optional-II-A/B/C			
BS508	Optional-III-A/B/C			
SEMISTER-6				
BS601	G/H **HOSPITAL WAST MANAGEMENT**	SEC-4	2	2
BS602	**CONTAGIOUS DISEASES AND IMMUNISATION**	GE-2	2	2
BS603	**MEDICAL MICROBIOLOGY**	DSC-1F	3+2	4
BS604	Optional-II			
BS605	Optional-III			
BS606	**A-FOOD MICROBIOLOGY B- INDUSTRIAL MICROBIOLOGY**	DSE-1F	3+2	4
	Optional-II-A/B/C			
	Optional-III-A/B/C			
				164

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 104, DSC- 1A**

B.Sc I year: 1st semester

Title: General Microbiology-I **4HPW -credits-4**

UNIT-1: HISTROY OF MICROBIOLOGY

Meaning, definition and scope. History of microbiology: Contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert, koch, lwanoswky, Beijernik, Winogradsky and Alexander Fleming. Importance and application of Microbiology.

UNIT-2: MICROSCOPY

Principles of Microscopy-Bright field, Dark field, Phase-contrast, Fluorescent and Electron microscopy (SEM and TEM). Ocular and stage micrometry. Size determination of microorganisms. Principles and types of stains-simple stain, differential stain, negative stain. Structural stain-spore, capsule, flagella. Bacterial motility-Hanging drop method.

Unit-3; BIOLOGY OF MICROORGANISMS

Classification of living organisms; Heckel, Whittaker and carlwoese systems. Place of microorganisms in the living world. Differentiation of prokaryotes and eukaryotes. Prokaryotes—General characteristics of bacteria, Archea bacteria. Rickettiasis, Mycoplasma,cyanobacteria and Actinomycets. Classification of bacteria as per the second edition of bergyes manual of systematic bacteriology

UNIT-4 STRACTURE OF MICROORGANISMS

Ultra structure of bacteria cell; invariant components-cellwall ,cellmembarane, Ribosomes ,nucleiod. Variant components-Capsule,flagella,fimbriae,endospores& storage granules. Gemneral characteristuics and classification of virus. Morphology and structure of TMV and HIV. Structure and multiplication of lambda bacteriophage. Eukaryotes- General characteristics and classification. Eukaryotic microorganism-protozoa,microalgae,molds and yeast.

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harly, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker,j. Broch Biology of Microorganism, 9th Edition, MacMillan Press, England.
4. Dube, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.

Dept. Microbiology: Osmania University

CHOICE BASED CREDIT SYSTEM-2016-17(CBCS)

B.Sc I year –I-semester Practical Syllabus

General Microbiology-I

2HPW-Credits-1

- Light compound microscope and its handling.
- Calibration of microscopic measurements(ocular, stage micrometer)
- Measuring dimensions of microorganisms (Bacteria and fungal spores)
- Simple and differential staining (Gram stating), Spore stating, capsule staining and negative statining.
- Microscopic observation of bacteria (Gram positive bacilli and cocci:Gram negative bacilli),cyanobacteria (nostoc,spirulina).
- Microscopic observation of algae
- Microscopic observation of fungi (sacharomyces, Rhizopus, Aspergillus, Pencillium, Fusarium)
- Electron Microscopic pictures of TMV and HIV

References:

1. Experiments in Microbiology by K.R. Aneja.
2. Gopal Reddy.M., Reddy. M.N., Sai Gopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
3. Dubey, R.C. and Maheshwari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 204, DSC-1B**

B.Sc I year: 2nd semester

Title: General Microbiology-II **4HPW-creditd-4**

UNIT-1-MICROBIOLOGICAL TECHNIQUES

Sterilization and disinfection techniques. Principles and methods of sterilization. Physical methods-Autoclave, Hot air oven, pressure cooker, Laminar air flow, Filter sterilization. Radiation methods-U.V rays, Gamma rays, Ultrasonic methods. Chemical methods-use of Alcohols, Aldehydes, Fumigants, Phenol, Halogens and Hypochlorides, Phenol coefficient.

UNIT-2-PURE CULTURE TECHNIQUES

Isolation of Pure cultural techniques- Enrichment culturing, Dilution plating, streak plate, spread plate, Micromanipulator. Preservation of Microbial cultures – Sub culturing, overlaying cultures with minerals oils, lyophilization, sand cultures, storage at low temperature

UNIT-3 BIOMOLECULES

Outline classification and general characteristics of carbohydrate (Monosaccharides, disaccharides and polysaccharides). General characteristics of Amino acids and proteins, Fatty acids(saturated and unsaturated) and lipids (sphingo lipids,sterols and phospholipids). Structure of nitrogenous bases, nucleotides and nucleic acids.

UNIT-4 BIOCHEMICAL TECHNIQUES

Hydrgen ion concentration in biological fluids. PH measurement. Types of buffers and their uses in biological reactions. Principles and application of colorimetry and chromatography (paper and thin layer). Principles and applications of Electrophoretic techniques.

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harly, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker,j. Broch Biology of Microorganism, 9th Edition, MacMillan Press, England.
4. Dube, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.

5. Voet, D Biochemistry WCB. Mc GrawHill, Iowa.
6. N.J. Dimmock, A.J Easton, and K.N. Leppard. Introduction to Modern Virology. Blackwell Publishing.

CHOICE BASED CREDIT SYSTEM (CBCS)-2016-17

B.Sc I year –II-semester Practical Syllabus

GENERAL MICROBIOLOGY-II

2 HPW- CREDITS-1

- Preparation of culture media: Solid/Liquid.
- Sterilization techniques: Autoclave, Hot air oven and filtration.
- Enumeration of bacterial numbers by serial dilution and plating.
- Isolation of pure cultures by streak, spread and pour plate techniques
- Preservation of microbial cultures- Slant, Stab, Sand cultures, mineral oil overlay and glycerol stocks
- Qualitative tests for carbohydrates and amino acids
- Paper chromatography-separation of sugars/amino acids
- Determination of pH
- Preparation of Buffers
- Colorimetry- Principles, laws, determination of absorption maximum.

References:

1. Experiments in Microbiology by K.R. Aneja.
2. Gopal Reddy.M., Reddy. M.N., Sai Gopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
3. Dubey, R.C. and Maheshwari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.
5. Mahy, B.W.J. and Kangro, H.O. Virology – Methods Manual Academic Press, USA.
6. Burleson et al Virology – A Laboratory Manual. Academic Press, USA.

SKILL ENHANCEMENT COURSE-I (SEC-I)

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 301, SEC-1**

B.Sc II year: 3rd semester

Title: HAEMATOLOGY **2 HPW-credits-2**

Unit-I:

Composition of blood (RBC, WBC, Plasma, Serum, Platelet cells), Staining of blood films. Total blood picture, Differential count. Blood grouping, Rh-typing, Blood hemoglobin. Anti-coagulants.

Unit-II

Blood transfusion (Principles). Blood preservation. Precautions of handling blood and it's products. Hemophilia. Anaemia. General account on spread of diseases through blood and blood products. ESR.

References:

1. Kawthalkar. Essentials of Haematology Paperback – 2013
2. Lokwani. D.P. The ABC of CBC Interpretation of Complete Blood Count and HistogramsPaperback – 2013
3. Ramnik Sood . Medical Laboratory technology Methods and Interpretation Jaypee Publications.
4. Shirish M Kawthalkar. Essential Of Hematology. Jaypee Publications.

Dept. Microbiology , Osmania University
Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)
With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 304, DSC-1C**

B.Sc II year: 3rd Semester

Title: Microbial Physiology and Enzymology **4 HPW-credits-4**

UNIT-1: MICROBIAL NUTRITION AND PHOTOSYNTHESIS -
Microbial Nutrition – Nutritional Requirement, Uptake of nuitrients by cell. Nutritional group of microorganism – Autotrophs , Heterotrophs , Mixotrophs , Methylotrophs. Photosynthetic Apparatus in Prokaryotes. Outline of oxygenic and Anoxygenic photosynthesis in bacteria.

UNIT-2: MICROBIAL GROWTH -
Growth media – Synthetic , Non Synthetic , Selective , Enrichment and Differential media. Microbial growth – Different Phases of Growth in Batch culture. Factors Influencing microbial growth.
Synchronous, Continuous , Biphasic Growth. Methods for measuring microbial growth – Direct Microscopic , Viable count , Turbidometry , Biomass

UNIT-3- MICROBIAL METBOLISM-
Aerobic : Respiration – Glycolysis , HMP Pathway , ED Pathway , TCA Cycle and Anaplerotic reaction, Electron Transport , Oxidative and substrate level phosphorylation.
ß-Oxidation of Fatty acids. Glyoxylate cycle , Anaerobic respiration (Nitrate , Sulphate respiration)
Fermentation – Common Microbial fermentation with special reference alcohol and lactic acid fermentation.

UNIT-4-ENZYMES-
Properties and Classifications of Enzymes , Enzymes unit. Biocatalysis – Induced fit and Lock & Key Model , Coenzymes , Co-Factors. Factors effecting catalytic reaction activity of enzymes. Inhibition of Enzymes activity – Competitive non Competitive , Un competitive and Allosteric

References:

1. Gottschalk, G. (1986). Bacterial Metabolism, Springer-Verlag, New-York.
2. Caldwell, D.R. (1995). Microbial Physiology and Metabolism, W.C. Brown Publications, Iowa, USA.
3. Moat, A.G. and Foster, J.W. (1995). Microbial Physiology, John-Wiley, New York.
4. White, D. (1995). The Physiology and Biochemistry of Prokaryotes, Oxford University Press, New York.
5. Reddy, S.R. and Reddy, S.M. (2004). Microbial Physiology, Scientific Publishers, Jodhpur, India.
6. Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). Principles of Biochemistry, 2nd Edition, CBS Publishers and Distributors, New Delhi.
7. Elliot, W.H. and Elliot, D.C. (2001). Biochemistry and Molecular Biology, 2nd Edition, Oxford University Press, U.S.A.

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

II Year B.Sc III SEMESTER MICROBIOLOGY -2016-17

Title: MICROBIAL PHYSIOLOGY & ENZYMOLOGY

Practical syllabus

2HPW- credits-1

- Preparation of media for culturing autotrophic and heterotrophic microorganisms – algal medium, mineral salts medium , nutrient agar medium, McConkey agar and Blood agar.
- Setting and observation of Winogradsky column
- Methods of pure culture isolation
- Enrichment culturing and isolation of phototrophs and chemoautotrophs.
- Determination of viable count of bacteria.
- Turbidometric measurement of bacterial growth.
- Factors affecting bacterial growth – pH, temperature, salts.
- Starch hydrolysis, Catalase test and sugar fermentation test

References:

1. Wilson, K. and Walker, J. (1994). Practical Biochemistry. 4th Edition, Cambridge University Press, England.
2. Sawhney, S.K. and Singh, R. (2000). Introductory Practical Biochemistry, Narosa Publishing House, New Delhi.
3. Dubey, R.C. and Maheswari, D.K. (2002). Practical Microbiology. S. Chand & Co. Ltd., New Delhi.
4. Plummer, D.T. (1988). An Introduction to Practical Biochemistry. 3rd Edition, Tata Mc GrawHill, New Delhi.
5. Reddy, S.M. and Reddy, S.R. (1998). Microbiology – Practical Manual, 3rd Edition, Sri Padmavathi Publications, Hyderabad.
6. Jaya Babu (2006). Practical Manual on Microbial Metabolisms and General Microbiology. Kalyani Publishers, New Delhi.
7. Sashidhara Rao, B. and Deshpande, V. (2007). Experimental Biochemistry: A student Companion. I.K. International Pvt. Ltd.
8. Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). Laboratory Experiments in Microbiology, . Himalaya Publishing House, Mumbai.

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 404, DSC-ID**

B.Sc II year: 4th semester

Title: Microbial Genetics and Molecular Biology **4 HPW-credits-4**

UNIT-1 : MICROBIAL GENETICS

Fundamentals of Genetics – Medellin laws , Alleles , Crossing over and Linkage
DNA and RNA as Genetic material
Structure of DNA – Watson and Crick model
Extra Chromosomal genetic elements – Plasmids and Transposons
Replication of DNA- Semi Conservative mechanism

UNIT-2: MUTATIONS

Mutations – Spontaneous and induced , Base pair changes , Frameshift , Deletion , Inversion , Tandem duplication , Insertion
Various physical and chemical mutagens
Outline of DNA Damage and repair mechanism
Brief account on gene transfer among bacteria – Transformation , Transduction and Conjugation

UNIT-3-GENE EXPRESSION

Concept of gene – Muton , Recon and Cistron.
One gene – One enzyme , One gene – One Poly peptide , One gene – One product hypothesis
Types of RNA and their function
Outline of RNA Biosynthesis in Prokaryotes
Genetic Code , Structure of Ribosomes and Brief account on Protein synthesis
Type of Genes – Structural , Constitutive , Regulatory
Operon Concept. Regulation of Genes expression in bacteria – Lac Operon

UNIT-4-RECOMBIANT DNA TECHNOLOGY

Basic principles of genetic engineering –Restriction endonucleases ,
DNA polymerases and Ligases, vectors
Outline of gene cloning methods.
Genomic and c DNA libraries
General account on application of genetic engineering in industry , agriculture and medicine.

References:

1. Freifelder, D. (1997). Essentials of Molecular Biology. Narosa Publishing House, New Delhi.
2. Crueger, W. and Crueger, A. (2000). Biotechnology: A Text Book of Industrial Microbiology, Prentice-Hall of India Pvt. Ltd., New Delhi.
3. Glick, B.P. and Pasternack, J. (1998). Molecular Biotechnology, ASM Press, Washington D.C., USA.
4. Freifelder, D. (1990). Microbial Genetics. Narosa Publishing House, New Delhi.
5. Strickberger, M.W. (1967). Genetics. Oxford & IBH, New Delhi.
6. Sinnot E.W., L.C. Dunn and T. Dobzhansky. (1958). Principles of Genetics. 5th Edition. McGraw Hill, New York.
7. Glazer, A.N. and Nikaido, H. (1995). Microbial Biotechnology – Fundamentals of Applied Microbiology, W.H. Freeman and company, New York.
8. Old, R.W. and Primrose, S.B. (1994) Principles of Gene Manipulation, Blackwell Science Publication, New York.
9. Verma, P.S. and Agarwal, V.K. (2004). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co. Ltd., New Delhi.

II Year B.Sc IV SEMESTER; MICROBIOLOGY -2016-17
CHOICE BASED CREDIT SYSTEM (CBCS)

Microbial Genetics and Molecular biology

Practical syllabus

2 HPW-Credits-1

- Colorimetric estimation of proteins by Biuret / Lowery method.
- Colorimetric estimation of DNA by Diphenyl amine method.
- Colorimetric estimation of RNA by Orcinol method
- Extraction of genomic DNA
- Agarose gel Electrophoresis
- Problems related to DNA and RNA characteristics, Transcription and Translation

References:

1. Wilson, K. and Walker, J. (1994). Practical Biochemistry. 4th Edition, Cambridge University Press, England.
2. Sawhney, S.K. and Singh, R. (2000). Introductory Practical Biochemistry, Narosa Publishing House, New Delhi.
3. Dubey, R.C. and Maheswari, D.K. (2002). Practical Microbiology. S. Chand & Co. Ltd., New Delhi.
4. Plummer, D.T. (1988). An Introduction to Practical Biochemistry. 3rd Edition, Tata Mc GrawHill, New Delhi.
5. Reddy, S.M. and Reddy, S.R. (1998). Microbiology – Practical Manual, 3rd Edition, Sri Padmavathi Publications, Hyderabad.
6. Jaya Babu (2006). Practical Manual on Microbial Metabolisms and General Microbiology. Kalyani Publishers, New Delhi.
7. Sashidhara Rao, B. and Deshpande, V. (2007). Experimental Biochemistry: A student Companion. I.K. International Pvt. Ltd.
8. Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). Laboratory Experiments in Microbiology, . Himalaya Publishing House, Mumbai.

SKILL ENHANCEMENT COURSE-II (SEC-2)

Dept.of Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 401, SEC-2**

B.Sc II year: 4th semester

Title: FOOD ADULTERATION **2 HPW-credits-2**

Unit-I

Definition and Introduction to food adulteration.
Types of Food Adulteration
Common Food adulterants
Causes of Food adulteration
Analysis of food

Unit-II

Effects of Food Adulteration
Prevention of Food adulteration
Detection of Common food Adulterants.
Food Adulteration act-1954

Reference:

1. Jesse Park Battershall. Food adulteration and its detection . Published by Book on Demand, Miami, 2015
2. R. B. Sethi's Prevention of food adulteration act
3. Dr. Sheela.S. Prevention of Food Adulteration

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

Syllabus for B.Sc Microbiology Code: BS 503, DSC-1E

CHOICE BASED CREDIT SYSTEM---2015-16

B.Sc III year, SEMESTER-V

THEORY

Title: APPLIED MICROBIOLOGY 3 HPW- Credits-3

UNIT-1 - Microbes in Agriculture

Physical and chemical characteristics of soil
Rhizosphere and phyllosphere
Plant growth promoting microorganisms
(*mycorrhizae,rhizobium,azospirillum,azatobacter,cynobacteria,frankia* and phosphate solubilising microorganisms)
Biofertilizers- *Rhizobium & Cyanobacteria*

UNIT-2 Plant Diseases & Biocontrol

Concept of disease in plant
Symptoms of plant diseases caused by fungi (ground nut rust),bacteria (angular Leaf spot cotton) and viruses (tomato leaf curl) Principles of plant disease control
Biological control of plant diseases, Biopesticides-*Bacillus thuringenisis*, Nuclear polyhedrosis virus (NPV), *Trichoderma*

UNIT-3 Microbial ecology

Outline classification of nitrogen fixation (symbiotic,non symbiotic)
Microorganisms of environment soil,water ,air
Role of microorganisms in nutrient cycles (carbon,nitrogen,sulphur)
Microbial interaction-mutalism, commensalism, antagonism, competition, parasitism, predation

UNIT-4 Role of microbes in environmental Pollution

Microbiology of potable and polluted water. *E.coli* and *Streptococcus faecalis* as indicators of water pollution. Sanitation of potable water. Sewage treatment (primary, secondary and tertiary)
Solid waste disposal-sanitary landfills composting
Outline of biodegradation of environmental pollutants –pesticides

References:

1. Alexander, M. (1985). Introduction to Soil Microbiology, 3rd Edition. Wiley Eastern Ltd., New Delhi.
2. Paul, E.A. and Clark, F.E. (1989). Soil Microbiology and Biochemistry, Academic Press, USA.
3. Subba Rao, N.S. (1993). Biofertilizers in Agriculture and Forestry, 3rd Edition Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

4. Rangaswami, G. and Bhagyaraj, D.J. (2001). Agricultural Microbiology, 2nd Edition, Prentice Hall of India, New Delhi.
5. Atlas, R.M. and Bartha, R. (1998). Microbial Ecology - Fundamentals and Applications, Addison Wesley Longman, Inc., USA
6. Lynch, J.M. and Poole, N.J. (1979). Microbial Ecology – A Conceptual Approach, Blackwell Scientific Publications, USA
7. Subba Rao, N.S. (1999). Soil Microorganisms and Plant Growth. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Reddy, S.R. and Singara Charya, M.A. (2007). A Text Book of Microbiology - Applied Microbiology. Himalaya Publishing House, Mumbai.
9. Singh, R.P. (2007). Applied Microbiology. Kalyani Publishers, New Delhi.

B.Sc III year –V-semester Practical Syllabus-2016-17

APPLIED MICROBIOLOGY

Practical syllabus

2 HPW-CREDITS-1

- Isolation &enumeration of Rhizosphere microorganisms.
- Isolation &identification of Phyllosphere microorganisms.
- Study of root nodules of leguminous plants.
- Isolation of Rhizobium from leguminous root nodules.
- Isolation of *Azospiriullum* and *Azotobacter*.
- Staining & observation of VAM fungi.
- Isolation of microorganisms in air by solid/liquid impingement method.
- Plant diseases-Rust, Smuts, Powdery mildews, Tikka disease of ground nut, citrus canker,bhendi yellow vein mosaic, tomato leaf curl ,little leaf of brinjal.
- Microbial quality testing of water by coliform test
- Determination of Biological oxygen demand (BOD) of water

References:

1. Aneja, K.R. (2001). Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom Production Technology, 3rd Edition, New Age International (P) Ltd., New Delhi.
2. Dubey, R.C. and Maheswari, D.K. (2002). Practical Microbiology, S. Chand & Co., New Delhi.
3. Burns, R.G. and Slater, J.H. (1982). Experimental Microbiology and Ecology. Blackwell Scientific Publications, USA.
4. Peppler, I.L. and Gerba, C.P. (2004). Environmental Microbiology – A Laboratory Manual. Academic Press. New York.
5. Gupte, S. (1995). Practical Microbiology. Jaypee Brothers Medical Publishers Pvt. Ltd.
6. Kannan, N. (2003). Hand Book of Laboratory Culture Medias, Reagents, Stains and Buffers. Panima Publishing Co., New Delhi.
7. Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). Laboratory Experiments in Microbiology, 2nd edition. Himalaya Publishing House, Mumbai.
8. Reddy, S.M. and Reddy, S.R. (1998). Microbiology – Practical Manual, 3rd Edition, Sri Padmavathi Publications, Hyderabad

SKILL ENHANCEMENT COURSE-III (SEC-3)

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 501, SEC-3**

B.Sc III year: 5th semester

Title: Mushroom cultivation **2 HPW-credits-2**

Unit-1

- Introduction to mushroom cultivation
- Importance and history of mushroom cultivation in India
- Global status of mushroom production
- Food value of mushroom

Unit-2

- Steps in mushroom cultivation
  a. Selection of site and types of mushroom
  b. Mushroom farm structure, design layout
  c. Principle and techniques of compost and composting
  d. Principle of spawn production
  e. Casing and crop production
  f. Harvesting and marketing
- Pest and pathogens of mushrooms
- Post harvest handling and preservation of mushrooms

Reference:

1. Mushroom cultivation in india by B.C.Suman and V.P. Sharma Published by Daya publishing house New Delhi.
2. Mushrooms Cultivation, Marketing and Consumption Manjit Singh Bhuvnesh Vijay Shwet Kamal G.C. Wakchaure Directorate of Mushroom Research (Indian Council of Agricultural Research) Chambaghat, Solan –173213 (HP)

GENERIC ELECTIVE-I (GE-1)

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 502, GE-1**

B.Sc III year: 5th semester

Title: Microbiology and Human health **2 HPW-credits-2**

Unit-1:

Historic developments of Microbiology, contributions of Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch.

Types of microorganisms, Morphological characteristics of bacteria, Staining, cultivation methods of bacteria, Culture Media.

Unit-II:

Microorganisms related to human health. Normal microbial flora, Pathogenic microbes and their diseases - typhoid, T.B, syphilis, AIDS, Influenza.

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harly, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker,j. Broch Biology of Microorganism, 9th Edition, MacMillan Press, England.
4. Dube, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.
5. Ananthanarayan and Panikar. Text book of Microbiology. Universities Press.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-IE) - A

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 506, DSE-1E-A**

B.Sc III year: 5th semester

Title: IMMUNOLOGY **3 HPW-credits-3**

UNIT-1 HISTORY OF IMMUNOLOGY AND IMMUNITY

Development of immunology.
Antigen –types,chemical nature,Antigenic determinants,Haptens
Factors affecting antigenicity.
Antibodies-Basic structure,Types,properties and functions of immunoglobulins.
Complement, components of complement and activation of complement.
Types of immunity-Innate, Acquired; Active and passive, humoral and cell mediated immunity.

UNIT-2 CELLS AND ORGANS OF IMMUNE SYSTEM

Primary and secondary organs of immune system- Thymus, bursa of fabrica, bone marrow, spleen and lymphnodes, mucus associated lymphoid tissue (MALT).
Cells of immune system, Identification and functions of B &T Lymphocytes, Null cells, Monocytes. Macrophages, Neutrophills, Basophills & Eosinophills.

UNIT-3 ANTIGENS AND ANTIBODY REACTION

Components of complement and activation of complement.
Types of antigens-Antibody reactions- Agglutination, blood groups, precipitation, neutralization, complement fixation.
Labeled antibody based techniques-ELISA, RIA and Immunoflurosence

UNIT-4 IMMUNOLOGICAL PROCESSES AND APPLICATIONS

Types of hypersensitivity immediate and delayed.
Autoimmunity and its significance.
Polyclonal and monoclonal antibodies production and application
Vaccines-Natural and recombinants

References:

1. Sudha Gangal. Shubhangi Sontakke. Text book of Basic and Clinical Immunology, Universitie Press.
2. Tizard, I.R. (1995). Immunology : An Introduction, WB Saunders, Philadelphia, USA.
3. Riott, I.M. (1998). Essentials of Immunology, ELBS and Black Well Scientific Publishers, England.
4. Goldsby, Kindt, T.J. and Osborne, B.A. (2004). Kuby Immunology, 6th Edition, W.H.Freeman and Company, New York.
5. Lydyard, P.M., Whelan, A. and Fanger, M.W. (2000). Instant Notes in Immunology, Viva Books Pvt. Ltd., New Delhi.
6. Chakraborty, B. (1998). A Text Book of Microbiology, New Central Book Agency (P) Ltd, Calcutta, India. 12
7. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
8. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
9. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
10. Shetty, N. (1994). Imuunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
11. Singh, R.P. (2007). Immunology and Medical Microbiology. Kalyani Publishers, New Delhi.
12. Reddy, S.R. and Reddy, K.R. (2006). A Text Book of Microbiology - Immunology and Medical Microbiology, Himalaya Publishing House, Mumbai.
13. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-IE) - A

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology Practicals

B.Sc III year: 5th semester

Title: IMMUNOLOGY **2HPW-credits-1**

- Determination of blood grouping and RH typing.
- Total count of RBC and WBC.
- Differential count of blood leucocytes.
- Estimation of blood Haemoglobin.
- WIDAL test for typhoid(slide test)by Ag-Ab reactions
- VDRL test for syphilis (slide test) by Ag-Ab reactions.
- Ouchterlony double diffusion test
- Separation of serum and plasma

References:

1. Talwar, G.P. and Gupta, S.K. (1992). A Hand Book of Practical and Clinical Immunology. CBS Publications, New Delhi.
2. Baren, E.J. (1994). Bailey and Scott's Diagnostic Microbiology, 9th Edition, Mosby Publishers.
3. Dubey, R.C. and Maheswari, D.K. (2002). Practical Microbiology, S. Chand & Co., New Delhi.13
4. Samuel, K.M. (Ed.) (1989). Notes on Clinical Lab Techniques, M.K.G. Iyyer & Son Publishers, Chennai.
5. Wadher, B.J. and Reddy, G.L.B. (1995). Manual of Diagnostic Microbiology, Himalaya Publishing House, Mumbai.
6. Dey, N.C., Dey, T.K., Dey, M. and Sinha, D. (1998). Practical Microbiology, Protozoology, and Parasitology. New Central Book Agency (P) Ltd. Calcutta.
7. Mukherjee, K.L. (1996). Medical Laboratory Technology. Vol II. Tata Mc GrawHill Publishing Co. Ltd., New Delhi.
8. Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). Laboratory Experiments in Microbiology, 2nd edition. Himalaya Publishing House, Mumbai.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-1E) - B

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 506, DSE-1E-B**

B.Sc III year: 5th semester

Title: PHARMACEUTICAL MICROBIOLOGY **3 HPW-credits-3**

UNIT-I:

Principles of chemotherapy – Clinical and lab diagnosis, sensitivity testing, choice of drug, dosage, route of administration, combined/mixed multi drug therapy, control of antibiotic/drug usage.

Unit-II:
History of chemotherapy – plants and arsenicals as therapeutics, Paul Ehrlich and his contributions, selective toxicity and target sites of drug action in microbes.
Over view of development of synthetic drugs.
Antibiotics - The origin, development and definition of antibiotics as drugs, types of antibiotics and their classification.

UNIT-III
Mode of action of important drugs – Cell wall inhibitors (Betalactam – eg. Penicillin), membrane inhibitors (polymyxins), macromolecular synthesis inhibitors (streptomycin), antifungal antibiotics (nystatin)

UNIT-IV:
Anti Microbial Assays: Assay for growth inhibiting substances – Assay for non-medicinal antimicrobials (Phenol coefficient/RWC). Drug sensitivity testing methods and their importance. Assay for antibiotics – Determination of MIC, the liquid tube assay, solid agar tube assay, agar plate assay (disc diffusion, agar well and cylinders cup method).

References:

1. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
2. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Imuunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.

6. Singh, R.P. (2007). Immunology and Medical Microbiology. Kalyani Publishers, New Delhi.
7. Reddy, S.R. and Reddy, K.R. (2006). A Text Book of Microbiology - Immunology and Medical Microbiology, Himalaya Publishing House, Mumbai.
8. Lydyard, P.M., Whelan, A. and Fanger, M.W. (2000). Instant Notes in Immunology, Viva Books Pvt. Ltd., New Delhi.
9. Chakraborty, B. (1998). A Text Book of Microbiology, New Central Book Agency (P) Ltd, Calcutta, India. 12

DISCIPLINE SPECIFIC ELECTIVE-(DSE-2E) - B

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology
B.Sc III year: 5th semester

PRACTICALS

Title: PHARMACEUTICAL MICROBIOLOGY 2HPW-credits-1

- Tests for disinfectants (Phenol coefficient)
- Determination of antibacterial spectrum of drugs/antibiotics Chemical assays for antimicrobial drugs
- Testing for antibiotic/drug sensitivity/resistance.
- Determination of MIC value for antimicrobial chemicals
- Microbiological assays for antibiotics (Liquid tube assay, agar tube assay, agar well assays)

References:

1. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
2. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Imuunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
6. Singh, R.P. (2007). Immunology and Medical Microbiology. Kalyani Publishers, New Delhi.
7. Reddy, S.R. and Reddy, K.R. (2006). A Text Book of Microbiology - Immunology and Medical Microbiology, Himalaya Publishing House, Mumbai.
8. Lydyard, P.M., Whelan, A. and Fanger, M.W. (2000). Instant Notes in Immunology, Viva Books Pvt. Ltd., New Delhi.
9. Chakraborty, B. (1998). A Text Book of Microbiology, New Central Book Agency (P) Ltd, Calcutta, India. 12

DISCIPLINE SPECIFIC ELECTIVE-(DSC-1F)

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 603, DSC-1F**

B.Sc III year: 6th semester

Title: MEDICAL MICROBIOLOGY **3HPW-credits-3**

UNIT-I: INTRODUCTION TO MEDICAL MICROBIOLOGY

Histroy of medical Microbiology.
Normal flora of human body. Definition of infection.
Non specific defence mechanism- Mechanical barriers.
Antibacterial substance- Lysozyme, Complement, Properdin, Antiviral substances, Phagocytosis.
Host pathogen interactions. Bacterial toxins, Virulence and Attenuation.

UNIT-II- DIAGNOSTICAND THERAPEUTICAL MICROBIOLOGY

General principles of diagnostic microbiology
Collections, transport & processing of clinical samples.
General methods of lab diagnosis-cultural, biochemical, serological & molecular methods
Test for antimicrobial susceptibility.
Elements of chemotherapy-Therapeutic drugs, Mode of action of Pencillin & sulpha drugs & their clinical use. Drug resistance.
Antiviral agents- Interferon, Base analogues.
Preventive control of diseases- active & passive immunization.

UNIT-III MEDICAL BACTERIOLOGY

General account of following diseases, casual organisms, pathogenesis, epidomology, diagnosis, prevention & control
Air born diseases-Tuberculosis.
Food & waterborn diseases- Cholera, Typhoid.
Contact diseases- Syphilis, Gonorrhoea. General account of Nosocomial infections.
Zoonotic diseases - Anthrax.

UNIT-IV MEDICAL VIROLOGY AND PARASITOLOGY

General account of following diseases, casual organisms, pathogenesis,epidomology,diagnosis,prevention &control
Air born diseases- Influenza.
Food&waterborn diseases- Hepatitis-A, Poliomyelitis, Amoebiosis.

Insect born diseases-Malaria, Filariasis, Dengue fever.
Zoonotic diseases -Rabies. Blood born diseases- Serum hepatitis, AIDS.

References:

1. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
2. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Imuunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
6. Singh, R.P. (2007). Immunology and Medical Microbiology. Kalyani Publishers, New Delhi.

DISCIPLINE SPECIFIC ELECTIVE-(DSC-IF)

Dept.of Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology

B.Sc III year: 6th semester

PRACTICALS

Title: MEDICAL MICROBIOLOGY **2 HPW-credits-1**

- Biochemical tests for identification members of enterobacteriacea.
- IMVIC test-indole test,methyl red test,voages proskeures test,citrate utilization test.
- Oxidase test.
- Catalase test.
- Study of medically important microorganisms-Ecoli, Klebsiella, Staphylococcus, Psedomonus.
- Test for disinfectant (Phenol coefficient)
- Antibiotic sensitivity testing – Disc diffusion method

Slides

Mycobacterium
Candida albicans
Entamoeba histolytica
plasmodium

References:

1. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
2. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Imuunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.

SKILL ENHANCEMENT COURSE-IV (SEC-4)

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 601, SEC-4**

B.Sc III year: 6th semester

Title: HOSPITAL WASTE MANAGEMENT **2 HPW-credits-2**

Unit-I

- Types of Hospital waste and its Management.
- General , Hazardous , Health care waste, Infectious waste, Genotoxic Waste.
- Specification of Materials and colour coding for Identification.
- Biomedical waste management and handling rules.
- Guidelines of Central Pollution Contreol Board (CPCB).
- Safe disposal of the Radioactive waste rules.

Unit-II

- Basic steps in health care waste management- Segregation, Decontamination/Disinfection, Storage and Transportation.
- Mechnical and Chemical Treatment of the Waste.
- Liquid waste treatment-Autoclaving, Incrimination.
- Waste minimization- Recyclinf and reusing.
- Health and safety practices.
- Estimation of various items of waste management.

References:

1. B.D. Acharya, Meeta Singh. Hospital Waste Management and Its Monitoring.

GENERIC ELECTIVE-II (GE-2)

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 602, GE-2**

B.Sc III year: 6th semester

Title: CONTAGIOUS DISEASES AND IMMUNISATION **2 HPW-credits-2**

Unit-1: Contagious diseases

Types of Infections,

Sources of infections,

Mode of infections.

Bacterial diseases: Diphtheria, woophing cough, Gonorrhoea,

Viral Diseases: HSV, HIV, HBV.

Unit-2: Immunization

Immunity,

Types of Immunity.

Immunization,

Types of immunization,

Vaccines- Live and killed vaccines,

Vaccination schedule.

References:

1. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
2. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Imuunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
6. Singh, R.P. (2007). Immunology and Medical Microbiology. Kalyani Publishers, New Delhi.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-IF) - A

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 606, DSE-1F-A**

B.Sc III year: 6th semester

Title: FOOD MICROBIOLOGY **3 HPW-credits-3**

UNIT-I

Microorganisms of food materials and their sources.
Spoilage of different food materials (Fruits, vegetables, Meat,Fish and Canned foods).
Food born diseases (Salmonellosis & Shigellosis) and their detection.

UNIT-II

Microbiological production of fermented foods- Bread, Cheese ,Yoghurt.
Biochemical activities of microbes in milk. Microorganisms as food – SCP, Edible mushrooms (white button oyster, Paddy straw). Concepts of Probiotics.

Unit-3

Methods of Food preservation, food poisoning (Staphylococci, C. botulinum)
Food intoxication.

UNIT-4

Microbiology of potable and polluted water
E.coli and streptococcus of water pollution Sanitation of potable water
Sewage treatment (primary,secondary And tertiary
Solid waste disposal-sanitary landfills composting
Outline of biodegradtion of environmental pollution –pesticides

References:

1. Stanbury, P.F., Whitaker, A. and Hall, S.J. (1997). Principles of Fermentation Technology, Aditya Books (P) Ltd. New Delhi.
2. Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). Food Microbiology: Fundamentals and Frontiers. ASM Press, Washington D.C., USA.
3. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology, Mc Graw-Hill, New York.
4. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York.
15
5. Ray, B. (1996). Fundamentals of Food Microbiology, CRC Press, USA.
6. Rangaswami, G. and Bhagyaraj, D.J. (2001). Agricultural Microbiology, 2nd Edition, Prentice Hall of India, New Delhi.
7. Atlas, R.M. and Bartha, R. (1998). Microbial Ecology - Fundamentals and Applications, Addison Wesley Longman, Inc., USA
8. Paul, E.A. and Clark, F.E. (1989). Soil Microbiology and Biochemistry, Academic Press, USA.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-IF) - A

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology Practicals

B.Sc III year: 6th semester

PRACTICALS

Title: FOOD MICROBIOLOGY 2HPW-credits-1

- Isolation of microorganisms by crowded plate technique.
- Isolation of Amylase producing organisms.
- Isolation of microorganisms in air by petriplate exposure method.
- Determination of microbiological quality of milk by MBRT method.
- Isolation of fungi & bacteria from spoiled fruits & vegetables.
- Microbiological examination of water by coliform test.
- Determination of biological oxygen demand.
- Spoiled foods-bacterial soft rot,bread& bakery products,milk& milk products, eggs, meat and meat products, canned foods, cheese, yoghurt.
- Bacterial slides- Escherichia coli, Bacillus, Lactobacillus, Azospirillum, Azotobacter, Rhizobium, Yeast, Rhizopus, Penicillium

References:

1. Stanbury, P.F., Whitaker, A. and Hall, S.J. (1997). Principles of Fermentation Technology, Aditya Books (P) Ltd. New Delhi.
2. Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). Food Microbiology: Fundamentals and Frontiers. ASM Press, Washington D.C., USA.
3. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology, Mc Graw-Hill, New York.
4. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York. 15
5. Ray, B. (1996). Fundamentals of Food Microbiology, CRC Press, USA.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-IF) - B

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology **Code: BS 606,DSE-1F-B**

B.Sc III year: 6th semester

Title: INDUSTRIAL MICROBIOLOGY **3 HPW-credits-3**

UNIT-I

Microorganisms of industrial importance-Yeast , Molds, Bacteria, Actinomycetes. Screening and isolation of industrially useful microbes. Methods of Screening and strain improvement.

UNIT-II

Types of fermentation- Aerobic, anaerobic , batch, continuous, submerged, surface, solid state Dual and multiple.

Design of stirred tank reactor fermentor,

UNIT-III

Inoculation media and fermentation media

Raw material used in fermentation industry and their processing

Downstream processing

UNIT-IV

Microbial products

Industrial production of alcohol (ethyl alcohol), Beverages (beer), Amylases, Antibiotics(pencillin) Aminoacids(glutamic acid), Organic acid(citric acid.) VitaminB12, Biofuels (biogas-methane)

References:

1. Patel, A.H. (1984). Industrial Microbiology, Mac Milan India Ltd., Hyderabad.
2. Cassida, L.E. (1968). Industrial Microbilogy, Wiley Eastern Ltd. & New Age International Ltd., New Delhi.
3. Crueger, W. and Crueger, A. (2000). Biotechnology – A Text Book of Industrial Microbiology, Panima Publishing Corporation, New Delhi
4. Reedy, G. (Ed.) (1987). Prescott & Dunn's Industrial Microbiology, 4th Edition, CBS Publishers & Distributors, New Delhi.
5. Reddy, S.R. and Singara Charya, M.A. (2007). A Text Book of Microbiology - Applied Microbiology. Himalaya Publishing House, Mumbai.
6. Singh, R.P. (2007). Applied Microbiology. Kalyani Publishers, New Delhi.
7. Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology and Biotechnology, ASM Press, Washington, D.C., USA.

DISCIPLINE SPECIFIC ELECTIVE-(DSE-IF) - B

Dept. Microbiology: Osmania University

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)

With effect from 2016-17

Syllabus for B.Sc Microbiology

B.Sc III year: 6th semester

Practicals

Title: INDUSTRIAL MICROBIOLOGY 2HPW-credits-1

- Screening for amylase producing microorganisms
- Screening for organic acid producing microorganisms
- Production and Estimation of Ethanol by potassium dichromate method.
- Production and Estimation of Citric acid by titrimetry method.
- Estimation of streptomycin.
- Bacterial slides- Bacillus, Lactobacillus, Yeast, Aspergillus, Pencillium

References:

1. Patel, A.H. (1984). Industrial Microbiology, Mac Milan India Ltd., Hyderabad.
2. Cassida, L.E. (1968). Industrial Microbilogy, Wiley Eastern Ltd. & New Age International Ltd., New Delhi.
3. Crueger, W. and Crueger, A. (2000). Biotechnology – A Text Book of Industrial Microbiology, Panima Publishing Corporation, New Delhi
4. Reedy, G. (Ed.) (1987). Prescott & Dunn's Industrial Microbiology, 4th Edition, CBS Publishers & Distributors, New Delhi.
5. Reddy, S.R. and Singara Charya, M.A. (2007). A Text Book of Microbiology - Applied Microbiology. Himalaya Publishing House, Mumbai.
6. Singh, R.P. (2007). Applied Microbiology. Kalyani Publishers, New Delhi.
7. Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology and Biotechnology, ASM Press, Washington, D.C., USA.