

**Dept.of Microbiology: Telangana 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: 104, DSC- 1A**

**B.Sc I year: 1<sup>st</sup> semester**

**Title: General Microbiology -I**

**4HPW -creditd-4**

**UNIT-1: HISTROY OF MICROBIOLOGY-**

Meaning, definition and history of microbiology, Contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert, Koch, Iwanoswky, 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 stains-spore, capsule, flagella. Hanging drop method.

**UNIT-3-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-4-PURE CULTURES 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

**References:**

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

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**Dept. Microbiology:Telangana 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: 2<sup>nd</sup> semester**  
**Title: General Microbiology-II** **4HPW -credits-4**

**UNIT-1: BIOLOGY OF MICROORGANISMS**

Classification of living organisms; Heckel, Whittaker and Carl Woese system of Classification.

Place of microorganisms in the living world.

Differentiation of prokaryotes and eukaryotes.

Prokaryotes—General characteristics of bacteria, Archea bacteria. Rickettsiasis,

Mycoplasma, cyanobacteria and Actinomycetes.

Classification of bacteria as per the second edition of Bergy's manual of systematic bacteriology

**UNIT-2: STRUCTURE OF MICROORGANISMS**

Ultra structure of bacteria cell; invariant components-cell wall, cell membrane, Ribosomes, nucleoid.

Variant components-Capsule, flagella, fimbriae, endospores & storage granules.

General characteristics 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.

**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 (sphingolipids, sterols and phospholipids).

Structure of nitrogenous bases, nucleotides and nucleic acids

**UNIT-4 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

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**Dept. Microbiology , Telangana 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 nutrients by cell. Nutritional group of microorganism – Autotrophs , Heterotrophs , Mixotrophs , Methylootrophs. 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. Synchronous, Continuous , Biphasic Growth

Factors influencing microbial 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.

$\beta$ -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

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**Dept. Microbiology: Telangana 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 – Mendel's 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, Frame shift, 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.  
General account on application of genetic engineering in industry, agriculture and medicine  
Genomic and c DNA libraries

**Dept. Microbiology: Telangana 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, azotobacter, cyanobacteria, frankia* and phosphate solubilising microorganisms)  
Outline classification of nitrogen fixation (symbiotic, non symbiotic)  
Biofertilizers- *Rhizobium & Cyanobacteria*  
Biopesticides-*Bacillus thuringensis*, Nuclear polyhedrosis  
Virus (NPV), *Trichoderma*

**UNIT-2 Plant Diseases & Bio-control**

Concept of disease in plant  
Symptoms of plant diseases caused by fungi, Bacteria, Virus and other organisms  
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,

**UNIT-3 Microbial ecology & Environment**

Microorganisms of environment soil, water, air  
Role of microorganisms in nutrient cycles (carbon, nitrogen, sulphur)  
Microbial interaction-mutualism, commensalism, antagonism, competition, parasitism, predation  
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 and biodegradation of environmental pollutants

## 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.
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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.

**GENERIC ELECTIVE-I (GE-I)****Dept.of Microbiology: Telangana 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: 5<sup>th</sup> semester****Title: Microbiology and Human health****2HPW-creditd-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., Harley, J.P. and Klein Microbiology 5<sup>th</sup> Edition, WCB Mc GrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker,j. Broch Biology of Microorganism, 9<sup>th</sup> 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.

**SKILL ENHANCEMENT COURSE-III (SEC-III)****Dept.of Microbiology: Telangana 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: 5<sup>th</sup> semester****Title: Mushroom cultivation****2HPW-creditd-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)



**DISCIPLINE SPECIFIC ELECTIVE-(DSE-IE) - A**  
**Dept. Microbiology: Telangana 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 AND CELLS AND ORGANS OF IMMUNE SYSTEM**

History and Development of immunology

Types of immunity -Innate, Acquired; Active and passive immunity

Humoral and cell mediated immunity

Primary and secondary organs of immune system- Thymus, bursa of fabrica, bone marrow, Spleen and lymph nodes, mucus associated lymphoid tissue (MALT).

Cells of immune system

Identification and functions of B &T Lymphocytes

**UNIT-2 ANTIGENS, ANTIBODIES AND REACTION**

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 antigens-Antibody reactions- Agglutination, blood groups, precipitation, neutralization, Complement fixation

**UNIT-3 IMMUNOLOGICAL PROCESSES AND APPLICATIONS**

Types of hypersensitivity immediate and delayed

Autoimmunity and its significance

Polyclonal and monoclonal antibodies production and application

Labeled antibody based techniques-ELISA, RIA and Immunofluorescence

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-1E) - B**  
**Dept. Microbiology: Telangana 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**

History of chemotherapy – plants and arsenicals as therapeutics, Paul Ehrlich and his Contributions, selective toxicity and target sites of drug action in microbes  
Principles of chemotherapy – Clinical and lab diagnosis, sensitivity testing,  
Choice of drug, dosage, route of administration, combined/mixed multi drug therapy  
Over view of development of synthetic drugs

**Unit-II**

Antibiotics - The origin, development and definition of antibiotics as drugs, types of antibiotics  
And their classification, Control of antibiotic/drug usage  
Mode of action of important drugs – Cell wall synthesis inhibitors (Penicillin)  
Membrane inhibitors (polymyxins),  
Macromolecular synthesis inhibitors (streptomycin),  
Antifungal antibiotics (Nystatin)

**UNIT-III**

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, and  
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). Immunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
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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

**GENERIC ELECTIVE-I (GE-1)**

**Dept. Microbiology: Telangana 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:**

History and Applications of microbiology  
Types of microorganisms and its Occurrence  
Infections and its control,  
Methods of personnel hygiene

**Unit-II:**

Microorganisms related to human health.  
Normal microbial flora,  
Pathogenic microbes and their diseases  
Prevention and control of epidemic Diseases

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harley, 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-(DSC-1F)**

**Dept. Microbiology: Telangana 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**

History 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.

Antiviral agents- Interferon, Base analogues

Host pathogen interactions

Bacterial toxins, Virulence and Attenuation

**UNIT-II- DIAGNOSTIC AND THERAPEUTICAL MICROBIOLOGY**

General principles of diagnostic microbiology

General methods of lab diagnosis- Collections, transport & processing of clinical samples  
cultural, biochemical, serological & molecular methods

Test for antimicrobial susceptibility.

Elements of chemotherapy- Therapeutic drugs, Mode of action of Penicillin & sulpha drugs.

Drug resistance

**UNIT-III MEDICAL PATHOLOGY**

General account of following diseases, casual organisms, pathogenesis, epidemiology, diagnosis,  
Prevention & control

Air born diseases- Tuberculosis, Influenza

Food & waterborne diseases- Cholera, Typhoid. Hepatitis, Poliomyelitis, Amoebiasis

Contact diseases- Syphilis, Gonorrhoea

Zoonotic diseases – Anthrax, Rabies

Insect born diseases- Malaria, Dengue fever

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). Immunology – 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: Telangana 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),  
Methods of Food preservation  
Food born diseases (Salmonellosis & Shigellosis) and their detection food poisoning)  
Food intoxication (Staphylococci, C. botulinum), Methods for detection of food borne illness

**UNIT-II**

Types of microorganisms in milk, significance, uses and their biochemical activities  
Microbiological production of fermented foods- Bread, Cheese, Yoghurt  
Microorganisms as food – SCP, Edible mushrooms (white button oyster, Paddy straw).  
Concepts of Probiotics

**UNIT-III**

Food Quality: Importance and functions of quality control. Methods of quality assessment of foods-Sampling, qualitative and quantitative microbiological analysis,  
Bacteriological examination of fresh and canned foods, Screening and Enumeration of spoilage microorganisms

References:

1. Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). Food Microbiology: Fundamentals and Frontiers. ASM Press, Washington D.C., USA.
2. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology, Mc Graw-Hill, New York.
3. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York.
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4. Ray, B. (1996). Fundamentals of Food Microbiology, CRC Press, USA.
5. Paul, E.A. and Clark, F.E. (1989). Soil Microbiology and Biochemistry, Academic Press, USA.



**DISCIPLINE SPECIFIC ELECTIVE-(DSE-IF) - B**

**Dept. Microbiology: Telangana 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 strain improvement  
Design of fermentor

**UNIT-II**

Types of fermentation process-Aerobic, anaerobic, batch, continuous, submerged, surface, solid state, Dual and multiple processes  
Fermentation media and sterilization: Raw material used in fermentation industry and their processing

**UNIT-III**

Industrial production of alcohol (ethyl alcohol), Beverages (beer), Amylases,  
Antibiotics (pencillin) Aminoacids(glutamic acid), Organic acid(citric acid.) VitaminB12,  
Biofuels (biogas-methane)  
Immobilization methods – Absorption, covalent linkage, entrapment and cross linkage, types of carriers, advantage and disadvantages

References:

1. Patel, A.H. (1984). Industrial Microbiology, Mac Milan India Ltd., Hyderabad.
2. Cassida, L.E. (1968). Industrial Microbiology, 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.

**SKILL ENHANCEMENT COURSE-I (SEC-I)****Dept.of Microbiology: Telangana 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: 3<sup>rd</sup> semester****Title: HAEMATOLOGY****2HPW-creditd-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 Histograms Paperback – 2013
3. Ramnik Sood . Medical Laboratory technology Methods and Interpretation Jaypee Publications.
4. Shirish M Kawthalkar. Essential Of Hematology. Jaypee Publications.

Dept.of Microbiology: Telangana University

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

*B.sc Third YEAR ,THEORY*

*SEMESTER-V, PAPER-V*

Syllabus for B.Sc Microbiology

*Code: BS 503, DSC-1E*

**CHOICE BASED CREDIT SYSTEM---2015-16**

**Title: APPLIED MICROBIOLOGY**

**3HPW- Credits-3**

**UNIT-1 - Soil Microbiology**

Physical and chemical characteristics of soil

Rhizosphere and phyllosphere

Plant growth promoting microorganisms

(mycorrhizae, rhizobium, azospirillum, azotobacter, cyanobacteria, frankia and phosphate

solubilising microorganisms)

Biofertilizers-Rhizobium

Biopesticides-Bacillus thuringiensis, Nuclear polyhedrosis(NPV), Trichoderma .

**UNIT-2**

Concept of plant diseases

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

**UNIT-3**

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- mutualism, commensalism, antagonism, competition, parasitism, predation

**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 biodegradation of environmental pollution –pesticides

## References:

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

**DISCIPLINE SPECIFIC ELECTIVE-(DSE-IE)----A****Dept.of Microbiology: Telangana 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: 5<sup>th</sup> semester****Title: IMMUNOLOGY****3HPW-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 immunoglobins.

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.

Cells of immune system, Identification and functions of B&amp;T Lymphocytes, Null cells, Monocytes.

Macrophages, Neutrophils, Basophils &amp; Eosinophils.

**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 Immunofluorescence

**UNIT-4 ANTIBODIES AND IMMUNE DISORDERS**

Polyclonal and monoclonal antibodies production and application

Types of hypersensitivity immediate and delayed.

Autoimmunity and its significance.

## 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
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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-1E)----B****Dept.of Microbiology: Telangana 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: 5<sup>th</sup> semester****Title: PHARMACEUTICAL MICROBIOLOGY****3HPW-creditd-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.

Development of synthetic drugs – Sulphanamides, antitubercular compounds, nitrofurans, nalidixic acid, metronidazole group of drugs.

Antibiotics - The origin, development and definition of antibiotics as drugs, types of antibiotics and their classification. Non-medical uses of antibiotics

**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:

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